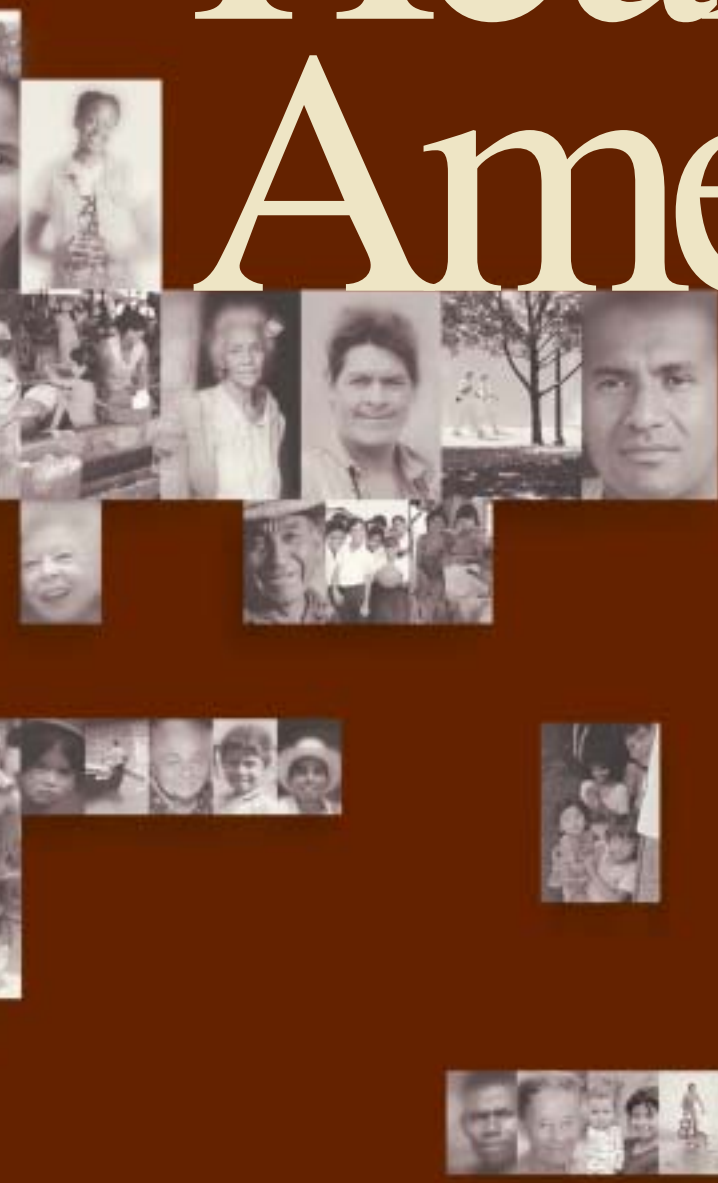


# Health in the Americas



VOLUME I  
2002 Edition



Pan American  
Health  
Organization

# Health in the Americas

2002 Edition  
Volume I



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## **PAN AMERICAN SANITARY BUREAU VALUES, VISION, and MISSION**

The Pan American Sanitary Bureau (PASB), the oldest international health agency in the world, is the Secretariat of the Pan American Health Organization (PAHO). The Bureau is committed to providing technical support and leadership to PAHO Member States as they pursue their goal of Health for All and the values therein. Toward that end, the following values, vision, and mission guide the Bureau's work.

### **VALUES**

#### **Equity**

Striving for fairness and justice by eliminating differences that are unnecessary and avoidable.

#### **Excellence**

Achieving the highest quality in what we do.

#### **Solidarity**

Promoting shared interests and responsibilities and enabling collective efforts to achieve common goals.

#### **Respect**

Embracing the dignity and diversity of individuals, groups, and countries.

#### **Integrity**

Assuring transparent, ethical, and accountable performance.

### **VISION**

The Pan American Sanitary Bureau will be the major catalyst for ensuring that all the peoples of the Americas enjoy optimal health and contribute to the well being of their families and communities.

### **MISSION**

To lead strategic collaborative efforts among member countries and other partners to promote equity in health, to combat disease, and to improve the quality of, and lengthen, the lives of the peoples of the Americas.



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**GENERAL OBSERVATIONS**

Because of rounding, the sum of partial details and percentages in the tables may not coincide with the total.

Explanation of symbols:

- |     |  |
|-----|--|
| ..  | Not applicable                         |
| ... | Data not available                     |
| —   | Zero magnitude                         |
| 0.0 | Greater than zero, but lower than 0.05 |

The term “country” also may be used to designate territories or other areas.





# PREFACE

On this centennial year of the Pan American Health Organization (PAHO), I am pleased to present the quadrennial publication *Health in the Americas*, 2002 edition. With this publication, PAHO continues to respond to Member States' mandate to analyze and disseminate information on health situation and trends in the Region of the Americas. This publication presents, in two volumes, a Regional analysis and an analysis for each of the 47 countries and territories of the health situation and trends in the Americas from 1997 to 2000.

An important feature of this publication is its documentation of the effects of socioeconomic inequalities on the populations' health, particularly the relationship between income distribution and health status, viewed when countries are analyzed in groups. This relationship has an extremely important implication—it is possible to make significant improvements in health not only by promoting economic growth, but also by reducing income gaps within a country.

In broad terms, the Region's health situation can be viewed as a reflection of the dual impact of the demographic changes and shifts in epidemiological profiles. It also mirrors the effectiveness of health policies and the performance of the health systems. Some health problems still remain unresolved and new ones have emerged. Moreover, health problems are unequally distributed across the population and have differential effects on various groups. The health gains that have accumulated at the beginning of the 21st century are, in great measure, a tribute to the capacity of the countries to pursue the goal of "Health for All by the Year 2000," recognizing that it remains valid in the Region of the Americas even today.

This publication offers an updated assessment of overall health conditions in the Americas and, as such, contributes to a better understanding of its determinants. I encourage national health authorities, policy makers, scholars, researchers, health workers, and anyone committed to the advancement of public health in the Americas to take advantage of this valuable resource.

George A. O. Alleyne  
Director



# INTRODUCTION

*Health in the Americas* is the Pan American Health Organization's flagship publication analyzing the health situation and trends in the Region of the Americas. This edition is the latest in a long series of such reports that the Organization has published since 1954. The book's contents, format, and slant have evolved over time in order to adapt to changing demands from Member States, to reflect new developments in epidemiologic thinking and practice, and to respond to new challenges in PAHO's technical cooperation. Through its history, this publication has grown from an almost purely statistical report to an in-depth, comprehensive, public health assessment of the Region's health status and its determinants.

In this 2002 edition, the analysis of *Health in the Americas* is oriented toward documenting inequalities in health. In order to best show the analysis at both the Regional and country levels, this edition, as were previous ones, is presented in two volumes. Volume I's eight chapters bring together the contributions of several of PAHO's technical units to present a Regional perspective on the current health situation. This volume includes analyses of the status and trends of several important health and health-related indicators and determinants, ranging from mortality and changes in life expectancy to the impact that income-level and income-distribution inequalities have on the population's health. Viewed in the context of globalization, health sector reform, and other macro-political processes, Volume I describes the current status and trends in health promotion, environmental health, disease prevention and control, availability of health resources and technology, and external cooperation in health.

Chapter I presents a conjunctural analysis of the current political and socioeconomic context in the Americas, emphasizing democratization, decentralization, globalization, privatization, urbanization, and other major macro-determinants of health. It also presents a demographic analysis that focuses on changes in natality and fertility, as well as their transition; aging; migration; and urbanization processes. In addition to showing updated mortality rates for major causes of death, by sex and age, the mortality analysis in this chapter documents the contribution of 32 causes of death to changes in life expectancy observed in the Americas between the beginning of the 1980s and the end of the 1990s. The chapter ends with an analysis of inequalities in health that considers the population's income level and income distribution.

Chapter II analyzes major macro-political, social, economic, and financial determinants of health, emphasizing those processes that can potentially affect health status and the organization, effectiveness, and accessibility of health systems. The chapter also examines the effects of globalization, international trade, and economic policy and growth on poverty, as well as issues of gender and ethnicity as health determinants.

Chapter III looks at trends and main features of health sector reforms in the Region, stressing the importance of essential public health functions and including an analysis of policies, resources, and offer/access of health services according to public, private, and social security participation. It also describes the stages of decentralization of health services and essential public health functions; the reorganization of health care systems and public health services; health sector financing, including national health accounts; health legislation and regulation; and the monitoring processes of health sector reforms.

Chapter IV deals with how individuals and populations organize themselves to respond to health needs by promoting health activities both within and outside the health sector. It examines healthy communities and healthy individuals; food and nutrition; prevention and control of tobacco, alcohol, and other drug use; reproductive health; indigenous populations; the elderly; the disabled and handicapped; violence prevention and control; oral health; and mental health.

Chapter V shows how environmental forces change living conditions and public health. It highlights environmental policies and the regulation of water, air, housing, waste, and pollution; it also looks at progress made in water supply and sanitation, control of pesticides and other pollutants, and the work environment and occupational health services in the Region.

Chapter VI—which deals with disease prevention and control—briefly describes the current situation and trends of health problems and impairments based on morbidity and disability, stressing the main interventions carried out to prevent and control them. Analyses highlight inequalities by geographic areas, age, sex, and socioeconomic categories. The chapter also shows the Region's current situation in regard to emerging and re-emerging diseases; tuberculosis and other chronic communicable diseases; AIDS and sexually transmitted infections; vaccine preventable diseases, with emphasis on Regional efforts toward measles eradication; and acute respiratory infections and diarrheal and other infectious intestinal diseases in the context of the Integrated Management of Childhood Illness Initiative. It also updates the situation analysis of vector-borne and foodborne diseases; zoonoses, including rabies; Creutzfeldt-Jakob disease; foot-and-mouth disease; as well as cancer and other chronic degenerative diseases, accidents and other external causes, and disaster preparedness and emergencies.

Chapter VII analyzes health resources and technology, and details how scientific and technical activities are organized to cope with health problems in the countries. The analysis includes the situation of human and technological resources, health care facilities, health services provision, medical technology, drugs, blood and other biological products, and the scientific production in health in the Americas.

Finally, Chapter VIII reviews the characteristics and trends of external cooperation in health within the context of changes in subregional initiatives, including the international commercialization of foods, biological products, means of current transportation and tourism. It also examines new forms and new agents in cooperation in health, PAHO's response to disasters, the volume of resources for international and bilateral technical cooperation in the context of the "Shared Agenda for Health in the Americas."

Volume II presents the most up-to-date health situation analysis for each of the 48 countries and territories of the Americas. This volume is a product of a Regionwide analytical effort that is conducted using a common framework that includes an analysis of overall health status, specific health problems, and the response of the health system and services. Emphasis was given to the use of disaggregated core health data available within each country, the documentation of inequalities, and the gender approach. Each country's overall health status analysis covers recent political, economic, and social trends, as well as the degree of implementation of national development plans and these plans' impact on the population's living conditions, health status, and level of equity. It also includes a demographic and mortality analysis, with emphasis in health inequalities. Country-specific health problems are analyzed both in terms of standard population groups and in terms of specific diseases and injuries, taking into account a gender approach. The section that examines the health system's response touches on current national health policies and plans; health sector reform strategies and programs and their relationship to principles of equity, quality, efficiency, financial sustainability, and social participation; and the degree to which essential public health functions have been implemented. It also updates information on the institutional or-

ganization, health regulations, and functioning of health system and health care services. Finally, the country's health situation analysis includes the availability of health supplies, human resources, health technology, and research, as well as an assessment of sectoral financing and expenditure, including technical and financial external cooperation in health.

Additional information to complement the analyses presented here can be accessed in other PAHO publications and on the Organization's website. These sources include the Core Health Data System at regional and national levels, a series of annual brochures, *Health Situation in the Americas: Basic Indicators*, and the publications, *Health Statistics from the Americas*, the *Annual Report of the Director*, and the *PAHO Epidemiological Bulletin*.



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# I. REGIONAL HEALTH ANALYSIS

*The report makes it possible to form a judgment as to the health conditions in the Americas, their recent past, and immediate future. As the data are further improved, it will become possible to formulate programs, allocate resources, and invest funds on a more rational basis. In short, to accelerate progress.*

Dr. Abraham Horwitz,  
*Health Conditions in the Americas, 1961–1964*

## **SOCIOECONOMIC AND HEALTH CONTEXT IN THE REGION OF THE AMERICAS**

As the goal of “health for all” reached its target year in 2000, most of the Region’s countries had attained several of the goal’s objectives. For example, the countries in the Americas have been able to reduce infant mortality to an average of 24.8 per 1,000 for the 1995–2000 period—a decrease of approximately 12 deaths per 1,000 births as compared to the 1980–1985 period. This average masks important differences that can be seen within countries, however. Coupled with other demographic processes (decreasing fertility and population growth), the decrease in infant mortality has resulted in an increase in life expectancy at birth to more than 70 years, which was another goal of “health for all by the year 2000.” Again, this added life expectancy was not evenly attained in the Region’s countries, however, and requires a more detailed analysis.

By the end of the period, the Region’s demographic transition also had intensified, spurred by reductions in the birth rate, overall mortality, fertility, and natural population growth. Moreover, the countries have experienced what has been called epidemiological polarization, whereby the populations’ mortality profile is affected simultaneously, and in almost equal importance, by both communicable and noncommunicable diseases. In this way, chronic degenerative diseases, disability, violence, and lifestyle-related diseases rise to coexist with emerging and reemerging communicable diseases, such as diseases that were thought to be under control (such as malaria, tuberculosis, and dengue) or those that were unknown or had been confined to limited geographic areas (such as hantavirus, leptospirosis, West Nile fever, and bovine spongiform encephalopathy). Alongside these trends, the Americas has continued to experience migration, urbaniza-

tion, and the aging of its populations, which generate specific demands from social and health goods and services.

In order to fully understand the complex dynamic of health conditions and trends in the Region, it is necessary to consider structural and process factors, such as political, socioeconomic, and environmental, as well public health systems and their resources, which accompany and define this process.

This chapter uses a different informational and analytical paradigm from those used in previous *Health in the Americas* editions. As such, it does not merely review national averages, but also examines the extent of the differences in the indicators and the distribution of these differences within the population.

### **Political Factors**

Structural changes in the Region’s countries, which deepened in the 1990s, have mainly followed two lines. The first deals with State reform and modernization in economic and social terms and in terms of institutional aspects related to political decisions. The second is centered on strengthening and improving the democratic order based on principles of freedom and social participation (*I*).

The establishment of democratic systems and civil society’s growing participation in the political arena are considered to be the most noteworthy political events and trends of the 1980s and 1990s. Other gains include the broadening of human rights ideas and values; a reliance on the electoral process as the operating basis of the political system; and the widening of social development, gender equality, respect for ethnic and cultural diversity, and environmental sustainability. The concomitant spread of information and communication technologies has favored this trend and furthered social mobilization in connection with these



views. But a turn towards democratic ideals has not been enough to reduce the social and economic inequities that threaten stability, social integration, and good governance. Strengthening democratic principles and practices is an ongoing challenge, particularly in periods of economic uncertainty and situations of poverty, when holding on to peace and averting violence also are health-related issues.

State reforms continued to be undertaken at the end of the millennium. They emphasized efficiency and macroeconomic balance designed to strengthen institutional capabilities, and stressed administrative and management aspects. However, the structural reforms and macroeconomic stabilization processes that were promoted and put in place in most of the Region's countries, with uneven results, could not overcome certain residual problems related to the debt accumulated in the previous decade, nor could they cope with the political and social consequences that accompanied them. The State reform and modernization experience underscores the need to strengthen the role of government and civil society in economic and social development.

State reforms have, in turn, led to changes in the health sector, including decentralization, a rethinking of the legal and administrative autonomy of public institutions, cost containment, a reformulation of health services organization and financing, and special efforts to improve services and increase customer satisfaction. Moreover, as the private sector has increasingly participated in the economic and social spheres, the design and management of social services, including health services, have changed dramatically. For example, the insurance sector has increased in Argentina, Brazil, Chile, Colombia, Uruguay, and, to a lesser degree, in Mexico and Peru.

Globalization's unique, multidimensional dynamic continues to exert critical pressure, as it has changed the structure of production and has been responsible for easing restrictions on trade and international financial transactions. Globalization's effects on the countries' economic and political relationships produce alternate frameworks, both internationally and regionally. New rules of the game challenge the States' ability to govern, as societies are increasingly influenced by external forces of change and governments lose some control over events within their countries' borders.

Globalization also has helped to homogenize consumption and lifestyle patterns, which has had important health implications, such as the spread of disease or vectors (cholera, foot-and-mouth disease, and dengue fever are good examples), and the introduction of unhealthy behaviors and lifestyles (smoking, obesity, consumerism, use of illegal drugs, violence). Other consequences affect national, regional, and global cooperative efforts, as well as efforts to disseminate information and useful experiences regarding health and development. Globalization carries both risks and opportunities, and imposes international and transnational challenges for the promotion of health, the prevention and control of disease, and quality of life.

## Economic and Social Trends

Social and economic development conditions and levels are basically heterogeneous in the Region, but they significantly shape the populations' type and degree of risk to health and well-being. The economic and social changes the countries experienced in the 1990s were characterized by the governments' attempts to improve conditioning socioeconomic factors through efforts designed to maintain internal macroeconomic equilibrium. This was done by implementing policies to reduce inflation, increase investment, adjust budgets, regulate financial systems, and privatize state-owned companies, as recommended by the international banking community.

The Region's governments have worked to improve their performance and to achieve greater transparency and accountability. But governability—that is, a government's ability to efficiently and responsibly exercise power or authority in a democratic manner—was often weakened by the limited ability of public institutions to confront new and mounting challenges and to formulate and enforce certain public policies. The so-called governing crisis also has been affected by an increase in corruption; international organized crime, frequently linked to illegal drug trafficking; pressures of the international financial sector; and the public's growing sense of insecurity and lack of confidence.

It is well known that a people's health level is determined by that population's economic level, which, in turn, is a reflection of the resources available for social investment. While the gross domestic product (GDP) in most of the Region's countries is higher than their gross national product (GNP), in practice, the GNP, as a measure of income, is considered to more appropriately represent the amount of national resources available for social investment in the country.

Around 1980, the annual median per capita GNP (adjusted for purchasing power parity, in international dollars) in the Region was US\$ 2,349, with a low of approximately US\$ 1,300 and a high of approximately US\$ 15,000 (Figure 1). In 1998, the amounts had increased significantly, with the median value in the Region reaching US\$ 4,614; the lowest income levels were approximately US\$ 1,600, but the maximums doubled, to more than US\$ 25,000 (Figure 2). It should be noted, however, that this favorable economic trend was not equitably distributed, disproportionately favoring the countries in the upper income tercile (e.g., those with an average annual per capita income exceeding US\$ 4,893 during 1978–1998) (Figure 3). In contrast, countries in the lowest income tercile (e.g., with average annual per capita income under US\$ 2,935) saw practically no income increases during a 20-year period. Consequently, the absolute gap between the wealthiest and poorest terciles tripled, from US\$ 3,551 in 1978 to US\$ 10,361 in 1998. Moreover, in examining the situation at the subregional level, it can be seen that in the late 1990s the GNP gap between North America and the other subregions was between 3 and 12 times higher. Table 1 shows the countries divided into five groups, or quintiles, according to per capita distribution of per capita GNP.

One of the noteworthy developments of the 1990s was economic growth, which was especially evident in Latin America where, according to the Economic Commission for Latin America and the Caribbean (ECLAC), the average annual rate of GDP growth was 3.3%, as compared to 1% for the 1980s (2). The Caribbean also experienced growth, albeit at a slower rate—an annual average of 2.0% in the 1990s and 0.1% in the 1980s. GNP growth has not been the same in each country, however, as can be seen in comparing the median values in the 1980s and 1990s (Figure 4). It also is notable that most countries experienced less growth during the 1990s.

Although structural reforms benefitted the countries' economic growth indices, this increase was characterized by volatility, which contributed to higher levels of unemployment and resulted in greater income disparities. Income distribution patterns reflect the effects of the countries' wealth redistribution policies, as well as their modes of production, the effects of the economic growth models, the effects of regulatory and fiscal policies, and cultural and social patterns. In this respect, the Americas in general, and Latin America and the Caribbean in particular, are considered to have the most inequitable income distribution in the world. To measure the economic inequality among the countries, the Gini coefficient (0.54)<sup>1</sup> was calculated, using the Lorenz curve to take into consideration the full range of distribution of the countries' income, not just the extreme values (Figure 5).

Another indicator of economic distribution is the ratio of the income of the wealthiest 20% to that of the poorest 20%. In the Region in the 1980s, for example, the median income among the wealthiest 20% of the population was 12.6 times higher than that of the poorest 20%. In the 1990s, this gap increased to 14.6, and by the end of 1999 it was 15.8. From 1989 to 1998, this ratio ranged from a low of 5.2 in Canada to a high of 30 in Guatemala. Table 2 shows the Regional distribution by quintile of income gap, based on the median value of the 20%/20% ratio for 1978–1998. It should be noted that the composition of the income quintiles is not the same as that of “income gap” quintiles. In other words, the wealthiest countries have not necessarily been the most equitable in terms of income distribution, nor have the poorest necessarily been the most inequitable.

Despite the increase in public spending on social programs and the decrease in the population living in poverty in Latin America and the Caribbean in the 1990s, poverty levels, determined by the unequal distribution of income, did not decline (3). It is estimated that at the beginning of that period, some 41% of the households in Latin America were living in poverty (approximately 200 million people), and this percentage fell to 36% by around 1997. But

it also is estimated that, in absolute terms, the number of poor people has climbed to more than 224 million in recent years (2). The distribution of the population living below the poverty line around 1997 also varies greatly in the different countries of the Region, from a low of 5.9% in Canada to nearly 65% in Haiti (4).

One of the factors associated with the countries' poverty and income level is their ability to create jobs and engage the population in productive activities. With regard to unemployment, it has been noted that, although economic reforms contributed to economic growth in the countries, economic activity has been volatile and unpredictable. That growth, moreover, was followed by higher levels of unemployment, greater disparity among social groups, and more unequal distribution of income. The level of open unemployment around 1997–1998 can be used to illustrate the fragility of social trends in the Region; in that period, open unemployment ranged from 16.3% in Argentina, the Dominican Republic, Saint Lucia, and Trinidad and Tobago, to 2.6% in Mexico (5). The gap between skilled and unskilled workers also grew substantially in the 1990s (an average between 18% and 24% for the Region). In fact, the increased participation by women in the labor market is the only favorable pattern in the evolution of labor. In 1980, women comprised 38% of the workforce, and in 1999 they represented 43% (6). Nevertheless, while inclusion of women in the workforce has increased in the Region, women do not always have access to the same opportunities or benefits that men receive. Currently, more women are graduating from college than ever before and are earning degrees in fields traditionally reserved for men, but the increased presence of women in the labor market has not been accompanied by changes in patterns of work responsibility. It also is important to look at child labor in the Region—it is illegal, and children who work are exposed to health risks and situations that threaten their lives and their futures. Around 1995, it was estimated that more than 7.5 million Latin American children between the ages of 10 and 14 were working (7).

The positive association between levels of health and education, as an essential component of the link between social and economic development, has been well documented. Therefore, investing in the education of young children continues to be a priority for the developing countries (8). Those with less schooling have less access to wage-earning activities (9), and it has been said that an educated nation ensures its social integration (10). These studies by ECLAC show that a person must have completed between 11 and 12 years of education to have a high probability of not living in poverty. Illiteracy decreased between the beginning of the 1980s and the end of the 1990s, but nearly 13% of the population of the Americas and the Caribbean was still illiterate in 1998, with a high of 52.2% in Haiti and a low of 0.5% in the United States (4). Figure 6 shows the literacy rates in different subregions of the Americas between 1980 and 1998. Central America's disadvantage is clear. While it has the lowest values at both points, it is the subregion where literacy has increased most

<sup>1</sup>The Gini coefficient is based on the Lorenz curve, which is a cumulative frequency curve that compares the empirical distribution of a variable with the uniform distribution (of equality). This uniform distribution is represented by a diagonal line. The greater the distance or area between the Lorenz curve and that diagonal, the greater the inequality. The coefficient can range in value from 0 (no inequality) to 1 (maximum inequality).

in percentage terms. Also, to point out the differences in the distribution of illiteracy in 300 subnational geographic units in selected countries of the Americas, it was established that, around 1998, this indicator ranged from a low of 0.7% to a high of 58.2%, with a median of 13% (Figure 7; Table 3).

### Environmental Trends

The Region continues to experience environmental changes, partly due to demographic and technological changes, modes of economic production, and natural disasters. The effects of global warming, soil degradation, and deforestation are compromising the people's health and have serious consequences for maintaining biodiversity. Human activity and persistent poverty are associated with contamination of resources and scarcity of water sources. Unchecked urbanization, for example, demands that the needs of new residents be satisfied and, consequently, unhealthy conditions remain and are repeated, particularly for the poor. Thus, disparities in access to high-quality housing and basic water and waste disposal services increase.

Natural disasters, such as earthquakes, hurricanes, floods, and droughts, have significantly affected the Americas. In Latin America and the Caribbean, approximately 82,000 people died and 11.9 million lost their homes as a result of natural disasters, with damage totaling approximately US\$ 45 billion between 1972 and 1999. For example, the devastating effects of Hurricane Mitch, which ravaged Central America in October 1998, left nearly 10,000 dead, 9,000 missing persons, 13,000 injured, and 1.9 million homeless (11). Disasters hit the poor hardest, particularly because of the location and condition of their homes. Besides creating immediate risks in terms of health conditions, these disasters reflected the limited ability to prevent and respond to them.

A Regionwide evaluation showed that, around 1998, there were 76.5 million people without access to water, which represents about 9% of the population of the Americas; percentages in various countries ranged from 0% to 54%. These differences also show up at the subnational level, with percentages ranging from 0% to 100%, and a median value of 33.3% (Table 3). In addition, 103.2 million people have no sewerage service. This represents 12% of the Region's population, with percentages ranging from 0% to 73.6% in the different countries (4). The situation at the subnational level is similar to that of access to water. Moreover, between 20% and 50% of the urban population has inadequate garbage collection services.

Urbanization is one of the leading factors bringing about environmental changes. In the late 1990s, the Region was rapidly urbanizing, with 76% of the population considered urban, higher than the 68.6% figure in 1980. At the country level, the percentage of urban population ranged from 12.3% in Anguilla to 100% in Bermuda and the Cayman Islands (4). When this indicator was analyzed by subnational geographic unit in selected countries, the median value was 64.3%, while the low and high values were 11% and 100%, respectively (Table 3).

Given the countries' population growth, energy needs, and development policies, between 1990 and 2000, approximately 37,000 km<sup>2</sup> of forest in Latin America were lost each year to deforestation. This translates to an average annual loss of 0.5% of forest cover. Were this trend to continue, 5% of forest cover will have been lost in the next 10 years (12).

### General Trends in Public Health

Here, general health trends in the Region are analyzed using a positive indicator, life expectancy at birth, and a negative indicator, infant mortality. Vaccination coverage for measles and the number of doctors available per 10,000 population are used as indicators of public health or of the health services' organized response.

Life expectancy at birth refers to the age a population can potentially reach, based on survival in the different stages of life. Infant mortality refers to the number of deaths in children younger than 1 year, and largely depends on the population's living conditions. Infant mortality is a health indicator that has undergone significant changes in the last 10 years; it also remains one of the most widely-used indicators because of its political importance.

In Latin America, life expectancy at birth increased by approximately one year between 1995 and 2000, reaching an average of 70 years by the latter year, which is the target set for the end of the century in the "health for all by the year 2000" strategy. In early 2000, it was estimated that life expectancy at birth ranged between 54.1 and 79.2 years in the countries of the Region. In other words, there was a difference of more than 25 years between the countries with the longest life expectancy at birth and those with the shortest (Figure 8). In some selected countries that have subnational data, in-country figures show similar gaps, ranging from a low of 56.8 years to a high of 79, with a median of 70 years (Table 3). It also is noteworthy that between 1950–1955 and 1995–2000, the difference in life expectancy between men and women increased from 3.3 to 5.7 years in Latin America, from 2.7 to 5.2 years in the Caribbean, and from 5.7 to 6.6 years in North America.

The infant mortality rate in the Region of the Americas around the year 2000 was 24.8 deaths per 1,000 live births, ranging from 5.2 (Anguilla) to 80.3 (Haiti)—a 16-fold difference between those two countries (4). To measure the degree of inequality in infant mortality in all the countries, and not just the ones with the extreme values, the Lorenz cumulative distribution curve was used, and a Gini coefficient of 0.33 was obtained (Figure 9). These data show that approximately 50% of infant deaths occurred in 30% of the live births in the countries of the Americas, which implies a significant level of inequality in terms of health.

More information about infant mortality is available at the subnational level, which makes it possible to more effectively gauge the degree and distribution of inequalities. Figure 10 shows that there is a heterogeneous mosaic of differences within the countries, but groups of high-risk units can be identified.

Upon evaluating the available information in more than 360 geographic units, subnational figures show wider gaps among them, ranging from 3.7 to 133 (Figure 11), with a median of 19.7 (Table 3). It also is clear that there is a gradient within each country, with four identifiable mortality profiles: very low (under 10 per 1,000), low (close to the regional median of 24 per 1,000), high (between 20 and 40 per 1,000), and very high (more than 40 per 1,000) (Figure 12). Mortality rates were nearly four times higher in areas where there were more infant deaths; the greatest inequalities in infant mortality did not occur in countries with the highest national rates, however. For example, in Colombia, which had relatively low infant mortality levels, the infant mortality ratio among geographic units was 6.2, higher than in any other country. In contrast, in Cuba and Uruguay, which had very low mortality levels, the mortality ratio also was lower. These figures reflect the enormous differences that still exist in this measure of health status for the people of the Americas.

Vaccination coverage for measles, one of the public health indicators, is one of the most important measures of health services at present. In 1980, coverage in the Region of the Americas was 48%, and it had increased to 93% by 2000. Thanks to this health intervention, the incidence of measles fell from 408 new cases per 1,000,000 population in 1980 to 2 new cases per 1,000,000 population in 2000. Vaccination coverage for measles by country in 2000 ranged from 100% (declared in eight countries) to 75% in Colombia (4, 13). At the subnational level in some countries, coverage is, on average, 77.6% (Table 3).

The number of physicians per 10,000 inhabitants is another indicator of organized social response, which is a measure of the availability of resources for health services. A noteworthy increase is observed for the Region of the Americas in recent years: from 13.1 in 1980 to 19.8 in 1999. The distribution of this indicator by country in 1999 ranged from 1.8 in Guyana and Montserrat to 58.2 in Cuba. The differences are accentuated when one notes the subnational values, ranging from 0.8 to 99.1 (Table 3). The enormous variability of this health services measure reflects the inequalities of health resources (4).

### Effect of Economic Inequalities on Health Indicators

Historically, the health situation in the Region, as measured by national average indicators, has never been better. But important differences among countries remain. Clearly, averages do not provide a complete picture, so measures of the distribution of the mortality indicators are more frequently being used. Measurement of economic inequalities and their impact on health indicators at the country level is reflected in the analyses of per capita income and the distribution of income in relation to health indicators (such as life expectancy at birth and infant mortality) and education indicators (such as literacy rate).

The economic classification of countries by income quintiles yields a population hierarchy that facilitates the documentation

of health inequalities and the ecological analysis of these inequalities to income level, one of their most important socioeconomic determinants. In the late 1990s, life expectancy at birth showed a declining gradient between the wealthiest and poorest population groups, with a difference of 9.8 years (75.6 and 65.8, respectively) (Figure 13). In the same decade, the infant mortality gradient also was pronounced, but in the opposite direction (Figure 14): a newborn in the lowest income quintile had, on average, a 2.9 times greater risk of dying before the age of 1 year than a newborn in the highest quintile (42.0 and 14.5 per 1,000 live births, respectively). This information confirms earlier findings on the relationship between income and health (14, 15).

Inequality of disposable wealth, expressed in terms of income level quintiles, also reflects the distribution gradient of other important health determinants, such as literacy. As Figure 15 shows, there are nearly five times more illiterates in the poorest quintile than in the wealthiest (3.3% and 15.6%, respectively). With respect to urbanization, the gradient between the wealthy and the poor decreases approximately 15%, with values of 75.5% and 59.0%, respectively (Figure 16). With respect to the other socioeconomic and environmental indicators (availability of public water and sanitation services, and deforestation), no clear relationship is observed.

The economic classification of the countries into quintiles based on income distribution (inequality gap) reflects a population hierarchy that yields the following results. In the late 1990s, life expectancy at birth showed a decreasing gradient between populations with fewer inequalities and those with the most inequalities (Figure 17). The difference in life expectancy between those with fewer inequalities and those with the most inequalities was 8.2 years (75.3 and 68.1, respectively). In the same period, the infant mortality gradient was also pronounced (Figure 18): a newborn in the population with the most inequalities had, on average, a 4.6 times greater risk of dying before the age of 1 than a newborn from the population with the least inequalities (33.1 and 7.2 per 1,000 live births, respectively). This means that inequality as a result of the income gap increased approximately 50% with respect to income level.

The differential effects of income levels and income distribution gaps in the measurement of health status suggest possible independent effects, which require special study because different strategies are required for reducing health inequalities. These responses should also be adjusted to the changing needs of the population, particularly with respect to shifts in size, growth, age composition, and distribution.

## POPULATION CHARACTERISTICS AND TRENDS

As the Region of the Americas enters the 21st century, it shows enormous variations in living conditions among countries and also within countries. There are differences in education, income, access to services, and other social characteristics that determine

the populations' health status. Upon considering the various and complex interactions between health status and its determinants, it is possible to establish the size, growth, distribution, and profile of the population. This section presents the conditions and trends of the population's distribution, growth, and structure that result from processes of birth rate, fertility, aging, mortality, migration, and urbanization in the countries of the Americas.

The information in this chapter comes mainly from estimates based on population projections by the United Nations Population Division, published in *World Population Prospects: the 2000 Revision (16)* and *World Urbanization Prospects: the 2000 Revision (17)*; for some Caribbean countries, the information came from the United States Census Bureau. Demographic estimates contained in the year 2000 basic indicators were also used (4). In order to follow trends for a longer period, projections of various demographic indicators for 1996–2002 and 2002–2008, or up to 2020, are included. This section presents the principal results and the analytical syntheses in graphs and charts, while detailed information at the country level is presented in the Annex tables.

For some of the analyses, the Region's countries have been grouped into two large areas: North America (Canada and the United States of America) and Latin America and the Caribbean. Latin America includes Central America, the Andean Area, and the Southern Cone; Brazil and Mexico are considered as two other subregions; and the Caribbean is divided into the Latin and non-Latin Caribbean, referred to as the Caribbean in this report. Other analyses use information presented at the country level (Annex B.1).

### Population Distribution in the Americas

The estimated population of the Americas in 2000 was 832.8 million, approximately 14% of the world population. This figure represents a 25% increase as compared to 1980. Approximately 37% of the population lives in North America, a third lives in Brazil and Mexico, and the rest is distributed among the Region's remaining 43 countries and territories. It is estimated that in 2002 the Region will have approximately 854 million people, about 4% more than in 2000 (Table 4). North America will be the most populous of the subregions, with approximately 320 million persons, 85% living in the United States. In descending order, North America is followed by Brazil, with approximately 175 million inhabitants; the Andean Area, with approximately 117 million; and Mexico, with 102 million. The Caribbean is the least populous subregion (just under 8 million), despite the fact that it has the most countries or political units (23).

### Population Growth

#### *Annual Population Growth*

Population growth can be analyzed from two standpoints: a) the number of people added to each country during a certain pe-

riod and b) the annual population growth rates, generally expressed as percentages.

The size of the population living in each of the subregions differs considerably, even though the number of people added to each subregion during six-year periods may be similar (Table 4). For example, while the population of Brazil is 50% larger than the population of the Andean Area, absolute population growth between 1996 and 2002 will be just 7% higher in Brazil. This is because the estimated growth rate of Brazil's population (1.3% annually in 1996–2002) is less than that of the Andean Area (1.8% in the same period), which is explained by the fact that Brazil has a higher gross mortality rate and lower fertility rate than does the Andean Area. A similar situation is noted in the growth of the Southern Cone's population as compared to that of Central America, despite the fact that the Isthmus has a smaller population. Finally, while the Latin Caribbean adds about two million people every six years, the Caribbean adds just 340,000 people.

As a reflection of absolute population growth, growth rates vary considerably in the Americas. The annual average for the Region in 1996–2002 was 1.3%. At the subregional level, the highest population growth rates are estimated to be in Central America, with an annual average of 2.4% during 1996–2002, while the lowest are found in the Caribbean, with 0.7% (Table 4). The Caribbean includes some countries whose populations grew very rapidly, however, such as French Guiana and the Turks and Caicos Islands (3.4% and 3.7% per annum, respectively, between 1996 and 2002), although the Central American countries, with the exception of Panama, had annual growth rates exceeding 2%. In the Southern Cone, Paraguay's growth rate of 2.6% per year in the same period is noteworthy.

In almost all the countries, population growth rates are declining, although the reduction is slight. Projections indicate that growth in the Americas will continue, and some 200 million people will be added between 2000 and 2020. Latin America's population will increase the most (143 million as compared to 57 million in the rest of the Americas).

#### *Births*

The number of births in a population can be analyzed from the perspective of crude birth rates or total fertility rates.

As was suggested earlier with respect to population growth, despite the decline of the birth and fertility rates in the Americas, the absolute number of births in most of the subregions has not decreased and, in some cases, it has increased. As a result, it is estimated that the number of births, young children, and pregnant women will not decrease during the next six years in most of the countries. There were an estimated 15.4 million births in the Americas in 2000, about 70% of them in Latin America and the Caribbean. According to United Nations projections, some 15.7 million children will be born in the Americas in 2002 (Table 4).

The distribution of births in the Americas differs from its population distribution. While it is estimated that in 2002 North America's population will represent 37.5% of the total population of the Americas, just 26.9% of births will occur in this subregion. In contrast, 7.2% of the births will occur in Central America, where 4.5% of the population will live.

### *Birth Rate*

The birth rate is defined as the number of births per 1,000 population. Birth rates are expected to continue to decline in the Region, despite the considerable reduction that has already occurred over the last 40 years. In the 1960s, the birth rate in the Americas was 32.5 per 1,000 population; in 2000 it was estimated to be 19.4, and in 2002 it is estimated that it will be 18.4 per 1,000. The rate differs nearly by a factor of 3 in different subregions, however: in Central America, the birth rate is 30 per 1,000, while in North America it is just 13 per 1,000 (Table 4).

Within Central America there are differences also. Guatemala, for example, has rates that exceed 34 per 1,000 (the highest in this subregion and in the Americas), while Panama and Costa Rica have low rates (approximately 20 per 1,000). The Andean Area has an estimated birth rate of 23.4 per 1,000 population; within the subregion, Bolivia has the highest rate with 30.5 per 1,000 in 2002. The most noteworthy fact with respect to the subregions is the rapid birth rate decline in Brazil, where estimates for 2002 indicate that the birth rate will be 19.2 per 1,000.

The Latin Caribbean is divided into two types of countries with regard to birth rate. On the one hand, Cuba and Puerto Rico have low rates, 11.7 and 15.1 per 1,000, respectively, while the Dominican Republic's rate nearly doubles that of Cuba, and Haiti's rate more than doubles Puerto Rico's. The Caribbean has a very low birth rate, although there are exceptions, such as French Guiana and the Turks and Caicos Islands (28.3 and 24.2 per 1,000, respectively).

Despite the differences, estimated birth rates for the Southern Cone, the Latin Caribbean, the Caribbean, and North America all showed a similar downward trend (13%); in the rest, the decline was 20% or more.

### *Fertility*

Fertility by age group is measured in terms of the frequency with which women in each age group have children. Using these frequencies or specific fertility rates by age, the total fertility rate (TFR) is calculated. TFR is the expected average number of children that would be born to a woman in her lifetime, if in her childbearing years she were to experience the age-specific fertility rates prevailing in a given year/period, for a given country, territory, or geographic area.

Around 2000, the TFR for the Region was 2.4 children per woman, which represented a decline since 1980–1985, when it was 3.1. With the exception of North America, where there was a slight increase, total fertility declined in all subregions. In Mexico, Brazil, Central America, and the Andean Area there was a decrease of

more than one child per woman. According to estimates for 2002, the subregions with the lowest fertility rates will be North America and the Caribbean, with TFRs of 1.9 and 2.1 children per woman, respectively (Table 4). If these two subregions maintain those rates in the future, and if they do not experience immigration, their populations will start to decline. Another subregion with low fertility levels is Brazil, with an estimated TFR of 2.2 for 2002.

In the Caribbean, the different fertility levels estimated for the countries in 2002 are noteworthy. These range from a TFR of 1.5 children per woman in Trinidad and Tobago to 3.9 in French Guiana. In the Latin Caribbean, Cuba for years has had a fertility rate below the replacement level, with an estimated TFR of 1.6 for 2002; Puerto Rico's is 1.9, while Haiti has one of the highest TFRs in the Americas, with 4.0 children per woman. Despite the declines, Central America has the highest fertility rate, with Guatemala (4.4 children per woman) and Nicaragua (3.8 children per woman) being especially high.

The fertility rate continues to decline in the Region of the Americas. When it falls below the replacement level, as it has in Cuba, the population will start to decrease. The consequences of such a decline—such as an increase in the aging of the population and a potential decrease in the labor force, with their respective consequences in terms of higher costs for health care and pension systems—are not expected to be evident over the short term. For the time being, various forums are discussing policies and strategies in different arenas, for both economic adjustment (for example, greater participation of women in the labor force, increased retirement age for workers, increased contribution to the social security system, and changes in the capitalization of these systems) and demographic adjustment (e.g., higher fertility levels and increased immigration).

### *Mortality*

This section presents three aspects of mortality: a) number of deaths, b) crude and infant mortality rates, and c) life expectancy at birth. Crude mortality rates represent the number of deaths per 1,000 population; when calculated for each age group, they constitute the age-specific mortality rates. Life expectancy at birth is a summary index that represents the number of years a group of newborns will live, on average, if the specific mortality rates by age observed in a given year remain constant in the future.

### *Deaths*

Around 2000, the average number of deaths per year in the Americas was 5.8 million. The subregion with the highest number of deaths is North America (43% of all deaths), followed by Brazil (20%) (Table 4). The high number of deaths in North America is due not just to population size, but also to the percentage of older individuals in the population, which is very high in relation to the rest of the subregions.

### *Crude Mortality Rate*

The crude mortality rates per 1,000 population vary little from subregion to subregion. It was estimated that in 2000 the Region's rate was 7.2 per 1,000, with rates in the subregions ranging from 5.1 in Mexico to 8.6 in North America. The lowest estimated crude mortality rate in the Region for 2002 is in Costa Rica (4 per 1,000 population), although it has begun to increase with the aging of the population. In contrast, the highest crude mortality rate will be observed in countries such as Haiti and Bolivia, not because their population is aging, but because mortality remains high.

### *Infant Mortality*

Infant mortality in the Americas decreased by approximately one-third, from 36.9 deaths per 1,000 live births in 1980–1985 to 24.8 in 1995–2000. The greatest gains occurred in Central America, Brazil, and the Latin Caribbean (with reductions of 45%, 34%, and 30%, respectively), although infant mortality rates remained higher than the average for 1980–1985.

It has been estimated that some 400,000 children in the Region will die before the age of 1 year in 2002, which translates to an infant mortality rate of approximately 25 deaths per 1,000 live births. But rates may differ up to six-fold when comparing subregions and countries (Table 4). For example, according to estimates for 2002, infant mortality will be 37.8 per 1,000 live births in the Latin Caribbean; but in this subregion, Cuba will have low levels (7.3 deaths per 1,000 live births), while Haiti's infant mortality will be almost 9 times that of Cuba (61.3 per 1,000 live births). In the subregion of Brazil, it is estimated that the infant mortality rate in 2002 will be 38.3 deaths per 1,000 live births, and a reduction of approximately 15% is expected by 2008. In the Andean Area and Central America, which have similar mortality rates (approximately 32 per 1,000), the pattern of differences among the countries holds. For example, infant mortality in Bolivia (55.6 deaths per 1,000 live births) is 3 times higher than in Venezuela, and infant mortality in Guatemala (41.2 per 1,000) is almost 3.5 times higher than in Costa Rica.

It is estimated that in 2002, the lowest infant mortality rates will be found in North America, with 6.7 deaths per 1,000 births. Infant mortality is expected to continue to decline until 2008 in all the subregions and countries of the Americas. Since the expected rate of decline is similar in all the countries, the areas that have higher infant mortality rates are those that will experience a greater absolute decline.

### *Life Expectancy at Birth*

The reduction in mortality from communicable diseases in the Americas resulted in increased life expectancy starting in the early 20th century. In most Latin American countries, life expectancy at birth has at least doubled since the beginning of the 19th century, and there are countries in which it has increased two-and-a-half times (Figures 19 to 23). In 2000, 37 countries and territories of the Americas have exceeded a 70-year life ex-

pectancy at birth for both sexes; only Haiti has a life expectancy at birth of less than 60 years.

Life expectancy at birth in the Americas was estimated to be 72.4 years in 2000; 76.9 years in North America, with the other subregions lagging 4 to 9 years behind. In 2002, it is estimated that North America will have a longer life expectancy at birth, almost 77.7 years for both sexes considered together (Table 4), and Canada an even longer one (79 years). The Caribbean subregion also enjoys a long life expectancy at birth (73.9 years); this subregion's countries or territories with lower mortality rates, such as Aruba, the Cayman Islands, Guadeloupe, Martinique, Montserrat, and the U.S. Virgin Islands, will have life expectancies above 78 years, while countries or territories such as the Bahamas, Grenada, and Guyana will remain below the 70 year mark. In the Latin Caribbean, disparities are great: Cuba and Puerto Rico are estimated to have a life expectancy at birth that is 22 years longer than Haiti's. The Andean Area also will experience important differences: it is estimated that Venezuela's population will have a life expectancy almost 10 years longer than Bolivia's. The Southern Cone has the lowest mortality rate and a life expectancy of 74.1 years, with a range from 70.7 years in Paraguay to 75.6 years in Chile. Life expectancy in Mexico is 73.0 years; in Brazil it is 68.3 years.

On average, life expectancy at birth for women in the Americas is approximately 6.3 years longer than for men, but the difference varies from subregion to subregion, from a low of 5.5 years in the Caribbean to a high of 8 years in Brazil. Differences also vary within each subregion. For example, in the Caribbean, there is an average difference of 5.5 years, but Guyana shows a difference of 8.9 years, while the British Virgin Islands shows a difference of just 1.9 years. In contrast, in North America, where the average difference is 5.8 years, the differences between the sexes are relatively homogeneous, from 4.1 to 5.8 years.

In the periods that were evaluated, life expectancy at birth has tended to increase, including in some projections. In the future, however, the effect of the increase in mortality from certain emerging causes (such as AIDS, diabetes, violence, and other external causes) that decrease the life expectancy of certain population groups must be monitored. Since these illnesses and injuries mainly affect people between the ages of 15 and 49, the effect on life expectancy at birth is not as immediate as it would be if the cause were childhood diseases. If the population stops growing and ages, the effects will tend to become more evident.

### *Age Structure*

#### *Age Groups*

The age structure of a population changes constantly, due to changes in mortality, fertility, and migration. A population is considered "young" when the percentage of people under the age of 15 years or under the age of 20 years ranges between 40% and 50% of the entire population. This type of young age structure

occurs only in populations with high fertility and moderate mortality at early ages. A population begins to age as its fertility starts to decline, and it continues to age when mortality at advanced ages begins to significantly decline.

In countries such as Argentina, Canada, the United States, and Uruguay, the decline in fertility and, in turn, the aging process of the population, began in the early decades of the 20th century. The population of several Caribbean countries started to age after the Second World War, as did Cuba and Puerto Rico in the Latin Caribbean. Later, around the 1970s, other countries began to experience a rapid decline in fertility.

Based on the above, the percentage of persons in certain age groups would correlate with fertility levels. For example, the percentage of individuals under 15 will be higher in subregions in which fertility is still at intermediate levels, such as Central America (Table 4), followed, in descending order, by the Andean Area, Mexico, the Latin Caribbean, the Southern Cone, and Brazil. As expected, the lowest percentage of young people is found in North America, which has always had the lowest fertility in the Region. The opposite occurs in 65-and-older age groups: the percentage of elderly people increases when fertility is low; consequently, the highest percentages of older persons are found in North America, followed by the Southern Cone and the Caribbean. Countries in a subregion differ, however: for example, in Paraguay, part of the Southern Cone, the percentage of people 65 and older is much lower than the average for the subregion, and the same occurs with Haiti in regards to the Latin Caribbean.

The population structure by age group reflects the aging process over time, in this case over a 20-year period (Figures 24 to 29). For example, North America and the Southern Cone began the aging process several years ago, and have adjusted their health systems and services to address the needs of their elderly populations. On the other end of the spectrum, Central America and the Andean Area have experienced a slower aging process. In between are Brazil and Mexico, which must make significant adjustments to cope with the rapid pace of change in their age structures, a result of the sharp drop in fertility. Other aspects of the age structure and population growth rates, such as various groups' demands for health care services, must be considered in planning services.

It is estimated that in 2002, the growth rates of the population over 65 years old will still exceed 2% each year in most of the subregions (Table 4), with the exception of the Caribbean (1.5%) and North America (1%). In the population group over 65 years old, physical changes and changes in health occur rapidly. In the countries of the Americas, the 85-and-older age group is growing fastest, at rates in excess of 3% a year in all the subregions, and in excess of 5% a year in three of them.

### *Aging*

Other indicators must be analyzed in connection with the aging process. These would include the ratio of persons in the 15-

to 64-year-old age group to the population aged 65 and over; that is, the number of people at an economically active age per elderly person, which would indicate the approximate number of people who, in one way or another, help support the elderly population. As the population ages, this ratio shrinks.

The ratio of adult individuals to elderly individuals remains high in several countries of the Americas, since in most of them the decline in fertility is a recent phenomenon, and the percentage of elderly is still low (Table 4). It is important to bear in mind how quickly this ratio changes, however. In the Southern Cone and North America, the ratio already is low, between 5 and 7 persons per elderly individual, and it is changing slowly. In other subregions, however, the ratio is higher (14 persons per elderly individual in Central America and approximately 13 in the Andean Area, Brazil, and Mexico), but it is declining rapidly. The impact on the social welfare, pension, and retirement systems will be significant. In the most populous Latin American countries and in Brazil and Mexico, the ratio of adults to elderly individuals is expected to decline by more than one person over the next six years, which is considerable for such a short period.

Because men die earlier, the ratio of women to men is increasing among older adults. For example, in 2000 there were 140 women 65 years old and older for every 100 men of the same age in North America. In the age group 85 years old and older there were 255 women for every 100 men. The Southern Cone shows similar figures. In the rest of the subregions, the ratio of women to men among the elderly tends to increase in the long term. This imbalance should be considered for planning purposes, since women generally participate less than men in the workforce and, therefore, there will be a percentage of women needing free health care services.

### **Natural Population Growth**

Natural population growth is the difference between births and deaths. Analysis of this factor in the Americas uncovered unexpected demographic issues, including how the population of each subregion would grow without migration.

Despite the difference in population size, Brazil and the Andean Area have practically the same natural increase, and the highest levels of all subregions (Table 4). Mexico's natural increase is the third highest, higher even than that of the United States, although the population of the United States is more than twice as large. Central America also has a natural increase exceeding that of the Southern Cone. The Latin Caribbean and the Caribbean have the lowest rates of increase.

### **International Migration**

Little information is available on international migration; therefore, available estimates regarding migratory movements considerably diverge from reality.



According to estimates, almost a million people will enter the Americas in 2002, but the distribution of this influx is uneven among the subregions. In fact, there are just two subregions that attract people: North America, with an immigration balance exceeding 1.35 million persons, and the Southern Cone, with 12,000 immigrants per year. In contrast, Mexico has the highest emigration balance, with nearly 300,000 people leaving the country in 2002, followed by the Latin Caribbean, with more than 43,000 people leaving the subregion annually.

Analysis within the subregions shows that in North America, the United States receives 1.2 million people a year and Canada receives 150,000. In the Southern Cone, only Argentina has an immigration balance, 24,000 people a year, while Chile has an emigration balance of 10,000. All the countries in the Andean Area registered emigration or null migratory movement. In Central America, Costa Rica has an immigration balance, while the other countries have emigration balances. In the Caribbean there are small countries that receive immigrants, notably Guyana, with an annual immigration balance of 1,320 per year. In contrast, Jamaica has an emigration balance of 14,000. In the Latin Caribbean, the only country experiencing immigration is Puerto Rico, with 6,000 persons entering yearly. Haiti's and Cuba's high emigration balances, with 21,000 and 15,000 people leaving each year, respectively, also are worthy of note.

## Urbanization

In general, urbanization is considered to be the increase in the percentage of people who live in zones defined as urban. But, given that in the Americas, particularly in Latin America, urbanization has increased rapidly, it is also necessary to measure the speed of change or the pace of the process. In this analysis, the difference between the growth rate of the urban population versus that of the rural population was used to measure the urbanization process.

### *Percentage of the Population Living in Urban Areas*

The populations of the Americas have achieved a high level of urbanization, particularly in the more developed countries, as measured by the percentage of the total population living in urban areas. It should be noted, however, that urbanization is proceeding more rapidly in the less developed countries. In 2000, it was estimated that 75% of the Region's population lived in cities, compared to 41% in 1950.

In 2002, the subregion with the highest percentage of urban population will be the Southern Cone, with more than 86.4%, followed by Brazil and North America. In Central America, 48.7% of the population will be urban (Table 5). The Andean Area has countries at different stages of urbanization. While in Venezuela 87.4% of the population is urban, in Bolivia and Ecuador the numbers are 63.7% and 67.1%, respectively. Similarly, in the Latin Caribbean 75.7% of the population in Cuba and 75.9% of

the population in Puerto Rico live in urban areas; in Haiti, just 37.1% lives in cities.

The number of people in the Region's rural areas will not change significantly, which means that rural growth will be absorbed by the urban areas. The rural population will begin to decline in the Southern Cone, Brazil, and the Caribbean; it will remain stable in the Andean Area, the Latin Caribbean, and North America; and it will continue to increase in Mexico and Central America (Table 5).

All the countries in each subregion show the same tendency, which means that the growth rates of the rural population in the coming decade will be lower than those observed between 1996 and 2002. The exceptions will be countries where rural growth rates over the coming six-year period are expected to be higher than those experienced during the previous six-year period, such as Argentina, Brazil, Uruguay, and some Caribbean countries.

A trend toward a slight increase or a decrease in a country's rural population means that practically all population growth is in urban areas. As a result, it is not surprising to see rates of urban growth that are relatively high, but not as high as in previous decades. The Central American subregion has the highest rates of urban growth (exceeding 3.3% per annum in 1996–2002); on the other hand, in North America and the Southern Cone, where there is already a high percentage of urban population, the growth rate of the urban population approximately 1%.

### *Rate of Urbanization*

While the percentage of urban population provides an idea of the degree of urbanization, variations in this percentage make it impossible to calculate the urbanization rate. A more satisfactory measure is the difference between the growth rates of the urban and rural populations, because this difference indicates the growth of urban dwellers per person living in a rural area.

Measured this way, Latin America's urbanization process is slightly faster than that of the non-Latin population in the Americas. Judging by changes foreseen in 1996–2002, the rate of urbanization in Latin America is slowing (Table 5). This phenomenon can be observed in most of the countries, but is most evident in Brazil, where the rate of urbanization was faster (3.5%) in relation to all the other subregions, although it is expected to decline considerably in the future. In contrast, the speed of urbanization in Mexico is one of the slowest (1%), because the country's rural population is, according to estimates, continuing to grow.

The rate of urbanization differs markedly among the countries in each subregion. In the Andean Area, for example, Ecuador's urbanization process is the most rapid, and Peru's is the slowest. In the Southern Cone, Argentina is showing rapid urbanization, while Chile's is slow. The differences among the Caribbean countries may be due to the fact that some of the countries have significant emigration in relation to their overall population size.

### *Growth of Cities*

The analysis of urban and rural population changes and trends deals with just one aspect of the urbanization process. Because the urban population is made up of residents of some very small cities and some vast metropolises, it is appropriate to analyze urban population growth with the size of the cities in mind.

In general, the countries of the Americas have entered a stage in which the population of the large cities (more than 750,000 inhabitants) is growing at lower rates, rates that increasingly resemble those of small cities. In 1996–2002, large cities continued to grow more rapidly than smaller cities in the Caribbean, the Andean Area, Central America, and Mexico (Table 5). In Brazil, the Latin Caribbean, and the Southern Cone, the population in cities with fewer than 750,000 inhabitants grew more rapidly than the population of larger cities. In the coming years it is expected that the growth rate of smaller cities will be higher than that of larger cities in every subregion except the Latin Caribbean.

Approximately half of the largest cities in the Americas are in Latin America. Some 160 million people live in the 20 largest cities, 55 million of them in the largest metropolises—Mexico City, São Paulo, and New York.

### **The Relationship between Fertility and Mortality in the Americas**

Demographic transition in a population refers to the relationship between mortality and fertility trends over time—in other words, it is the historical transition of a population from high to low levels of mortality and fertility. As mortality starts to decline, fertility also is expected to begin to drop. But because there is no biological or demographic imperative that ties a given level of fertility to a given level of mortality, every country undergoes its own demographic transition. In most of the countries of the Americas, several factors helped to move this demographic transition along—the ease of communication and the international exchange of medicines, which directly or indirectly contributed to the decline in mortality; contraception policies, which helped to reduce fertility; and accelerated urbanization. As a result of the accelerated decline in mortality in most of the Region's countries, the Americas experienced rapid and steep population growth. The rapid decline in fertility will lead to a fast-paced aging of the populations.

Demographic transition in Argentina, the United States, and Uruguay has been similar to that of some European populations, with a slow, sustained reduction in mortality and fertility. The other countries of the Americas had or have an accelerated demographic transition process that results in differences among the countries: some have higher mortality than others, but the same level of fertility; some have different levels of fertility and the same mortality. Figure 30 shows the Region's countries by life expectancy at birth and total fertility rate (TFR) in 2002. Overall, there is a concentration of countries with a low TFR (under 2.0) and long life expectancy at birth (over 74); these countries have

already reached a low level of mortality and fertility and are achieving balanced population growth.

At the same level of life expectancy (74.0 to 75.9), Chile, Jamaica, Panama, and Uruguay have a TFR of 2.4 to 2.5, while French Guiana has a TFR between 3.8 and 3.9. It could be said that French Guiana has very high fertility in relation to life expectancy, in comparison with the other countries mentioned. Similarly, Paraguay and Nicaragua would seem to have a relatively high TFR in relation to life expectancy, in comparison with Colombia, Ecuador, El Salvador, and Peru.

In comparing countries with TFRs between 2.2 and 2.3, the Bahamas, Brazil, and especially Guyana have high mortality in relation to fertility. This phenomenon may be due to the fact that, in the process of demographic transition, fertility has declined faster than mortality in these three countries.

Bolivia, Guatemala, Haiti, Honduras, Nicaragua, and Paraguay lag behind the other countries of the Americas in terms of declining fertility and mortality. Other countries, such as French Guiana and the Turks and Caicos Islands, have a fertility rate related to the level of mortality. The opposite is true of Grenada, Guyana, and the Dominican Republic, whose mortality is high with respect to the level of fertility.

Demographic transition in the Americas will continue in the future, and it is expected that mortality and fertility rates will continue to decline in all the countries. Due to the effect that causes of death have on life expectancy at birth at different ages and in different population groups, this process of demographic and epidemiological transition will become clearer through an analysis of mortality by cause of death and other determining factors.

### **MORTALITY SITUATION AND TRENDS**

This section analyzes the mortality situation and trends in the countries of the Americas. The first part describes the profile, magnitude, and trends in connection with mortality for broad groups of causes and for selected causes in the different age groups. The second part examines the relative importance of the causes of mortality in terms of years of life lost and estimates the effect of mortality on life expectancy at birth.

The analysis presented in this section includes data from 19 selected countries (which together account for 91.3% of the Region's population and 90.9% of its estimated deaths for 2001) and compares the mortality situation in the beginning of the 1980s with that of the end of the 1990s. The countries included in the analysis are Argentina, Barbados, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, the Dominican Republic, Ecuador, El Salvador, Jamaica, Mexico, Panama, Paraguay, Puerto Rico, Trinidad and Tobago, the United States, and Venezuela. A consideration in selecting the countries was the availability of data with satisfactory coverage and quality for both periods. The informa-

tion was analyzed according to estimated mortality rates by cause for the total population (see Technical Notes).

### **Mortality Profile, Magnitude, and Trends**

The estimated Regional mortality rate, adjusted for age, declined from 9.1 per 1,000 inhabitants at the beginning of the 1980s to 6.9 at the end of the 1990s. Figure 31 shows the estimated Regional rate, adjusted for age and sex, for each of the broad groups of diseases. In general, all the groups showed a decline in the rate between 1980 and 1990. It is important to analyze the difference in the percentage of reduction for each group of diseases, however (Figure 32). The sharpest decline was in diseases of the perinatal period (34.7%), but the decline for neoplasms was just 2.7%. The estimated mortality rates, adjusted for age, for the six broad groups of causes, by sex, are found in Table 6 (early 1980s) and Table 7 (late 1990s).

Table 8 shows the percentage reduction in the mortality rate for broad groups of causes between the beginning of the 1980s and the end of the 1990s in selected countries. The general trend was toward a decline in the risk of death, but there are differences among the countries, which are presented below. Annex B.2 shows changes in mortality from selected diseases between 1980 and 1990.

#### *Communicable Diseases*

There was a marked reduction in mortality from communicable diseases among males in almost all the countries, except in Barbados, Canada, the United States, and Puerto Rico, where rates increased by 79.1%, 21.0%, 41.6%, and 68.5%, respectively. Among females, the trend is similar in most of the countries, although not so pronounced. The only countries in which the rates for females increased were Barbados (1.3%), the United States (35.6%), and Puerto Rico (30.1%).

#### *Neoplasms*

With respect to malignant neoplasms, there was an increase in the rates for males in Barbados (29.2%), Canada (0.1%), Cuba (2.9%), the Dominican Republic (7.5%), Ecuador (13.1%), Jamaica (4.9%), Mexico (28.1%), Paraguay (2.7%), and Trinidad and Tobago (22.7%).

For females, rates increased in Barbados (6.1%), the Dominican Republic (5.3%), Jamaica (1.0%), and Trinidad and Tobago (6.1%).

#### *Diseases of the Circulatory System*

Mortality rates from this group of diseases decreased in all countries for both sexes. The magnitude of the reductions varied from 0.2% for men in Paraguay to 52.8% for men in El Salvador, however.

#### *Diseases Associated with the Perinatal Period*

With respect to this group of diseases, the vast majority of the countries had lower mortality rates for both sexes. Trinidad and

Tobago showed an increase of 11.9% for males, however. The increase for females was 4.7% in Paraguay and 10.2% in Trinidad and Tobago.

#### *External Causes*

In the majority of the countries of the Region, there was a reduction in mortality from all external causes, for both women and men. The exceptions for men were Brazil (5.7%), Colombia (9.4%), Costa Rica (3.2%), and Puerto Rico (4.3%). Rates increased for women in Costa Rica (2.1%), Paraguay (17.7%), and Puerto Rico (4.3%).

### **Impact of Mortality on Life Expectancy at Birth**

Because premature and avoidable death exacts such a high social cost, its analysis is of the utmost importance for evaluating the populations' health conditions. Mortality rates are indicators of the absolute risk of dying and, therefore, are a fundamental tool of epidemiological analysis. In the last two decades of the 20th century, the Region of the Americas has seen a reduction of about 25% in the mortality rate. As a result, there has been an average increase of almost 6 years in life expectancy at birth (Table 9). This net gain in life expectancy reflects and summarizes the various changes in the mortality rates and profiles in the Region during the early 1980s and late 1990s that were documented in the preceding section.

Considering the reciprocal relationship between mortality and life expectancy, this section evaluates the impact of changes in mortality on life expectancy in the countries of the Americas during the last 20 years; it uses the Arriaga method (18) to partition the change in life expectancy (Annex A.2). Based on the Pan American Health Organization's Regional Database on Mortality, abridged life tables were prepared for each country, sex, and period, and the underlying causes of death were classified into 6 large groups and 32 main categories (Annex A.1).

In this analysis, the impact of each cause of death on life expectancy at birth is evaluated using two complementary dimensions: 1) the change in mortality due to each group of causes, expressed in years of life expectancy gained (YLEG) between the beginning of the 1980s and the end of the 1990s; and 2) the level of mortality due to each group of causes, expressed in years of life expectancy lost (YLEL). Years of life expectancy lost was measured as the difference between life expectancy observed in the late 1990s and a theoretical life expectancy of 85 years. This approach extends equally to the different age groups and to both sexes. YLEG is a measure of the actual impact—seen in the study period—of a specific cause of death on life expectancy at birth. Complementarily, YLEL is a measure of the potential impact—achievable over the middle term—that reduction in mortality due to that cause would have on life expectancy at birth (i.e., years of life expectancy yet to be gained). Considered together, these measures add a strategic value to the analysis of mortality

trends and offer public health decision makers clearer evidence of the impact of mortality in the Americas.

Figure 33 shows the impact of mortality on life expectancy at birth, disaggregated by broad groups of causes of death, for the Region as a whole. The decrease in mortality due to communicable diseases and to diseases of the circulatory system observed between the beginning of the 1980s and the end of the 1990s was the greatest contributor to the observed increase in life expectancy in the Region. The result of the decreased risk of dying from each of these two major causes in half of the countries was between 1 and 3 YLEG during that period. On the other hand, by the end of the 1990s, mortality from cardiovascular diseases and neoplasms contributed most to the Region's loss of life expectancy (median of 4 and 2 YLEL, respectively). Figure 33 shows the comparatively minor impact on life expectancy at birth of perinatal mortality during the most recent period, not just because the change in this factor was relatively small (median: 0.5 YLEG), but also because perinatal mortality already is very low (median: 0.9 YLEL).

The net gain in life expectancy at birth achieved in the Americas between the beginning of the 1980s and the end of the 1990s was disaggregated into the specific contribution of each cause of death, by age and sex. Figure 34 summarizes that disaggregation, using YLEG averages, weighted by population size. The impact of the reduction of mortality in children under 5 years old on the gain in life expectancy in the Region as a whole is noteworthy—that reduction translates into an average gain of 2 YLEG for both sexes, which represents 50% of the total gain for men and 40% of that for women. This gain mainly was due to a reduction in mortality from infectious diseases (60%; 1.2 YLEG) and from diseases originating in the perinatal period (25%; 0.5 YLEG) in that age group and for both sexes. Figure 34 also shows the gain derived from the reduction in mortality from external causes in young people and from cardiovascular diseases in adults, which are most evident in women's life expectancy. This, added to the greater negative impact of mortality from residual causes, infectious diseases, and neoplasms on males' life expectancy, explains why women have gained, on average, more years of life expectancy than men (4.9 and 3.8 YLEG, respectively). The negative impact of mortality from infectious diseases in men aged 25–40 and in women aged 30–40, essentially attributable to the impact of mortality from AIDS in young people, also can be seen. This will be analyzed in the following section.

### *Infectious Diseases*

Practically all the Region's countries experienced a reduction in mortality from infectious diseases between the beginning of the 1980s and the end of the 1990s, which translated into substantial gains in life expectancy (Figure 35). As a rule, the largest contributions to YLEG were seen in countries where mortality levels from these causes of death (measured in YLEL) are highest. By the same token, the most modest increases in YLEG were

seen in countries that already had achieved a low level of mortality from these causes. The impact of mortality from infectious diseases in Ecuador, for example, exceeded 4 YLEG during that period, the highest amount observed among the countries studied. However, a further reduction in mortality from infectious diseases in that country could translate to a gain of three more years of life expectancy. In El Salvador and Paraguay, which in late 1990 had that same level of mortality (3 YLEL), the impact was less pronounced (1.7 and 2.4 YLEG, respectively). Mortality from infectious diseases had the most negative impact in Barbados and Puerto Rico, where there has been a negative contribution (–0.5 YLEG) to the already relatively high levels of mortality due to those causes in the last 20 years. In contrast, the small negative contribution to life expectancy found in Canada and the United States is associated with greater sensitivity to changes in mortality (especially from AIDS and other emerging diseases), since these countries have the lowest levels of mortality from infectious diseases in the Region. Roughly 25% of life expectancy gained in the Americas over the last 20 years (that is, 1 of every 4 YLEG) has resulted from a reduction in mortality from infectious diseases in the first 5 years of life.

**Diseases preventable by immunization.** Figure 36 illustrates the impact of mortality from these diseases on female life expectancy (similar to males). The positive contribution (in YLEG) in Ecuador and El Salvador and, to a lesser extent, in Brazil, Mexico, Panama, and Paraguay, is noteworthy. The almost total absence of YLEL from vaccine-preventable diseases in the Region also deserves mention; in other words, the reduction of the mortality level from these diseases to virtually zero in the Americas. To examine these changes, it is more telling to analyze the rate of change in YLEL between the beginning of the 1980s and the end of the 1990s (Figure 37). Loss of life expectancy attributable to mortality from these causes has been declining rapidly in all the countries of the Americas, at a pace that exceeds 20% a year in Brazil, Colombia, Cuba, Ecuador, El Salvador, Mexico, and Panama. This underlines the need to sustain immunization programs in order to safeguard this gain.

**Acute respiratory infections.** The reduction in mortality from this cause also has had a significant impact on the gain in life expectancy in the countries of the Region (Figure 38). Brazil, Ecuador, and Mexico benefited most (approximately 1.0 YLEG). The sole exception was in El Salvador, where the impact on YLEG was negative (approximately –0.5), making it the country with the most YLEL from this cause (1.4). In contrast with the situation with respect to vaccine-preventable diseases, the level of mortality from acute respiratory infections remains high, with most of the countries in the 0.5 to 1.0 YLEL range. There is a bimodal age distribution of these YLEL (Figure 39): the impact of mortality from acute respiratory infections on life expectancy affects children in the first years of life and adults at older ages—a

fact that must be considered in planning interventions. This pattern differs from that of acute diarrheal diseases, for example, which affect children in the first 5 years of life almost exclusively.

**AIDS.** In the period under study, the single most important infectious cause, in terms of loss of years of life, was AIDS, particularly in the male population (Figure 40). In terms of YLEG, Barbados (-1.5), Puerto Rico (-1.0), Panama (-0.7), and Trinidad and Tobago (-0.6) suffered the most negative impacts. These countries also are the ones with the highest level of mortality from this cause, as expressed in YLEL (2.0, 1.3, 0.8, and 0.8, respectively). The negative impact of AIDS in the period under study has mostly affected the young (Figure 41); the loss of years of life expectancy in males has roughly tripled that of females.

**Septicemia.** Between the beginning of the 1980s and the end of the 1990s, Argentina, Barbados, Canada, Colombia, Ecuador, El Salvador, Jamaica, Puerto Rico, Trinidad and Tobago, and the United States experienced a real increase in YLEL from septicemia. In those countries, the rate of relative change in YLEL attributable to mortality from that cause ranged between 2% and 10% per annum in both sexes, and this does not reflect net negative contributions to YLEG. Figure 42 shows the age distribution of YLEG from septicemia and provides evidence of a striking fact: the change in mortality from this cause made a positive contribution to YLEG in young people and a negative contribution to YLEG in adults. Aside from the health priorities in connection with reduction of infant and maternal mortality (note the difference vis-à-vis the curve for men aged 15 to 40), this evidence suggests that there are unequal opportunities in terms of access to health services and to specialized health care.

### *Neoplasms*

In general, mortality from cancer in the late 1990s still represented between 2 and 3 YLEL in each country. The contribution of mortality from these causes to the change in life expectancy in the Region between the beginning of the 1980s and the end of the 1990s has been very modest, no greater than  $\pm 0.5$  (Figure 43), although, as this analysis shows, there have been some important trends in the period. For example, half of the countries experienced a modest but positive impact on life expectancy attributable to the reduction in mortality from lung cancer in men (Figure 44). In women, however, *all* the countries experienced negative contributions to YLEG from this cause, particularly Canada and the United States (Figure 45). Furthermore, while there was a real accumulation of YLEG for men aged between 30 and 60, the net impact in women was negative (Figure 46).

On the other hand, whereas the contribution in YLEG from changes in stomach cancer mortality was positive for both sexes and in all the countries, except El Salvador, in the period under study, the impact attributable to colon cancer was negative, except in Canada, the Dominican Republic, Panama, Paraguay, and

the United States. These changes could be associated with lifestyle modifications and levels of exposure to carcinogens and factors related to the development of these neoplasms.

Another trend that was consistently observed in the countries of the Region, except Paraguay and the United States, is the negative impact on YLEG from prostate cancer, which is comparatively greater in Barbados (-0.5 YLEG) (Figure 47). Furthermore, the rate of change in YLEL from this cause is high in all the countries (Figure 48). The loss in male life expectancy from prostate cancer has grown at about 8% a year in Barbados, 6% in El Salvador, and approximately 4% in Chile, Colombia, the Dominican Republic, Ecuador, Mexico, Trinidad and Tobago, and Venezuela. Breast (Figure 49) and uterine (Figure 50) cancer together account for 1.0 to 1.5 YLEL in women. The change in mortality from breast cancer represented a net gain in life expectancy for women only in Canada and the United States, although it was a small gain (0.1 YLEG), while the change in mortality from uterine cancer had a positive effect in all the countries, except El Salvador (-0.3 YLEG).

### *Diseases of the Circulatory System*

Cardiovascular diseases contribute greatly to the loss of life expectancy in the Americas, although in the last 20 years, the reduction in mortality from these causes has had a considerable positive impact in all the countries of the Region (Figure 51). Between the beginning of the 1980s and the end of the 1990s, Canada accumulated 3.0 YLEG by reducing mortality from these diseases. While it still registers 2.5 YLEL attributable to these causes, it is the only country that had more YLEG than YLEL from cardiovascular death in the late 1990s. Argentina also accumulated 3.0 YLEG during that period, and still has 4.0 YLEL to reverse.

Both in terms of change (YLEG) and level (YLEL), mortality from ischemic heart disease has had the most impact on life expectancy in the Americas. The change in mortality from this cause resulted in a positive contribution to YLEG in all the countries studied, except Mexico (approximately -0.5 YLEG), Paraguay (-0.2 YLEG), and the Dominican Republic (0 YLEG). In Canada and the United States, a contribution of approximately 1.7 YLEG is noted, and Argentina registers approximately 1.0 YLEG due to reduction in mortality from ischemic heart disease (Figure 52). Considering the mortality level from this cause on YLEL, the gains in YLEG in Chile, Colombia, Costa Rica, Cuba, Puerto Rico, and Trinidad and Tobago have been smaller. The differential age distribution of YLEG in connection with gender is noteworthy: on the one hand, men begin to accumulate YLEG 15 to 20 years before women; on the other, women continue to accumulate YLEG continuously throughout their lifetimes, while in men it starts to decline at 55–60 years of age (Figure 53), according to the epidemiology of these diseases.

The reduction in mortality from cerebrovascular disease in the countries of the Americas also had a significant positive impact on YLEG (between 0.5 and 0.7 YLEG), particularly in Argentina, Brazil, Canada, Chile, El Salvador, and Venezuela

(Figure 54). Moreover, Canada, Puerto Rico, and the United States have already achieved the lowest level of mortality from this cause (under 0.5 YLEL). If this level were achieved by Barbados, Brazil, Colombia, Jamaica, Panama, Paraguay, Trinidad and Tobago, and Venezuela, life expectancy at birth in these countries would increase by at least 0.5 years. The age distribution of YLEL due to mortality from cerebrovascular disease is relatively similar in both sexes, although the loss of life expectancy from this cause starts some five years earlier for men (Figure 55).

The impact of mortality from arteriosclerosis and hypertensive disease has also been pronounced in both sexes and in all the countries of the Region, even though, proportionally, they represent significantly fewer YLEG and YLEL than do ischemic heart disease and cerebrovascular disease. The other heart diseases, grouped into a single category, on average contributed 0.5 YLEG (1.0 in Mexico) in most of the countries, and still represent approximately 1.0 YLEL (2.0 in Argentina). As a matter of fact, the rate of change in YLEL due to mortality from these causes—which in some circumstances may be proxy indicators of the quality of certification of cardiovascular death—shows a relatively rapid decrease of their impact on life expectancy, along the order of  $-2\%$  to  $-6\%$  per year, and slightly higher in women in the most countries (Figure 56).

#### *Diseases Originating in the Perinatal Period*

Figure 57 shows the impact of perinatal mortality on life expectancy at birth in the countries included in the analysis. With the exception of Trinidad and Tobago, all the countries experienced a positive contribution to YLEG due to the reduction of mortality from perinatal causes, especially El Salvador (2.0 YLEG) and Barbados (1.0 YLEG). Canada, Chile, Cuba, and the United States show the lowest YLEL from these causes (0.3 YLEL). Brazil, the Dominican Republic, Ecuador, Paraguay, and Trinidad and Tobago, in contrast, have the highest levels of YLEL (between 1.5 and 2.0 YLEL) from perinatal mortality. In Paraguay and Trinidad and Tobago, the rate of YLEL shows an increase in the loss of life expectancy along the order of  $1\%$  per year from mortality due to these causes. In the other countries, however, there is a reduction of up to  $-6\%$  a year, such as in Barbados, Chile, Cuba, and El Salvador (Figure 58).

#### *External Causes*

Violent death remains an important cause of loss of life expectancy in the Americas; in the late 1990s, the Region's countries showed between 1.5 and 3.5 YLEL from this cause. Changes in mortality from external causes from the beginning of the 1980s to the end of the 1990s resulted in a modestly positive contribution to YLEG (in general, not exceeding 0.5), with the exception of El Salvador (2.5 YLEG attributable to the end of the armed conflict early in the period) and Mexico (1.0 YLEG). Even in Colombia and, to a lesser extent, Puerto Rico and Brazil, the contribution to YLEG was negative (Figure 59). In fact, these modest YLEG gains are mostly the result of the reduction in mortality

from traffic accidents in men (Figure 60), especially young adults (Figure 61), since homicides (Figure 62) and suicides (Figure 63) had a negative effect on YLEG. Thus, as of the late 1990s, YLEL had increased due to these avoidable causes.

#### *Other Causes*

**Diabetes mellitus.** The impact on life expectancy because of a change in mortality due to this disease is considerable in the Americas. In fact, from the beginning of the 1980s to the late 1990s, the contribution attributable to this cause was negative in the vast majority of countries, especially Barbados, Ecuador, Jamaica, Mexico, Panama, Puerto Rico, and Trinidad and Tobago (between  $-0.3$  and  $-0.7$  YLEG). Only in Argentina, Chile, and Costa Rica were there positive contributions, and these were small (in general, not exceeding 0.2 YLEG). Moreover, the impact of the level of mortality from this cause in the late 1990s was high, between 1.0 and 2.0 YLEL in Barbados, Jamaica, Mexico, and Trinidad and Tobago (Figure 64). The rate of YLEL provides more striking evidence of the real and potential effect of this cause on life expectancy. Except in Chile and in women in Costa Rica, the rate of increase in loss of life expectancy from diabetes mellitus was positive and sharp in all countries and in both sexes, between  $2\%$  and  $6\%$  in most of the countries and up to  $8\%$  for men in Barbados (Figure 65). The age distribution of YLEL due to this cause shows that its greatest effect is on women starting at age 40 (Figure 66).

**Cirrhosis of the liver.** This cause of death, as do other liver disorders, has considerable impact on life expectancy in the population of the Americas, particularly among men. The change in mortality from this cause from the beginning of the 1980s to the end of the 1990s resulted in a positive contribution to YLEG in most countries, especially Chile, Puerto Rico, and Trinidad and Tobago (0.4 YLEG). However, the impact attributable to the level of mortality, in terms of YLEL, is still high in several countries: 1.5 in Mexico, 1.0 in Chile, and 0.8 YLEL in Barbados, Brazil, Costa Rica, the Dominican Republic, Ecuador, and El Salvador. In the last 20 years, countries such as Barbados, Costa Rica, Ecuador, and, to a lesser extent, Cuba, Colombia, and Panama accumulated negative contributions to YLEG from this cause (Figure 67); in these countries, the rate of YLEL indicates positive growth in loss of life expectancy from cirrhosis in both men and women (Figure 68).

**Complications of pregnancy, birth, and the puerperium.** The impact of mortality from these causes on women's life expectancy can be seen in Figure 69, which shows the significant positive impact on YLEG from the reduction in mortality due to these causes from the beginning of the 1980s to the end of the 1990s, especially in Paraguay, Ecuador, El Salvador, Mexico, and the Dominican Republic. In the late 1990s, YLEL from these causes was no higher than 0.1, except in Paraguay (0.3 YLEL).

**Chronic obstructive pulmonary diseases.** The rate with which loss of life expectancy attributable to these diseases is decreasing is noteworthy (Figure 70). The rate of change of this cause from the beginning of the 1980s to the end of the 1990s has ranged between  $-2\%$  and  $-6\%$  in most countries, reaching  $-10\%$  per year for both men and women in Colombia, Ecuador, and El Salvador. An exception to this trend is seen in the female population of Barbados and of the United States, where the rate of change of YLEL from chronic obstructive pulmonary disease has been growing ( $+3\%$  and  $+2\%$  per year, respectively).

Changes in a population's mortality profile—the different risks of dying to which its inhabitants are exposed—largely reflect the complex interactions of diverse macrodeterminants of individual and collective health. Included, of course, are the effects of preventive, curative, and rehabilitation health interventions implemented in those populations. Changes in mortality, and their impact on life expectancy, also are manifestations, in terms of health, of the persistent socioeconomic inequalities among the populations of the Americas. This analysis is not intended to be an exhaustive study of the impact of mortality on life expectancy in the Region during the last two decades of the twentieth century. It does, however, summarize the most important changes in the mortality risk profiles for the Region's countries. On the one hand, it provides an account of the obvious accumulation of health gains in the Region; on the other, it offers the analysis needed to explore the degree of equity with which these gains are distributed in the population. The latter analysis is the subject of this chapter's next section.

## REGIONAL HEALTH INEQUALITIES

In global terms, the increase in life expectancy at birth observed in the countries of the Americas can be considered as a summary indicator of the degree to which their populations are accumulating health gains. On average, 2.7 years of life expectancy were gained between 1985 (67.5) and 1995 (70.2), and 5.5 years between 1980 (65.8) and 2000 (71.3). These gains, however, do not occur to the same extent and are not distributed equally between countries or in population groups within a country. This section empirically documents health inequalities in the Region, their extent and trends, and their close link to observed socioeconomic inequalities. Based on the availability of data for this section, the analysis included Argentina, Bahamas, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, the Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago, the United States, Uruguay, and Venezuela. Together, these countries account for 98.2% of the Region's estimated 2001 population.

## The Socioeconomic Dimension of Health Inequalities

The historical and social context discussed at the beginning of this chapter provides a frame of reference for analyzing health determinants and their role in creating and maintaining health inequalities in the Region. Conceptually, the population's health can be seen as determined by a set of factors that operate simultaneously at different levels of organization, from the individual to the social. In other words, health conditions and health inequalities are determined individually, historically, and socially. Methodologically, an analysis of health inequalities requires that the distributions of socioeconomic factors, as well as health status indicators be considered, not merely their average values. From a managerial standpoint, the health situation can be viewed as a product of the policies with which the States organize their social agenda, the ways in which the population adapts to them, and the degree of efficiency of both processes. As we have seen in the earlier analyses, sharp differences in income level and income gap, life expectancy, literacy, and economic and health resources are examples of inequalities in the health of the Americas at the close of the 20th century.

Economic development is a widely recognized macrodeterminant of health. In general, the most economically developed societies also have better health status which, in turn, fosters human development. Since the 1960s, the average Gini coefficient for Latin America and the Caribbean has been the highest in the world (see Annex A.3), which means that this is the most inequitable region in terms of income gap (19). More recently, the configuration of open markets and globalized economies in the Region, as well as a concern over the eventual emergence of structural effects potentially harmful to the population, have stimulated an interest in documenting the extent of income gaps and in trying to reduce them. PAHO has documented health inequalities by analyzing the distribution of various health indicators in groups of countries defined by income level (14, 15).

In this section's regional analysis of health inequalities, the socioeconomic dimension has been defined in terms of income level—measured by the per capita gross national product adjusted for purchasing power parity—and in terms of the inequality of income distribution, or income gap—measured by the top 20%/bottom 20% income ratio. It is important to emphasize that income level and income gap each describe independent characteristics of the socioeconomic dimension (Annex A.4).

In 1978–1998, the median income level for the Region as a whole was 3,744.59 international dollars, and the median income gap was 13.75. These two regional values were used as cutoff points for assigning countries to one of four possible groups according to their national income level and income gap medians in the same period: 1) low income and narrow gap (Cuba, Guyana, Jamaica, and Peru); 2) low income and wide gap (Bolivia, the Dominican Republic, Ecuador, El Salvador,

Guatemala, Honduras, Nicaragua, and Panama); 3) high income and narrow gap (Argentina, Bahamas, Canada, Costa Rica, Trinidad and Tobago, the United States, Uruguay, and Venezuela); and 4) high income and wide gap (Brazil, Chile, Colombia, Mexico, and Paraguay) (Table 10).

In a Regionwide context, these four groups of countries represent different socioeconomic profiles and can serve as the basis for analyzing health situation inequalities during the last two decades of the 20th century. This hierarchical classification makes it possible to document the effect of income level—and, by extension, of economic growth—on the health situation, as defined by a set of core indicators. Moreover, it makes it possible to explore the effect on health attributable to an unequal redistribution of income. In this respect, this analytical approach tries to show that health inequalities in the Region of the Americas are not solely or primarily determined by the amount of available wealth, but also by how equally wealth is distributed.

#### *Inequalities in Life Expectancy at Birth*

In accordance with the hierarchical classification of countries grouped by income level and income gap, Figure 71 summarizes the distribution of life expectancy at birth in the Region during the 1990s. The distribution of this indicator in each group, which is represented by a boxplot (Annex A.5), makes it possible to see the inequalities in life expectancy within and among groups simultaneously. Figure 71 highlights two basic facts: 1) life expectancy is greater in countries with high income levels; and 2) given the same income level, life expectancy is greater in the countries with narrow income gaps. In fact, it is precisely those countries with narrow income gaps, regardless of their income levels, that in the 1990s had a median life expectancy above the regional median. The median life expectancy in countries with low income and narrow gaps (70.8 years) is higher than that in countries with high income levels and wide income gaps (69.7 years). These differences also are reflected by sex (Figure 72).

A more detailed analysis of the Region's current health situation and health inequalities can be accomplished by exploring the level and distribution of a set of specific indicators of the health situation and its determinants, such as those comprising the Core Health Data Initiative (5). This information makes it possible to present a broader, more diverse view that could not be arrived at by analyzing only summary indicators, such as life expectancy.

#### *Inequalities in the Risk of Dying*

The increase in life expectancy at birth seen in the Region over the past 20 years implies a decrease in mortality. For example, the Region's average crude mortality rate, estimated and adjusted by age, decreased from 9.1 per 1,000 population in the 1980s to 6.9 in the 1990s. In other words, the absolute risk of dying dropped by 24%. In the group of countries with low income and narrow

income gaps, this drop reached 30.1%, while in countries with high income levels and wide income gaps, it was 18.8%. In the 1990s, the median crude mortality rate for the latter group of countries exceeded that of the former (7.8 and 7.0 per 1,000 population, respectively); the effect also is observed in both sexes. In general, the median risk of dying for someone who lived in a wealthy and inequitable country of the Americas in the 1990s was 10% greater than the risk of someone who lived in a poor country with better income redistribution.

The decrease in infant mortality in the Americas is particularly significant. In the early 1980s, the median Regional infant mortality rate was 42.5 per 1,000 live births, and it had dropped to 32.0 by the late 1990s—a 25% reduction in the absolute risk of dying in the first year of life. Figure 73 shows the distribution trends for this indicator in the four socioeconomic groupings: infant mortality is invariably higher in the groups of countries with wider income gaps, and this effect is consistent over time. Moreover, the difference in infant mortality among groups with narrow income gaps as compared to those with wide income gaps is more marked in the groups of countries with high income; this effect also holds over time. For example, in the late 1990s, in countries with high income levels, the ratio of median infant mortality rates for the groups with wide income gaps, compared to those with narrow income gaps, was approximately 2.0 (32.2/16.8 per 1,000 live births, respectively); while for the groups of countries with low income levels, this indicator of relative risk was 1.2 (42.9/36.0 per 1,000 live births, respectively). This suggests that, while the risk of dying in the first year of life is certainly higher in those groups of countries with low income levels than in those with high income levels, it is in the groups of countries with high income levels where the inequality in income distribution more strongly reflects inequalities in infant mortality and survival. Moreover, the consistency of this phenomenon over time suggests that inequalities in infant mortality did not change significantly in the last two decades of the 20th century.

Inequalities in infant mortality and survival also may reflect differences in the contribution of the various causes of death to the risk of dying in the first year of life. The ratio of the perinatal mortality rate to the communicable disease mortality rate in children younger than 1 year is clearly higher in the high income/narrow income gap scenario, where the relative weight of perinatal causes in infant mortality exceeds that of communicable diseases by 2.0 to 5.2 times (Figure 74). In the late 1990s, infant mortality from communicable diseases contributed to a loss of 6.1 times more years of life expectancy at birth in countries with low income and wide income gaps than in countries with high income and narrow income gaps (0.85/0.14 years of life expectancy lost, respectively). The impact of perinatal causes is 2.0 times higher in countries with low income and wide gaps than in countries with high income and narrow gaps (1.4/0.7 years of life expectancy lost, respectively).



These inequalities are more significant because, in a broad sense, the impact of communicable diseases on infant mortality is associated with general interventions in living conditions, such as water, sanitation, and education, while the effect on perinatal causes is related to the availability of and access to medical services and technology.

Analysis of the inequalities in mortality suggests that they are associated more with inequalities of income distribution (the gap) than with inequalities of income magnitude (the level). This characteristic effect is observed invariably and consistently in the analysis of mortality from such causes as communicable diseases, neoplasms, cardiovascular disease, and external causes, as reflected by the examples presented below.

Between the beginning of the 1980s and the end of the 1990s in the Americas, the regional average rate of change in YLEL for mortality from breast cancer was 1.3% per year. However, given the same income level, the rate of change is faster in the groups with wide income gaps. In countries with low income and wide gaps, the YLEL from breast cancer increased at a rate three times higher than that in countries with high income and narrow gaps (2.0% and 0.7%, respectively). The prostate cancer situation is analogous, but more pronounced; the average regional rate of change in YLEL was 4.9% per year during the period under study (Figure 75).

The reduction in cardiovascular mortality contributed significantly to YLEG in the Americas between the 1980s and the 1990s. At the Regional level, this reduction accounts for 41.3% of YLEG for women and 35.9% of YLEG for men. Figure 76 shows that, given the same income level, these gains were greater in the groups with narrow income gaps: for both sexes, the percentage of YLEG resulting from the reduction in risk of cardiovascular death is 2.5 times higher in the group with narrow income gaps than in the group with wide income gaps. In narrow income gap scenarios, the YLEG is 60% higher in the countries with high income. The situation is similar with respect to the reduction in mortality from hypertensive cardiopathy, one of the most important specific causes of death among diseases of the circulatory system.

The effect of socioeconomic inequalities on mortality is amplified when analyzing the risk of dying from external causes in the Americas during the 1990s (Figure 77). Four observations deserve to be highlighted: 1) for both men and women, the risk of dying from an external cause is 1.5 to 2.0 times higher in the country groups with wide income gaps; 2) given the same income gap, differences in income level have no substantial effect on the risk of death from external causes in either sex (although the variability in each group is different); 3) there is marked gender inequality—at the regional level, the risk of dying from an external cause is 3.3 times higher in men than in women (102.9/31.2 per 100,000 population); and 4) this gender inequality is more pronounced in countries with wide income gaps, particularly those that also have high incomes (rate ratio: 5.3; 150.4/28.6 per 100,000 inhabitants).

### *Inequalities in the Supply and Production of Health Services*

Health inequalities also are expressed in dimensions other than mortality, particularly those relating to the level and distribution of resources and to the access, coverage, supply, and production of health services. The Regional median of national per capita expenditures on health increased 6.2% per year during the 1980s and the 1990s (from 85.2 to 155.8 constant US\$, respectively); the rate of growth was 26.5% higher than that of per capita income (4.9% a year) in that period (from 2,841.2 to 4,592.1 international dollars, respectively). This positive trend was not evenly experienced throughout the Region, however: national per capita annual expenditures on health increased almost four times more rapidly in countries with high income levels and narrow income gaps (7.7%) than in countries with low income levels and wide income gaps (2.0%). In the 1990s, the median national per capita expenditure on health in countries with high income levels and narrow income gaps was eight times higher than that in countries with low income levels and wide gaps (529.5 and 63.4 constant US\$, respectively). Given the same income level, the national per capita expenditure on health ranged from 1.6 to 2.4 times higher in countries with narrow income gaps. Moreover, public spending on health as a percentage of national expenditures on health was invariably higher in countries with narrow income gaps (Figure 78). Between 1978 and 1998, for example, public spending on health represented 74.1% of the median national expenditure on health in the group with low income levels and narrow income gaps, double that in the group with high income levels and wide income gaps (38.3%); in the latter, private spending and, especially, out-of-pocket spending represent a comparatively higher percentage of national expenditures on health.

Analysis of the distribution of a set of indicators of the supply and production of health services in the Region, such as availability of hospital beds (Figure 79), coverage of births by trained personnel (Figure 80), ratio of health professionals to population, prevalence of contraceptive use, and prevalence of low birthweight, shows a pattern of health inequality similar to that described in previous paragraphs. Overall, in the last two decades of the 20th century in the Americas, countries with narrow income gaps—in other words, those that redistribute wealth more equitably—have accrued more health gains, and this is not only true for the wealthiest countries.

### *Inequalities in Health Determinants*

Health inequalities at the Regional level reflect, to a large extent, structural socioeconomic inequalities. For example, the median total fertility rate for 1980–2000 was clearly lower in the groups of countries with narrow income gaps (2.7 and 2.6 children per woman in countries with low and high income, respectively) than in the groups of countries with wide income gaps, where fertility has been higher in low-income groups (4.3 children per woman) than in high-income groups (3.1 children per woman) (Figure 81).

In fact, countries with fertility rates nearer to the replacement level—meaning that their demographic transition is more advanced—were not the countries with the highest income, but those with less inequality in the distribution of their income.

For 2000, inequalities in education—one of the most significant macrodeterminants of health—can be analyzed through the distribution of the literacy rate. The regional median literacy rate increased from 84.9% in 1980 to 91.9% in 2000, with a slightly higher annual rate of growth for women (0.50%) than for men (0.38%). But, at the end of the period, the literacy rate was consistently lower in countries with wide income gaps, especially in those that also have low income levels. Moreover, gender inequalities associated with literacy have been more pronounced in countries with wide income gaps (Figure 82). In summary, the countries that tend to be more equitable in their income distribution tend to have higher literacy rates, and these are distributed more evenly between men and women.

Finally, a macrodeterminant of health that has much significance in the Region is access to basic water and sanitation services. Median water and sanitation coverage in the Region increased from 66.3% to 86.9% between the beginning of the 1980s and the end of the 1990s, at a rate of 1.4% per year. Three observations are noteworthy in Figure 83: 1) urban areas achieved median coverage levels above 90%, and the distribution is similar regardless of income levels and income gaps; 2) given the same income level, countries with wide income gaps have lower coverage of access to water and sanitation in rural areas; and 3) inequalities between urban and rural areas are more accentuated in the groups of countries with wide income gaps, regardless of their income levels. This evidence suggests that the countries which tend to distribute their income more equitably also tend to have better water and sanitation coverage with fewer urban-rural disparities.

### Regional Scenarios for Health Action

In addition to having to generate evidence that can guide health policies, there is a need to translate this information into timely and effective interventions that can improve the health situation. This goal, inherent in epidemiological analysis, must continue to support the political commitment to reduce inequalities and improve the health conditions in the Region. This section presents the differential impact on life expectancy produced by the mortality profile of each country grouping, by income level and income gap. This impact, measured in terms of years of life expectancy lost before reaching age 85 due to mortality from specific causes, shapes characteristic regional scenarios that make it possible to document the mortality burden and identify health intervention priorities in the middle term.

In the Region of the Americas at the dawn of the 21st century, the impact of mortality on life expectancy at birth is more pronounced in countries with greater inequality in their income distribution, not in the poorest countries. Men in countries with low

income levels and narrow gaps lose, on average, 13.2 YLEL, a level similar to that seen in countries with high income levels and narrow gaps (13.4 YLEL). In contrast, countries with low income levels and wide gaps lose 17.6 YLEL, and countries with high income levels and wide gaps lose 19.6 YLEL. This impact also is evident in women (10.0 and 8.8; 13.0 and 12.9, respectively).

Existing scenarios in the Region are defined by analyzing the specific contributions of each group of causes of death, by age group and sex, in countries with low income and narrow gaps (Figure 84), low income and wide gaps (Figure 85), high income and narrow gaps (Figure 86), and high income and wide gaps (Figure 87). Given the same income level, countries with wide gaps have a significantly greater concentration of YLEL in the youngest age groups for both males and females, mostly attributable to mortality from infectious diseases and perinatal causes. The impact of violent death at young ages also is greater in countries with wide income gaps, especially in the male population. Table 11 presents a detailed analysis of the similarities and differences in these scenarios, both in the relative positions of the most important causes of mortality and in the extent of the impact of each on life expectancy at birth. Moreover, these Regional scenarios also show different demographic structures, as illustrated in the distribution of their population pyramids, seen in Figure 88.

The dissociation between level of health and distribution of health, and the contrast between income level and income gap reflect the multicausal model under which health determinants operate and interact. On the one hand, the Region's health situation shows that scenarios with greater socioeconomic disadvantage are not just those in which there is more poverty, but also those in which there is more inequality in the distribution of income, regardless of the amount of wealth available. On the other hand, it shows that improvements in average levels of health that are not accompanied by improvements in the distribution of health gains are insufficient to generate human capital and accumulate sustainable development. In light of this analysis and given the urgent need to steer interventions toward promoting development and equity in health, decision makers must step up to the challenge and include both the level and the distribution of health when they set health policies and priorities.

### Pan Americanism and Equity: Efforts toward a Healthier Hemisphere

At the dawn of the 21st century, the Americas are confronting a double challenge: they must make still greater gains in health and they must redistribute existing gains more equitably among their populations. The goal of "health for all" remains vibrant, as it emphasizes the distribution of health gains. The challenge involves closing the gap between the level and distribution of health gains; it also demands political and technical commitment at all levels of organization (local, national, and subregional), and it is, in essence, a Pan American effort.

Consolidating the stewardship of health—one of the main objectives of health sector modernization processes throughout the Hemisphere—is of the highest political importance for guiding decisions that promote equity in health. In this respect, the top priorities are the creation of public health information and communication networks and systems, the strengthening of the ability to analyze the health situation, and the proactive use of epidemiology in health management (generation of epidemiological intelligence). Technically, these priorities are reflected in the definition of the essential functions of public health. Moreover, an understanding of the multilevel scenario in which health determinants operate and interact calls for a multisectoral policy response that encompasses many currently operating factors: the legal framework; the strategies to reduce poverty and the promotion of economic growth; the trade-offs between equity and efficiency and between capital and labor; the strength of redistributive policies; the opportunities to strengthen civil society and create jobs; social security; housing and food subsidies; universal education and health coverage; and a safe, high-quality, sustainable environment, while encouraging equitable distribution of wealth and well-being in the spirit of Pan Americanism.

The surveillance and monitoring of health inequalities through indicators that are sensitive to the socioeconomic dimension and cultural diversity are critical for evaluating the effect and impact of health policies and interventions. The analytical approach will become more useful as decentralization in health grows and the capability to regularly gather and process health data disaggregated at the local level develops. Similarly, the capacity to intervene successfully in matters of health benefits as communications and the link between epidemiological practice and local health management are strengthened.

In broad terms, the Region's health situation presented here—changes in life expectancy, mortality profile, pattern of socioeconomic inequalities in health—can be seen as a reflection of the combined impact that demographic transition, epidemiological polarization, and, especially, the effectiveness of health policies and the performance of health systems have had on the populations of the Americas in the last decades of the 20th century. The accumulated health gains are a tribute to “health for all by the year 2000.” The unresolved health problems, the emergence of new ones, and the unequal distribution and effect of both on the collective health in the Americas result from a complex dynamic that opens the way to the sweeping social, economic, political, and cultural changes that are taking place. These changes provide a framework for globalization and require the Region's renewed commitment to “health for all,” tied to Pan Americanism and equity.

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TABLE 1. Selected countries, distributed by income quintiles, Region of the Americas, 1978–1998.

Quintile 1 (int\$ <2,286)	Quintile 2 (int\$ ≥2,286–3,062)	Quintile 3 (int\$ ≥3,062–4,195)	Quintile 4 (int\$ ≥4,195–<5,572)	Quintile 5 (int\$ ≥5,572)
Bolivia	Ecuador	Chile	Brazil	Argentina
Cuba	El Salvador	Panama	Colombia	Bahamas
Guyana	Guatemala	Paraguay	Costa Rica	Canada
Honduras	Jamaica	Peru	Trinidad and Tobago	Mexico
Nicaragua	Dominican Republic		Uruguay	United States
			Venezuela	

TABLE 2. Selected countries, distributed by income gap quintiles, Region of the Americas, 1978–1998.

Quintile 1 (<10.6)	Quintile 2 (≥10.6–<11.9)	Quintile 3 (≥11.9–<15.3)	Quintile 4 (≥15.3–<18.4)	Quintile 5 (≥18.4)
Canada	Argentina	Costa Rica	Bolivia	Brazil
Cuba	Bahamas	El Salvador	Chile	Guatemala
Jamaica	Guyana	Paraguay	Colombia	Honduras
Trinidad and Tobago	Uruguay	Peru	Ecuador	Panama
United States	Venezuela	Dominican Republic	Nicaragua	Mexico

TABLE 3. Measures of distribution of health indicators in subnational geographic units, selected countries, Region of the Americas, 1995–1998.

Indicator	No.	Minimum	Maximum	Range	Median
Infant mortality rate	363	3.7	133.0	129.3	19.7
Percentage of illiteracy	258	0.7	58.2	57.6	13.0
Percentage of urban population	250	11.0	100.0	89.0	64.3
Life expectancy at birth	192	56.8	79.0	22.2	70.0
Access to drinking water services	261	0.0	99.5	99.5	66.7
Access to excreta disposal services	244	0.0	98.3	98.3	43.5
Doctors available by population	222	0.8	99.1	98.4	9.6
Measles vaccine coverage in children under 1 year old	213	15.0	133.9	118.9	77.6

TABLE 4. Demographic indicators for the Americas, by subregion, 1996–2002.

Indicators	Year/period	Region or country								Total
		Andean Area	Brazil	Latin Caribbean	Non-Latin Caribbean	Southern Cone	Central America	Mexico	North America	
Population (in thousands)	1996	104,807.8	161,698.3	30,247.8	7,399.8	57,838.7	32,906.2	92,709.7	301,381.5	788,989.7
	2002	116,927.9	174,706.1	32,299.4	7,736.8	62,696.6	37,971.4	101,842.4	319,861.8	854,042.3
Population change (in thousands)	1996–2002	12,120.1	13,007.8	2,051.6	336.9	4,857.9	5,065.2	9,132.7	18,480.2	65,052.5
Population growth rate (%)	1996–2002	1.8	1.3	1.1	0.7	1.3	2.4	1.6	1.0	1.3
Births (in thousands)	1996	2,740.8	3,361.3	656.6	147.0	1,222.6	1,070.9	2,341.6	4,380.7	15,921.6
	2002	2,733.1	3,373.7	653.9	140.6	1,242.8	1,120.6	2,273.2	4,135.8	15,673.6
Birth rate (per 1,000 population)	1996	26.2	20.7	21.7	19.9	21.1	32.5	25.1	14.5	20.2
	2002	23.4	19.2	20.2	18.2	19.8	29.5	22.2	12.9	18.4
Total fertility rate (children/woman)	1996	3.1	2.3	2.7	2.3	2.7	4.1	2.8	2.0	2.5
	2002	2.8	2.2	2.5	2.1	2.5	3.6	2.5	1.9	2.3
Deaths (in thousands)	1996	640.4	1,152.4	260.1	47.6	423.1	209.2	475.5	2,566.4	5,774.6
	2002	713.4	1,237.7	279.6	49.4	448.4	227.1	520.0	2,668.7	6,144.2
Mortality rates (per 1,000 population)	1996	6.1	7.1	8.6	6.4	7.3	6.4	5.1	8.5	7.3
	2002	6.1	7.0	8.7	6.4	7.2	6.0	5.1	8.3	7.2
Infant mortality rates (per 1,000 live births)	1996	37.8	43.1	41.4	23.7	22.2	38.1	31.6	7.6	28.5
	2002	31.5	38.3	37.8	21.3	20.1	32.8	28.2	6.7	25.3
Life expectancy at birth (years)	1996	69.2	66.9	67.3	73.0	73.0	67.6	72.0	76.5	72.0
	2002	70.9	68.3	67.8	73.9	74.1	68.9	73.0	77.7	73.2
Ratio of adults to elderly persons <sup>a</sup>	1996	13.8	13.3	9.6	9.0	7.3	14.4	13.9	5.3	9.8
	2002	13.0	12.4	9.2	9.1	7.2	13.9	12.8	5.4	9.5
Natural population growth (in thousands)	1996	2,100.4	2,209.0	396.5	99.4	799.5	861.8	1,866.1	1,814.3	10,147.0
	2002	2,019.7	2,136.0	374.3	91.2	794.5	893.5	1,753.2	1,467.1	9,529.4

<sup>a</sup>The ratio of adults to elderly individuals is the number of persons between 15 and 64 years old per person aged 65 years old or older.

TABLE 5. Urbanization process indicators, by subregion, Region of the Americas, 1996–2002.

Indicators	Year/period	Region or country								Total
		Andean Area	Brazil	Latin Caribbean	Non-Latin Caribbean	Southern Cone	Central America	Mexico	North America	
Population (in thousands)	1996	104,807.8	161,698.3	30,247.8	7,399.8	57,838.7	32,906.2	92,709.7	301,381.5	788,989.7
Urban population (in thousands)	1996	76,314.9	127,717.8	49,017.8	18,438.6	4,554.0	15,220.8	68,268.3	230,297.2	589,829.3
	2002	88,280.4	143,631.8	54,149.4	20,395.9	4,976.8	18,506.8	76,216.7	248,423.1	654,580.8
Rural population (in thousands)	1996	28,492.9	33,980.5	8,820.9	11,809.2	2,845.8	17,685.4	24,441.4	71,084.3	199,160.5
	2002	28,647.5	31,074.3	8,547.3	11,903.4	2,759.9	19,464.6	25,625.7	71,438.7	199,461.5
Urban percentage	1996	72.8	79.0	84.7	61.0	61.5	46.3	73.6	76.4	74.8
	2002	75.5	82.2	86.4	63.1	64.3	48.7	74.8	77.7	76.6
Annual urban growth rates (%)	1996–2002	2.4	2.0	1.7	1.7	1.5	3.3	1.8	1.3	1.7
Annual rural growth rates (%)	1996–2002	0.1	–1.5	–0.5	0.1	–0.5	1.6	0.8	0.1	0.0
Rate of urbanization (%)	1996–2002	2.3	3.4	2.2	1.5	2.0	1.7	1.0	1.2	1.7
Urban population in cities (in thousands)	1996	32,763.6	55,434.0	22,903.6	9,604.0	124,554.6	7,586.4	30,684.8	...	283,531.0
Cities larger than 750,000 inhabitants	2002	38,516.4	61,238.8	24,886.4	10,984.8	132,001.8	9,287.2	34,567.2	...	311,482.6
Cities smaller than 750,000 inhabitants	1996	43,551.3	72,283.8	26,114.2	8,834.6	105,742.6	7,634.4	37,583.5	...	306,298.3
	2002	49,764.0	82,393.0	29,263.0	9,411.1	116,421.3	9,219.6	41,649.5	...	343,098.2
Annual growth rates (cities larger than 750,000)	1996–2002	2.7	1.7	1.4	2.2	1.0	3.4	2.0	...	1.6
Annual growth rates (cities smaller than 750,000)	1996–2002	2.2	2.2	1.9	1.1	1.6	3.1	1.7	...	1.9

TABLE 6. Estimated mortality rates (per 100,000 population), adjusted for age, by broad groups of causes, selected countries of the Americas, beginning of the 1980s.

	Communicable diseases		Neoplasms		Diseases of the circulatory system		Perinatal conditions		External causes		All other causes	
	F	M	F	M	F	M	F	M	F	M	F	M
Argentina	50.2	69.2	111.9	179.3	275.9	435.0	35.0	46.4	30.5	88.7	109.75	166.26
Barbados	40.7	56.2	114.8	132.8	237.7	326.7	43.5	42.4	16.8	56.0	139.60	163.04
Brazil	159.2	217.1	110.4	164.5	374.4	534.3	64.5	82.6	34.8	132.3	170.31	247.05
Canada	12.9	21.7	108.2	163.7	170.4	314.8	9.6	12.8	31.2	83.3	64.55	110.51
Chile	70.1	107.0	132.2	168.3	201.0	288.3	24.7	31.4	35.7	134.8	135.39	222.99
Colombia	89.9	112.2	125.2	141.8	300.2	387.8	40.3	49.7	38.1	189.6	164.87	208.74
Costa Rica	42.8	58.9	117.4	155.3	175.4	229.1	21.3	26.4	23.6	86.1	128.60	144.70
Cuba	50.8	61.6	95.4	128.1	222.9	263.5	18.5	26.1	46.0	88.6	85.18	91.61
Dominican Republic	121.6	138.7	83.2	92.5	267.8	311.3	74.5	79.9	23.5	71.5	202.20	260.57
Ecuador	254.9	282.4	111.3	103.4	193.8	222.0	45.2	56.0	41.3	139.9	229.81	274.17
El Salvador	208.8	278.8	114.4	90.8	260.7	335.7	103.5	128.3	78.2	464.4	349.63	557.54
Jamaica	68.3	90.1	131.6	154.7	302.4	359.3	18.1	19.2	8.0	26.5	159.77	234.38
Mexico	160.8	195.6	82.2	73.0	176.2	201.3	32.0	44.3	42.7	199.1	219.22	301.60
Panama	88.7	104.4	106.1	130.5	197.1	261.8	35.7	44.1	31.9	117.1	142.16	175.20
Paraguay	182.0	230.8	86.7	80.2	250.9	308.4	35.3	48.3	23.2	93.2	141.07	170.15
Puerto Rico	29.0	49.1	79.0	125.9	187.9	260.0	24.2	33.7	18.1	107.7	107.79	171.16
Trinidad and Tobago	82.3	109.4	97.6	101.5	354.3	452.4	32.2	41.9	30.3	96.0	192.39	243.97
United States	16.2	27.0	110.7	169.8	199.1	356.7	15.6	20.0	31.8	95.0	73.30	119.84
Venezuela	103.0	131.3	121.1	124.7	256.3	335.7	38.3	50.3	38.4	150.8	137.71	170.71

F = female

M = male

TABLE 7. Estimated mortality rates (per 100,000 population) adjusted for age, by broad groups of causes, selected countries of the Americas, end of the 1990s.

	Communicable diseases		Neoplasms		Diseases of the circulatory system		Perinatal conditions		External causes		All other causes	
	F	M	F	M	F	M	F	M	F	M	F	M
Argentina	36.2	57.5	99.2	153.6	153.4	274.8	22.7	29.6	23.5	77.7	96.25	165.12
Barbados	41.2	100.7	121.8	171.6	220.2	266.7	13.7	16.5	14.9	55.4	159.44	206.68
Brazil	75.1	122.3	101.2	155.9	245.0	375.2	49.4	64.3	30.9	139.8	165.81	264.84
Canada	12.6	26.3	107.3	163.8	94.7	182.4	6.2	7.9	19.4	55.5	66.11	104.80
Chile	51.1	94.8	115.3	160.9	118.5	202.1	8.7	10.9	23.1	107.0	102.50	172.66
Colombia	52.7	74.2	107.0	127.5	221.4	290.3	28.0	35.6	35.2	207.3	132.86	167.51
Costa Rica	27.9	48.0	108.0	138.1	148.8	208.8	15.5	19.1	24.1	88.9	118.06	148.57
Cuba	30.3	44.5	95.1	131.8	169.3	228.9	6.0	8.8	36.4	85.8	84.61	101.87
Dominican Republic	64.3	89.9	73.3	99.5	214.0	267.5	52.7	60.3	21.8	66.9	126.66	160.99
Ecuador	87.1	118.2	117.2	116.9	159.8	211.1	29.4	37.1	32.6	134.5	165.17	215.49
El Salvador	109.7	151.7	108.6	80.8	145.9	158.3	23.8	29.5	39.5	199.0	188.36	306.98
Jamaica	39.7	51.3	127.3	162.3	279.0	315.2	15.1	16.6	4.2	14.1	176.50	216.79
Mexico	47.7	70.7	83.0	93.6	145.9	186.5	27.1	35.7	24.9	107.3	218.53	308.40
Panama	41.5	75.3	90.2	105.6	140.0	188.6	24.5	29.6	24.3	96.6	128.25	166.33
Paraguay	94.9	122.6	80.6	82.3	250.1	307.9	37.0	46.9	27.4	87.2	114.96	137.71
Puerto Rico	37.7	82.7	69.2	115.0	116.4	192.4	14.4	16.6	18.8	112.3	130.16	216.07
Trinidad and Tobago	43.4	84.2	103.5	124.6	280.0	364.4	35.5	46.9	23.9	79.9	220.33	291.84
United States	22.0	38.2	108.9	155.0	136.1	223.1	7.9	10.5	25.2	70.2	87.60	119.35
Venezuela	55.1	81.2	99.7	110.8	185.1	261.2	29.6	38.1	26.7	124.6	121.35	154.09

F = female

M = male



TABLE 8. Percentage reduction in estimated mortality rate, adjusted for age, by broad groups of causes, selected countries of the Americas, 1980–1990.

	Communicable diseases		Neoplasms		Diseases of the circulatory system		Perinatal conditions		External causes		All other causes	
	F	M	F	M	F	M	F	M	F	M	F	M
Argentina	27.9	16.9	11.3	14.3	44.4	36.8	35.2	36.3	22.9	12.5	12.3	0.7
Barbados	-1.3	-79.1	-6.1	-29.2	7.4	18.4	68.6	61.2	11.2	1.0	-14.2	-26.8
Brazil	52.9	43.7	8.3	5.2	34.6	29.8	23.4	22.1	11.2	-5.7	2.6	-7.2
Canada	2.6	-21.0	0.8	-0.1	44.5	42.1	35.4	38.8	37.7	33.5	-2.4	5.2
Chile	27.2	11.4	12.8	4.4	41.0	29.9	65.0	65.4	35.2	20.6	24.3	22.6
Colombia	41.4	33.8	14.5	10.0	26.2	25.1	30.4	28.3	7.6	-9.4	19.4	19.7
Costa Rica	34.7	18.5	8.0	11.1	15.2	8.9	27.4	27.4	-2.1	-3.2	8.2	-2.7
Cuba	40.4	27.7	0.3	-2.9	24.0	13.1	67.4	66.3	20.8	3.2	0.7	-11.2
Dominican Republic	47.1	35.1	12.0	-7.5	20.1	14.1	29.3	24.6	7.4	6.5	37.4	38.2
Ecuador	65.8	58.2	-5.3	-13.1	17.5	4.9	35.1	33.8	20.9	3.9	28.1	21.4
El Salvador	47.5	45.6	5.1	10.9	44.0	52.8	77.0	77.0	49.5	57.1	46.1	44.9
Jamaica	41.9	43.0	3.3	-4.9	7.8	12.3	16.8	13.4	47.6	47.0	-10.5	7.5
Mexico	70.3	63.8	-1.0	-28.1	17.2	7.4	15.3	19.4	41.6	46.1	0.3	-2.3
Panama	53.2	27.9	15.0	19.1	29.0	28.0	31.3	32.9	23.7	17.5	9.8	5.1
Paraguay	47.9	46.9	7.0	-2.7	0.3	0.2	-4.7	3.0	-17.7	6.4	18.5	19.1
Puerto Rico	-30.1	-68.5	12.4	8.6	38.1	26.0	40.3	50.9	-3.8	-4.3	-20.8	-26.2
Trinidad and Tobago	47.2	23.0	-6.1	-22.7	21.0	19.4	-10.2	-11.9	21.1	16.8	-14.5	-19.6
United States	-35.6	-41.6	1.6	8.7	31.6	37.5	49.3	47.5	20.6	26.1	-19.5	0.4
Venezuela	46.5	38.1	17.7	11.2	27.8	22.2	22.9	24.1	30.6	17.4	11.9	9.8

F = female

M = male

TABLE 9. Level and change in life expectancy at birth (Eo), by sex and period, selected countries of the Americas, beginning of the 1980s and end of the 1990s.

Country	Men				Women			
	Eo	Eo	Absolute change (years)	Annual average rate of change (%)	Eo	Eo	Absolute change (years)	Annual average rate of change (%)
	beginning of the 1980s	end of the 1990s			beginning of the 1980s	end of the 1990s		
Argentina	66.3	70.3	4.04	0.370	73.1	78.0	4.90	0.406
Barbados	70.2	69.7	-0.49	-0.050	73.9	74.7	0.85	0.082
Brazil	59.1	64.1	5.05	0.482	66.1	71.9	5.76	0.491
Canada	71.9	75.4	3.52	0.299	79.1	82.4	3.38	0.262
Chile	66.9	71.1	4.11	0.397	73.6	78.3	4.76	0.418
Colombia	64.3	67.1	2.81	0.389	70.1	74.2	4.14	0.521
Costa Rica	71.6	72.6	1.06	0.113	75.8	77.6	1.85	0.186
Cuba	72.1	73.8	1.71	0.138	75.4	78.7	3.26	0.249
Dominican Republic	65.9	70.4	4.48	0.387	69.0	74.4	5.38	0.442
Ecuador	61.9	68.3	6.36	0.575	65.9	73.6	7.71	0.652
El Salvador	53.5	65.5	12.00	1.265	63.4	72.9	9.43	0.866
Jamaica	68.3	71.1	2.75	0.438	71.7	73.4	1.69	0.258
Mexico	63.6	69.4	5.77	0.482	70.3	74.9	4.65	0.356
Panama	68.1	72.0	3.90	0.328	73.1	77.5	4.39	0.343
Paraguay	65.4	69.0	3.69	0.457	69.9	73.1	3.17	0.369
Puerto Rico	70.2	70.4	0.21	0.018	77.5	79.5	1.99	0.149
Trinidad and Tobago	65.2	66.4	1.20	0.131	69.7	71.5	1.79	0.181
United States	70.1	73.6	3.44	0.282	77.6	79.4	1.74	0.130
Venezuela	65.7	69.5	3.83	0.354	71.1	75.8	4.74	0.404

Absolute change (years) = number of years of life expectancy at birth (Eo) gained between the two periods.

Annual average rate of change (%) = annual average growth rate of life expectancy at birth; exponential method:  $r = \ln((t^1/t^0)/n)$ .

Source: Pan American Health Organization, Special Program for Health Analysis, 2001.

TABLE 10. Socioeconomic groupings of countries, by income level and income gap, Region of the Americas, 1978–1998.

		Income level (per capita gross national product, adjusted for purchasing power parity, 1978–1998)	
		Low (\$ ≤3,744.59)	High (\$ >3,744.59)
Income gap (ratio of the wealthiest 20% / poorest 20%, 1978–1998)	Narrow (≤13.75)	Cuba Guyana Jamaica Peru	Argentina Bahamas Canada Costa Rica United States Trinidad & Tobago Uruguay Venezuela
	Wide (>13.75)	Bolivia Ecuador El Salvador Guatemala Honduras Nicaragua Panama Dominican Republic	Brazil Chile Colombia Mexico Paraguay

TABLE 11. Five leading causes of death, by their contribution to years of life expectancy lost, by age groups and socioeconomic groupings, Region of the Americas, end of the 1990s.

0-4 years		5-14 years		15-44 years		45-59 years		60+ years		Total	
Country groupings with low income and narrow income gap											
Perinatal conditions	0.992	Traffic accidents	0.049	Homicide	0.521	Ischemic heart disease	0.419	Ischemic heart disease	1.067	Ischemic heart disease	1.59
Congenital anomalies	0.314	Accidental drowning	0.022	Traffic accidents	0.281	Cerebrovascular disease	0.250	Cerebrovascular disease	0.722	Cerebrovascular disease	1.06
Intestinal infections	0.268	Leukemias	0.020	AIDS	0.136	Diabetes mellitus	0.243	Diabetes mellitus	0.509	Perinatal conditions	0.99
Acute respiratory infections	0.225	Acute respiratory infections	0.018	Suicide	0.120	Other diseases of the heart	0.130	Other diseases of the heart	0.402	Diabetes mellitus	0.81
Nutritional deficiency	0.072	Homicide	0.016	Ischemic heart disease	0.097	Traffic accidents	0.107	Hypertensive disease	0.254	Homicide	0.69
Country groupings with low income and wide income gap											
Perinatal conditions	1.360	Traffic accidents	0.051	Homicide	0.400	Cerebrovascular disease	0.282	Cerebrovascular disease	0.796	Cerebrovascular disease	1.19
Acute respiratory infections	0.444	Acute respiratory infections	0.027	Traffic accidents	0.328	Ischemic heart disease	0.273	Ischemic heart disease	0.705	Ischemic heart disease	1.06
Intestinal infections	0.396	Leukemias	0.026	AIDS	0.168	Other diseases of the heart	0.175	Other diseases of the heart	0.542	Other diseases of the heart	0.82
Congenital anomalies	0.394	Accidental drowning	0.026	Cerebrovascular disease	0.106	Diabetes mellitus	0.138	Diabetes mellitus	0.385	Traffic accidents	0.59
Nutritional deficiency	0.147	Congenital anomalies	0.021	Suicide	0.104	Chronic liver disease	0.123	Hypertensive disease	0.238	Diabetes mellitus	0.56
Country groupings with high income and narrow income gap											
Perinatal conditions	0.500	Traffic accidents	0.028	AIDS	0.284	Ischemic heart disease	0.302	Ischemic heart disease	0.855	Ischemic heart disease	1.22
Congenital anomalies	0.228	Accidental drowning	0.018	Traffic accidents	0.252	Other diseases of the heart	0.230	Other diseases of the heart	0.624	Other diseases of the heart	1.01
Acute respiratory infections	0.049	Other diseases of the heart	0.011	Suicide	0.173	Lung cancer	0.182	Cerebrovascular disease	0.491	Cerebrovascular disease	0.75
Other diseases of the heart	0.034	Leukemias	0.011	Homicide	0.130	Cerebrovascular disease	0.181	Lung cancer	0.384	Lung cancer	0.60
Nutritional deficiency	0.021	Congenital anomalies	0.010	Other diseases of the heart	0.115	Diabetes mellitus	0.122	Diabetes mellitus	0.351	Diabetes mellitus	0.51
Country groupings with high income and wide income gap											
Perinatal conditions	0.655	Traffic accidents	0.033	Homicide	0.512	Chronic liver disease	0.299	Ischemic heart disease	0.785	Ischemic heart disease	1.11
Congenital anomalies	0.325	Leukemias	0.015	Traffic accidents	0.302	Ischemic heart disease	0.261	Diabetes mellitus	0.561	Diabetes mellitus	0.84
Acute respiratory infections	0.165	Accidental drowning	0.012	AIDS	0.276	Diabetes mellitus	0.224	Cerebrovascular disease	0.451	Chronic liver disease	0.70
Intestinal infections	0.059	Congenital anomalies	0.011	Chronic liver disease	0.134	Cerebrovascular disease	0.141	Other diseases of the heart	0.285	Perinatal conditions	0.66
Nutritional deficiency	0.033	Homicide	0.010	Suicide	0.116	Other diseases of the heart	0.092	Chronic liver disease	0.270	Cerebrovascular disease	0.65

Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 1. Distribution of per capita gross national product (in international dollars adjusted for purchasing power parity), selected countries of the Americas, 1980.

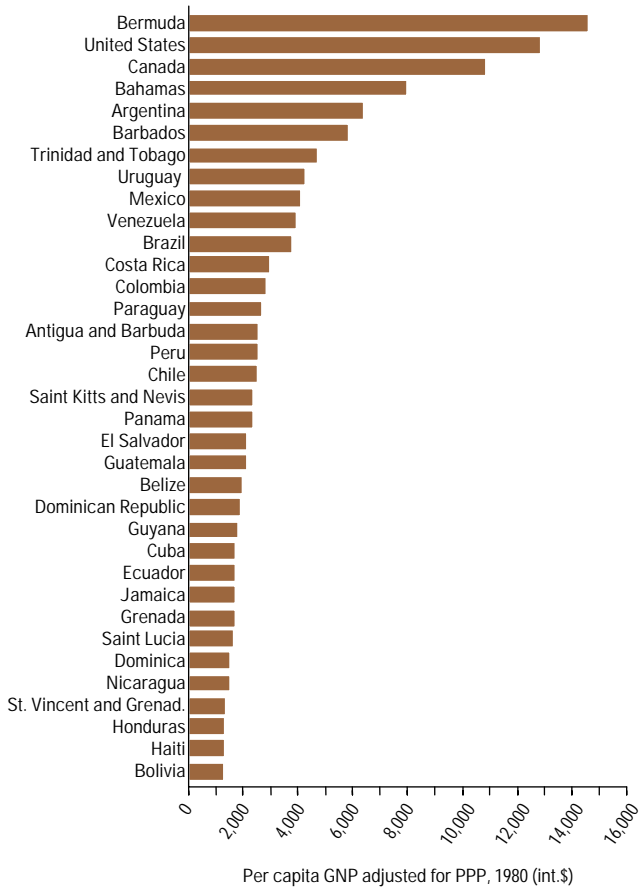


FIGURE 2. Distribution of per capita gross national product (in international dollars adjusted for purchasing power parity), selected countries of the Americas, 1998.

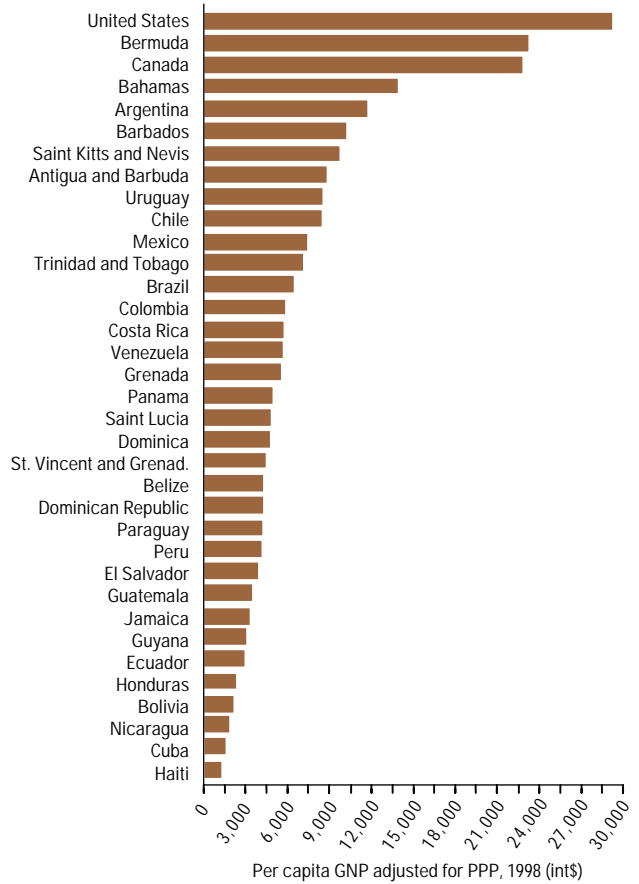


FIGURE 3. Changes in per capita gross national product (in dollars adjusted for purchasing power parity) by distribution tertiles, Region of the Americas, 1978–1998.

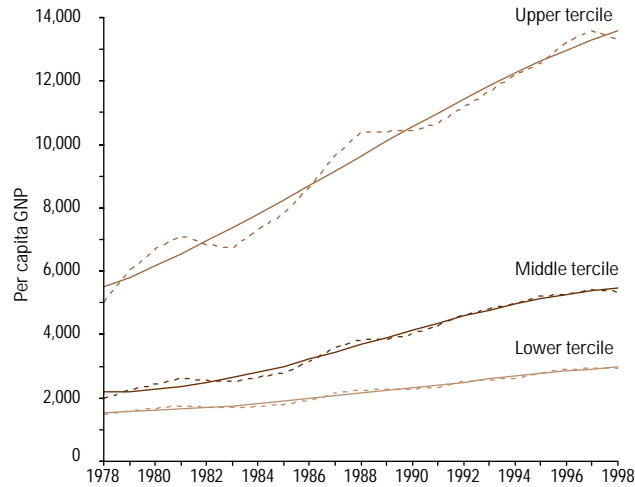


FIGURE 5. Lorenz curve for income distribution (expressed as the current value of the per capita gross national product), selected countries of the Americas, 1999.

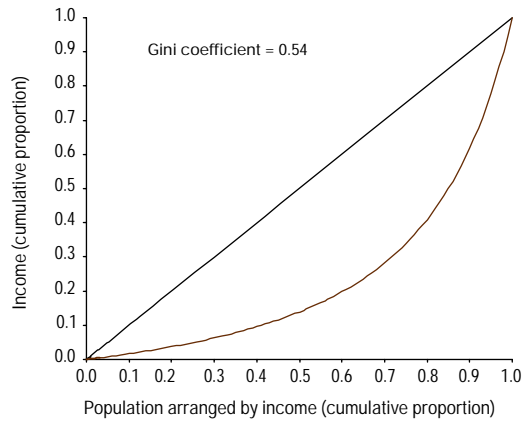


FIGURE 4. Gross national product growth trends, selected countries of the Americas, 1978–1988 and 1988–1998.

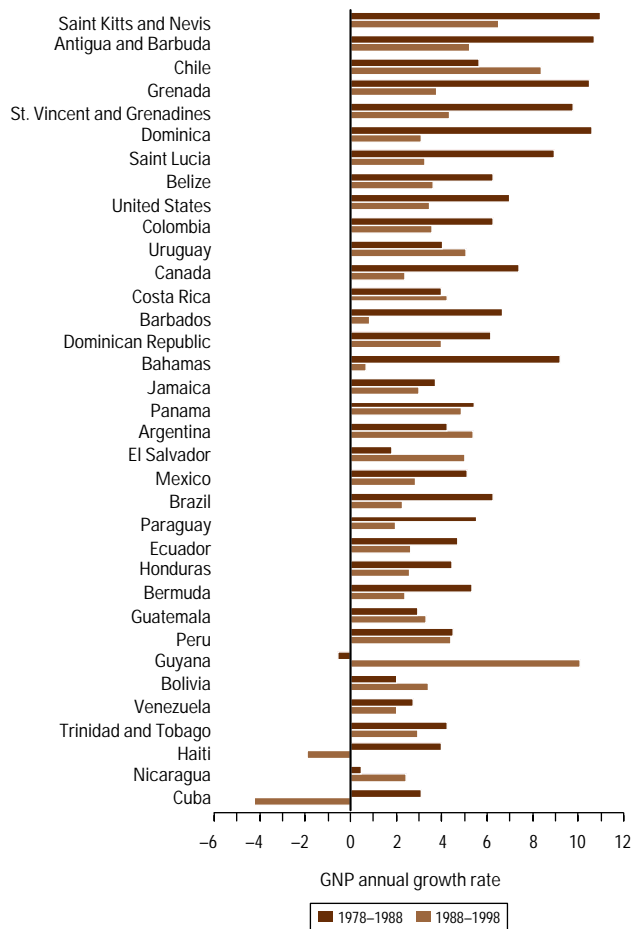


FIGURE 6. Literacy trends, by subregion, Region of the Americas, 1980–1998.

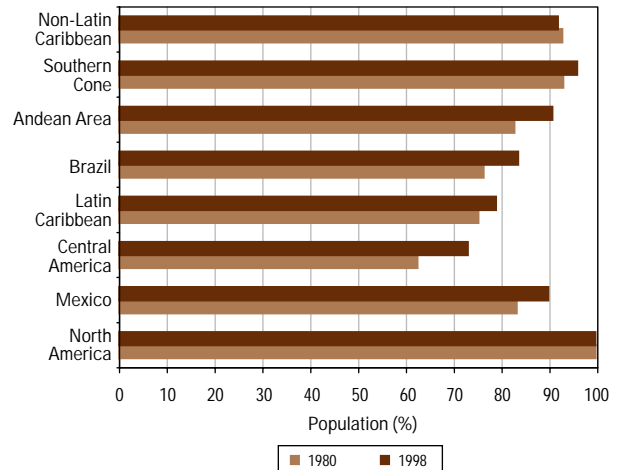


FIGURE 7. Distribution of the illiterate population, by subnational geographic units, selected countries of the Americas, 1994–1997.

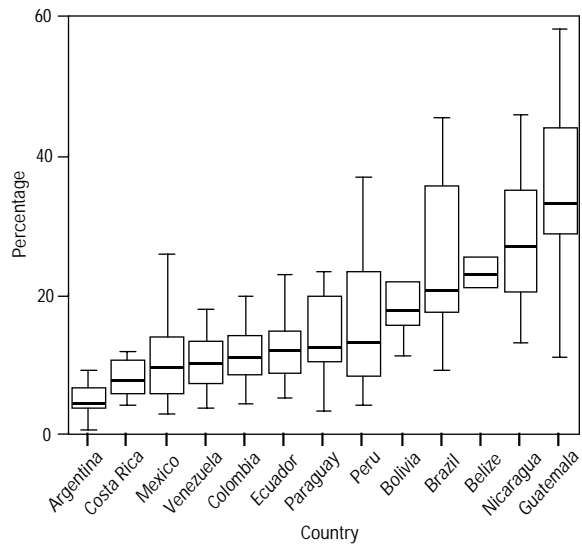


FIGURE 9. Lorenz curve for infant mortality, selected countries of the Americas, 1997.



FIGURE 8. Trends in life expectancy at birth, Region of the Americas, 1980–2000.

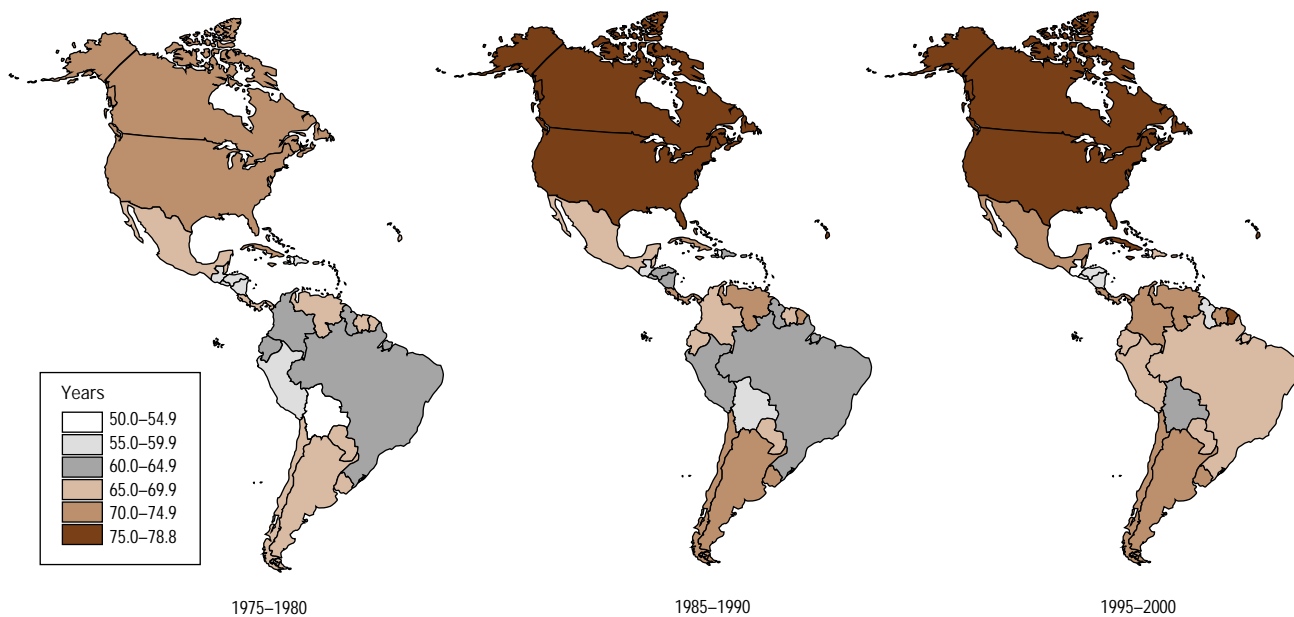


FIGURE 10. Infant mortality, by subnational geographic units, Region of the Americas, 1994–1997.

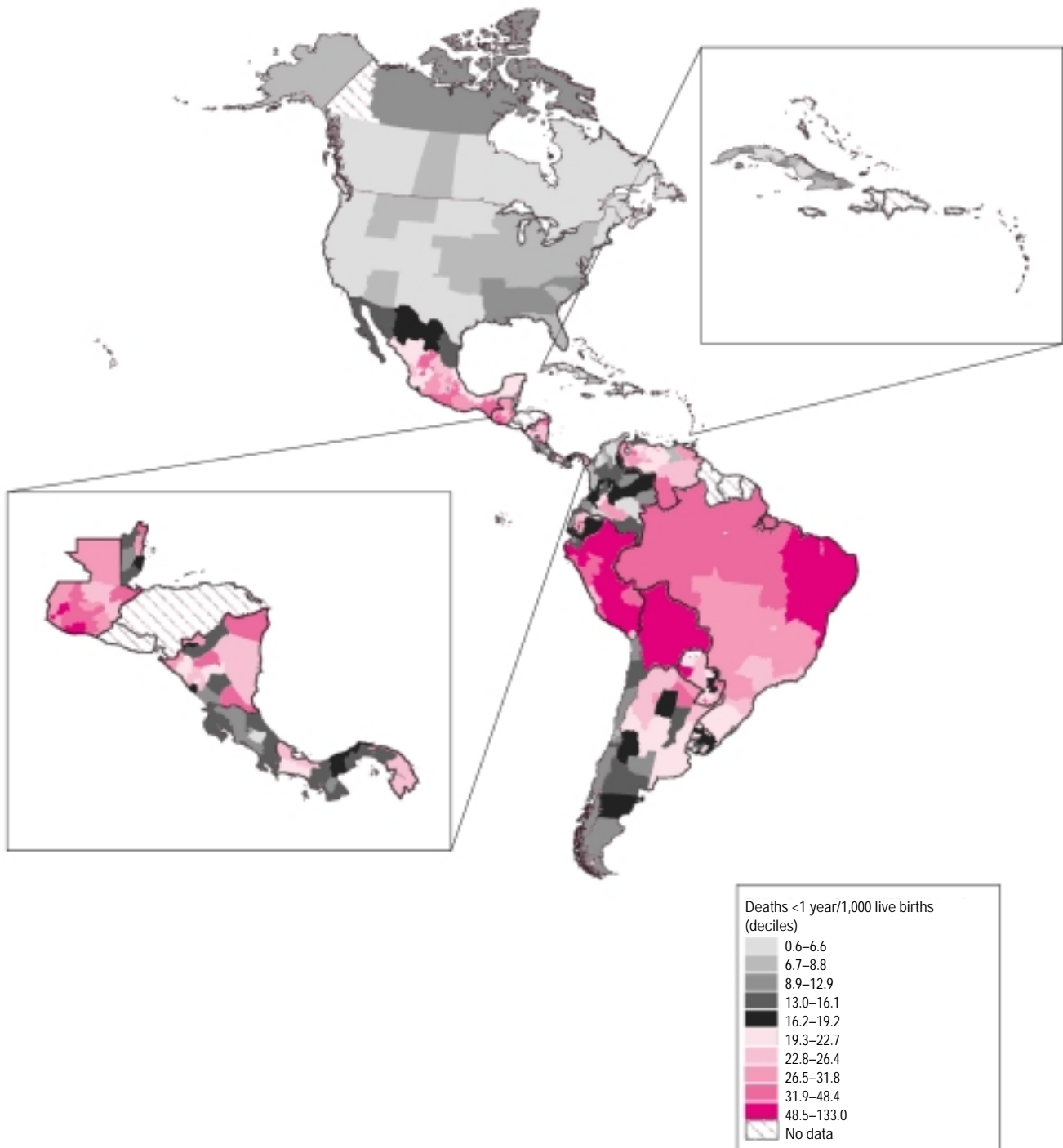
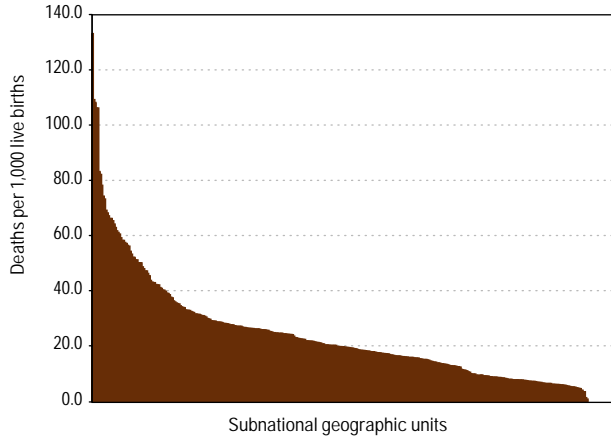


FIGURE 11. Infant mortality distribution, by subnational geographic unit, selected countries of the Americas, 1994–1997.



Includes Argentina, Belize, Bolivia, Brazil, Canada, Colombia, Costa Rica, Cuba, Ecuador, United States of America, Guatemala, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela.

FIGURE 12. Infant mortality distribution, by subnational geographic unit, selected countries of the Americas, 1994–1997.

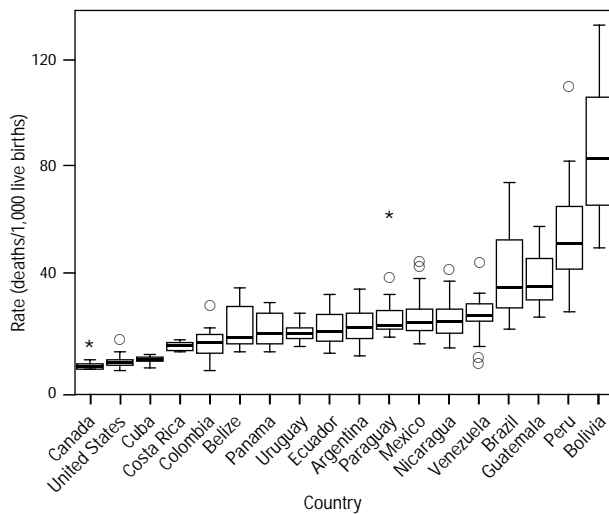


FIGURE 13. Summary distribution of life expectancy at birth, by income quintile, selected countries of the Americas, 1999.

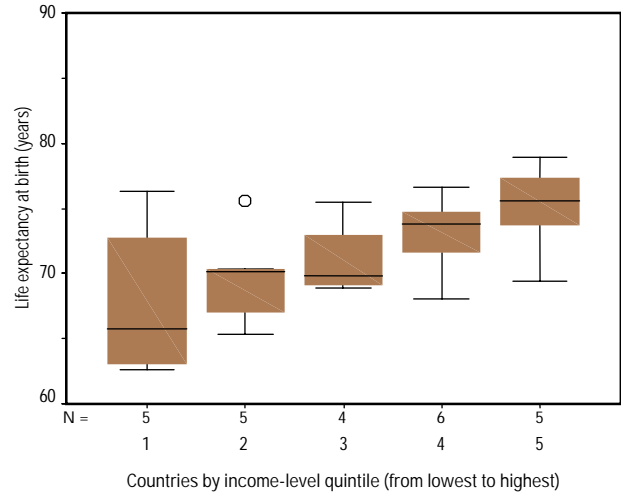


FIGURE 14. Summary distribution of infant mortality, by income quintile, selected countries of the Americas, 1999.

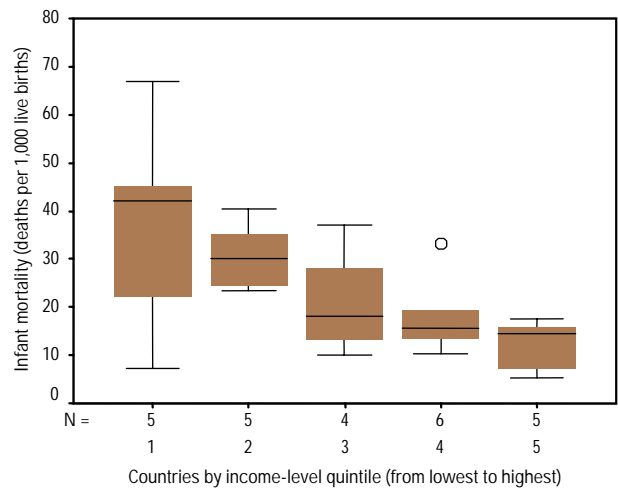




FIGURE 15. Summary distribution of literacy, by income quintile, selected countries of the Americas, 2000.

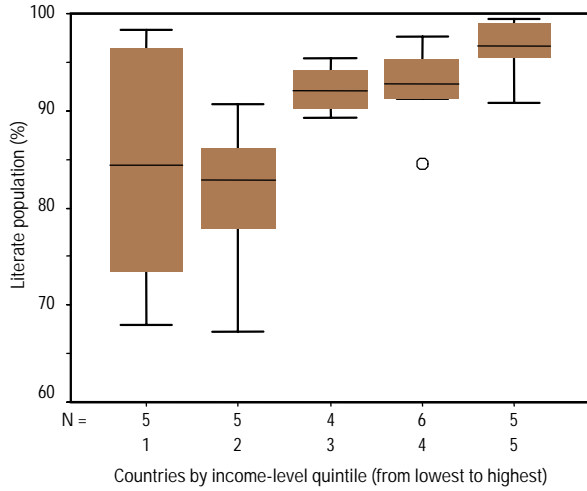


FIGURE 17. Summary distribution of life expectancy at birth, by income-gap quintile, selected countries of the Americas, 1999.

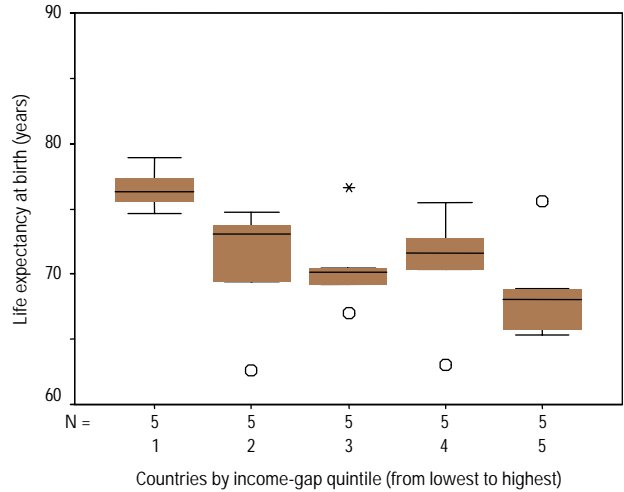


FIGURE 16. Summary distribution of level of urbanization, by income quintile, selected countries of the Americas, 2000.

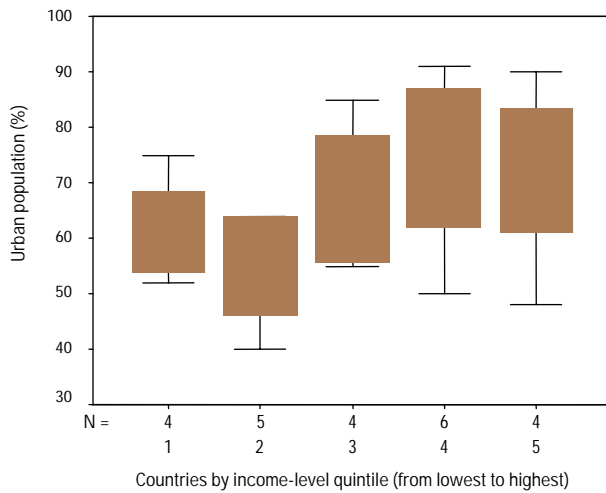


FIGURE 18. Summary distribution of infant mortality, by income-gap quintile, selected countries of the Americas, 1999.

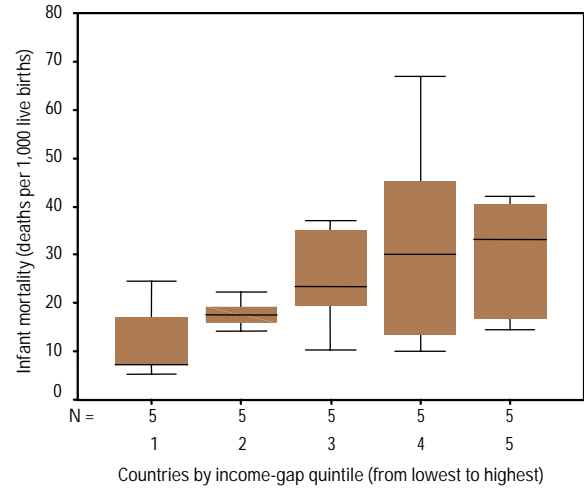


FIGURE 19. Trends in life expectancy at birth in the Andean Area, 1950–2000.

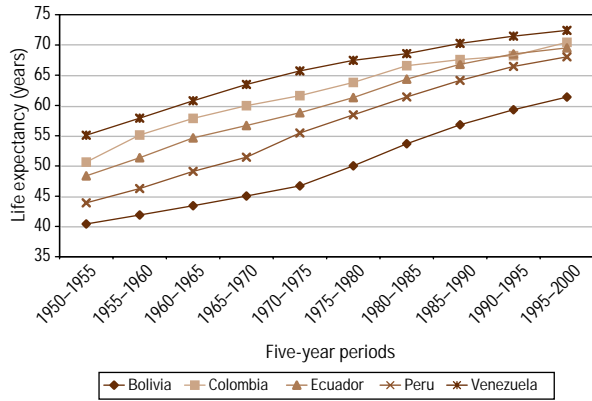


FIGURE 22. Trends in life expectancy at birth in the Central American Isthmus and Mexico, 1950–2000.

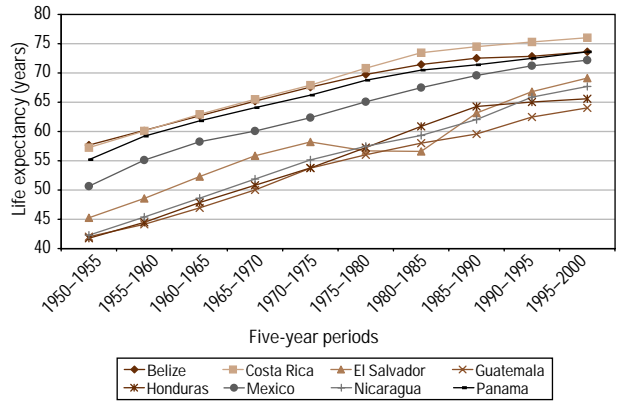


FIGURE 20. Trends in life expectancy at birth in Brazil and the Southern Cone, 1950–2000.

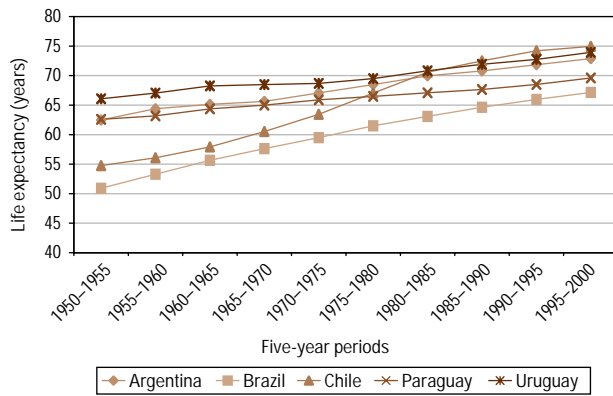


FIGURE 23. Trends in life expectancy at birth in Canada and the United States of America, 1950–2000.

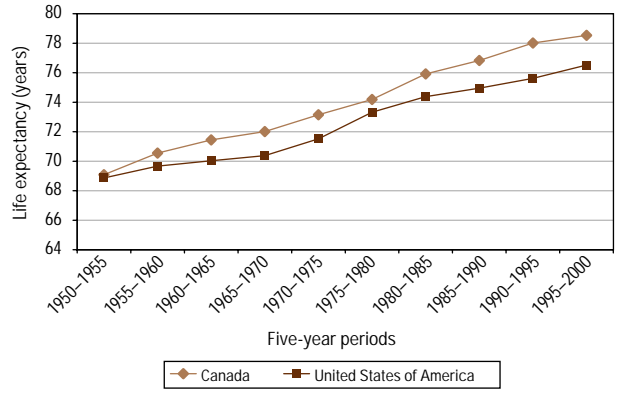


FIGURE 21. Trends in life expectancy at birth in the Caribbean, 1950–2000.

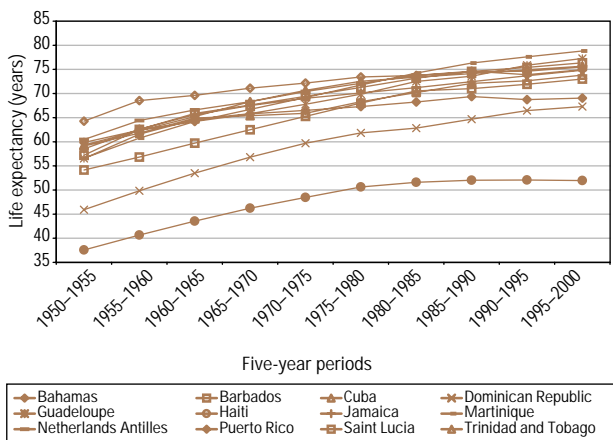


FIGURE 24. Population structure, by age and sex, Andean Area, 1980 and 2000.

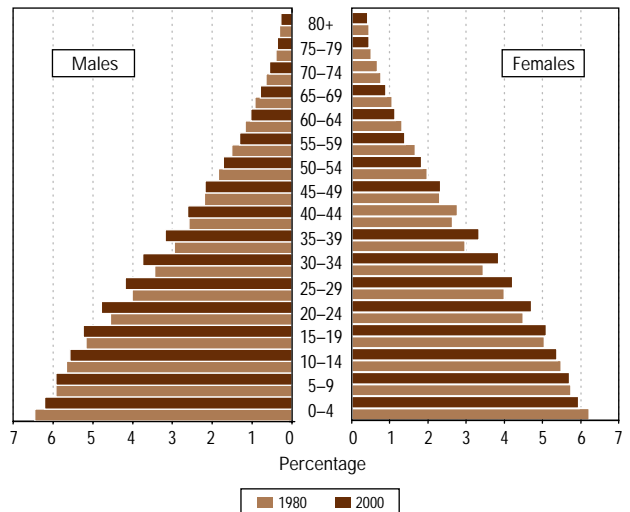


FIGURE 25. Population structure, by age and sex, Brazil, 1980 and 2000.

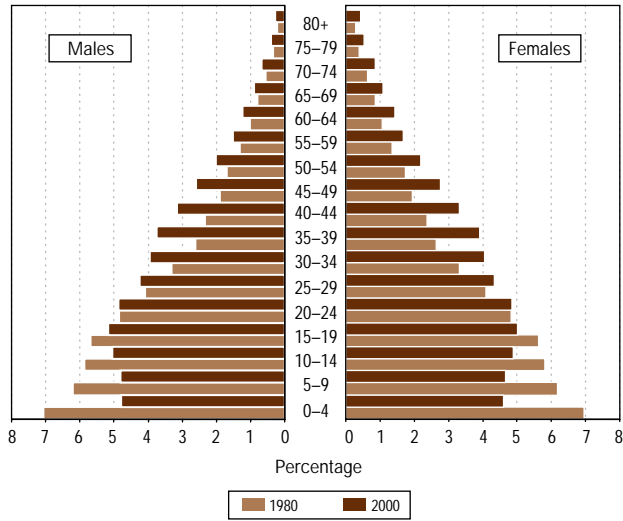


FIGURE 27. Population structure, by age and sex, Central America, 1980 and 2000.

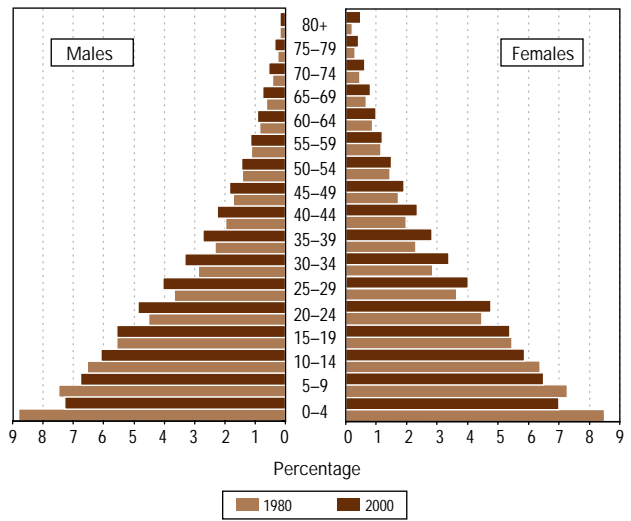


FIGURE 26. Population structure, by age and sex, Southern Cone, 1980 and 2000.

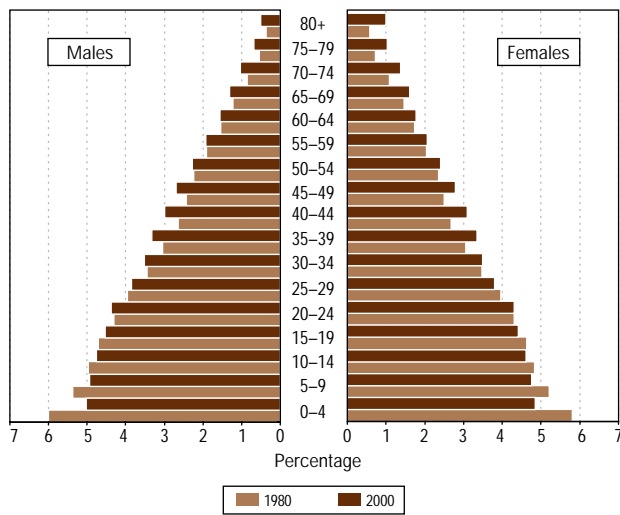


FIGURE 28. Population structure, by age and sex, Mexico, 1980 and 2000.

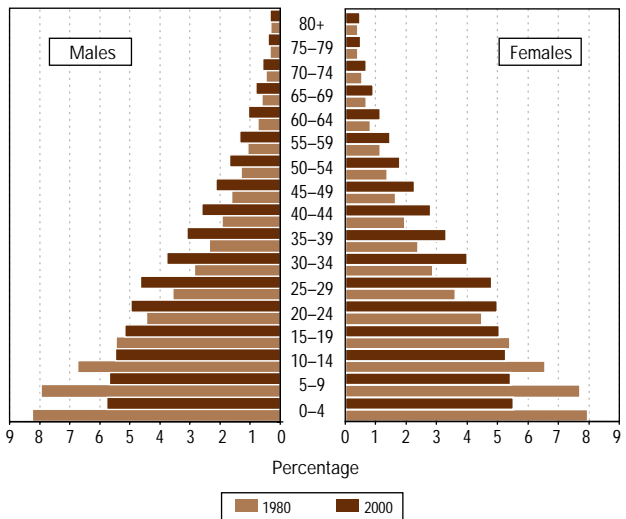


FIGURE 29. Population structure, by age and sex, North America, 1980 and 2000.

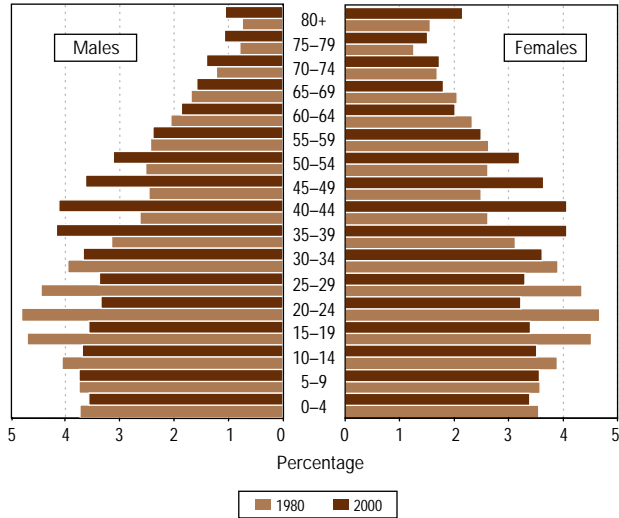


FIGURE 30. Countries of the Americas, by life expectancy at birth and total fertility rate, circa 2002.

Life expectancy at birth (both sexes)	Total fertility rates												
	Less than 1.8	1.8-1.9	2.0-2.1	2.2-2.3	2.4-2.5	2.6-2.7	2.8-2.9	3.0-3.1	3.2-3.3	3.4-3.5	3.6-3.7	3.8-3.9	4.0 or more
79 or more	Canada		*Cayman Islands										
78.0-78.9	Martinique	*Aruba		* Virgin Islands (US)									
77.0-77.9	Barbados	*Montserrat	Guadeloupe										
76.0-76.9	Cuba	*Bermuda											
75.0-75.9	*Virgin Islands (UK)	United States	Netherlands Antilles										
74.0-74.9	Trinidad and Tobago	Puerto Rico		Uruguay	Chile								
73.0-73.9			*Dominica		Jamaica								
72.0-72.9			* Saint Vincent and the Grenadines		Panama								
71.0-71.9			Suriname										
70.0-70.9			*Antigua and Barbuda										
69.0-69.9													
68.0-68.9			Bahamas										
67.0-67.9			Brazil										
66.0-66.9													
65.0-65.9													
64.0-64.9													
63.0-63.9													
62.0-62.9													
61.9 or less													

Source: United Nations. *World Population Prospects: the 2000 Revision*, except (\*) whose source is the U.S. Census Bureau.

FIGURE 31. Estimated regional average mortality rate, adjusted for age and sex, by broad groups of causes, beginning of the 1980s and end of the 1990s.

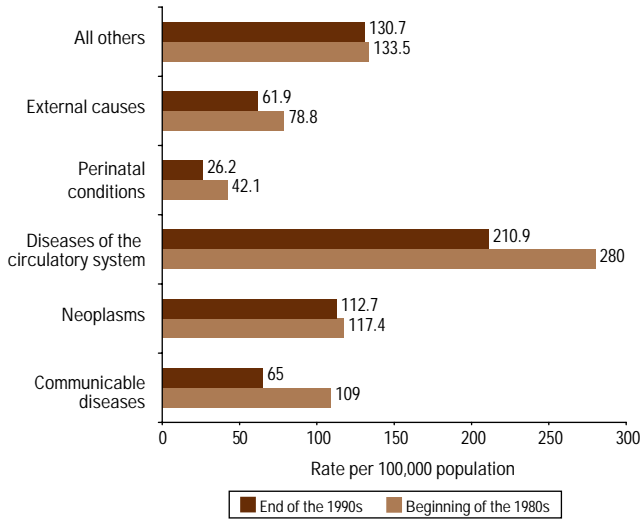


FIGURE 32. Percent reduction and confidence intervals at 95% for the estimated mortality rate, adjusted for age and sex, by broad groups of causes, beginning of the 1980s and end of the 1990s.

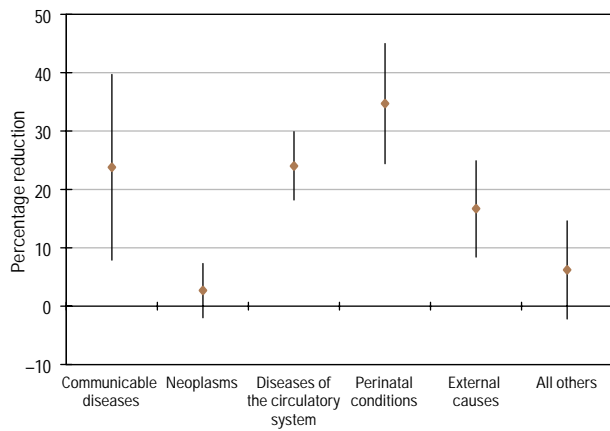
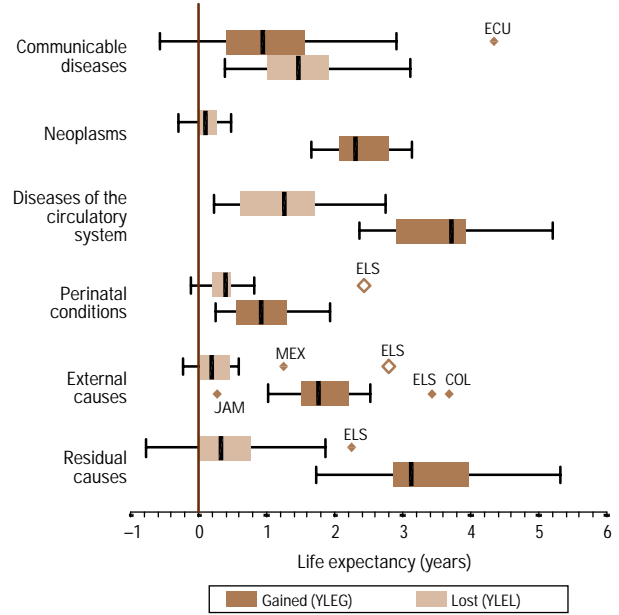
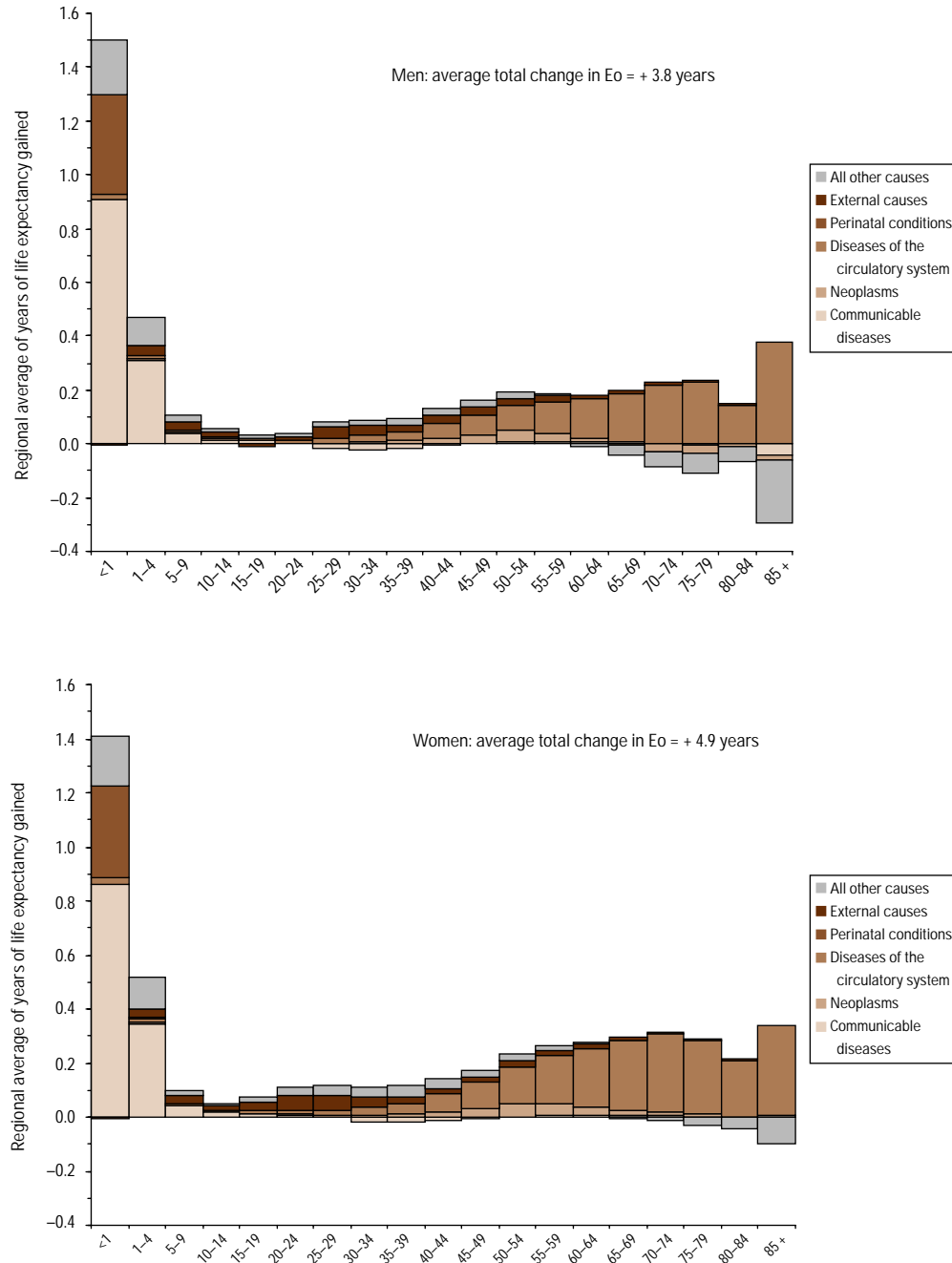


FIGURE 33. Regional impact of mortality from broad groups of causes on life expectancy at birth, Region of the Americas, beginning of the 1980s to the end of the 1990s.



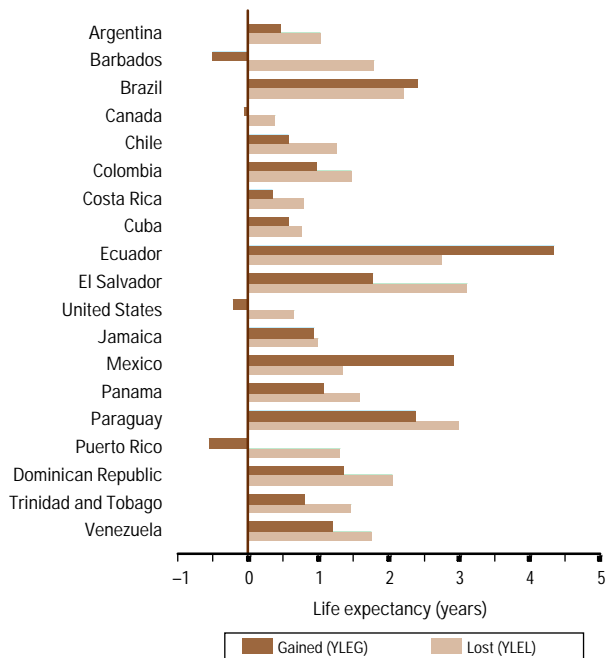
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 34. Contribution of age groups and causes of death to changes in life expectancy, by sex, Region of the Americas, beginning of the 1980s to the end of the 1990s.



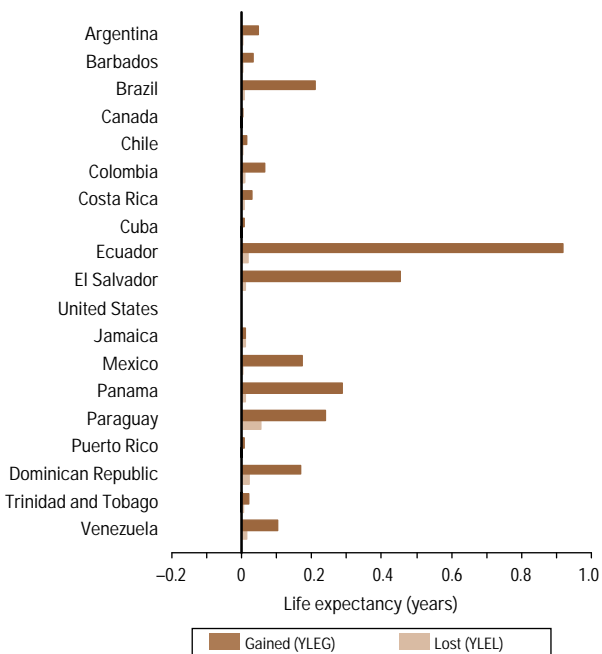
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 35. Impact of mortality from infectious causes on life expectancy at birth, selected countries of the Americas, beginning of the 1980s to the end of the 1990s.



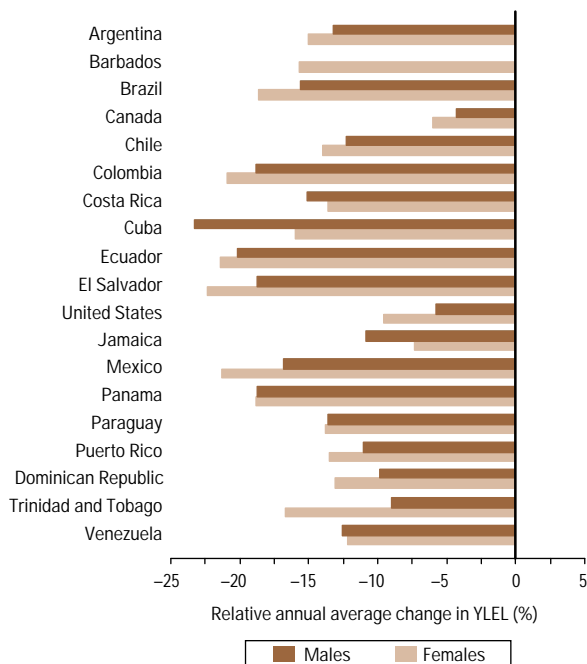
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 36. Impact of mortality from vaccine-preventable diseases on women's life expectancy, selected countries of the Americas, beginning of the 1980s to the end of the 1990s.



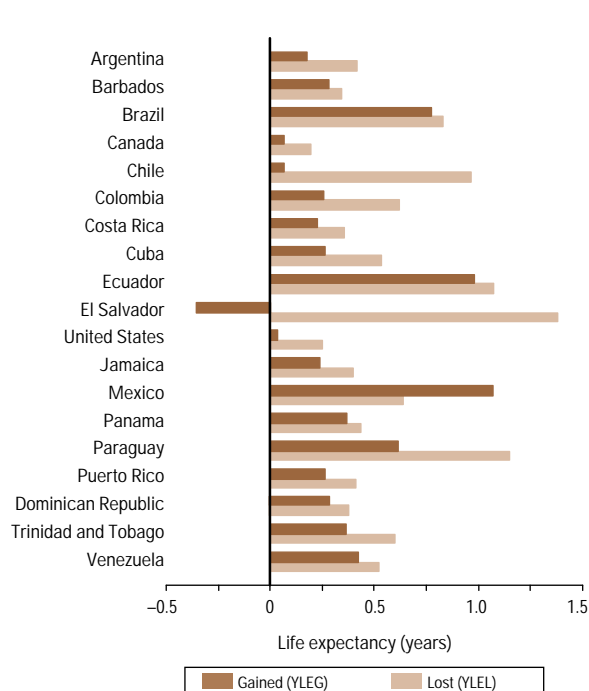
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 37. Rate of change in years of life expectancy lost due to mortality from vaccine-preventable diseases, selected countries of the Americas, beginning of the 1980s to the end of the 1990s.



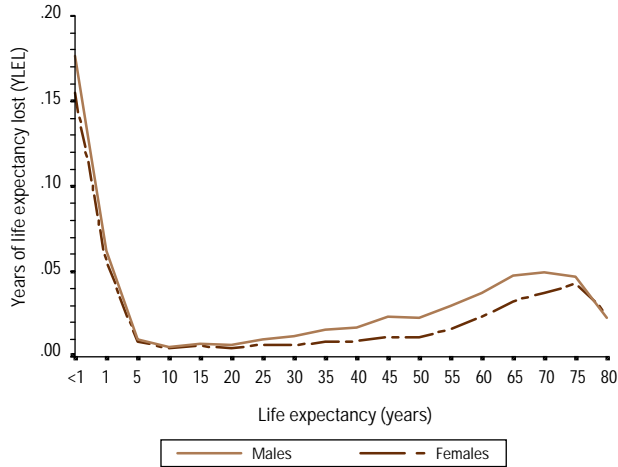
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 38. Impact of mortality from acute respiratory infections on men's life expectancy, selected countries of the Americas, beginning of the 1980s to the end of the 1990s.



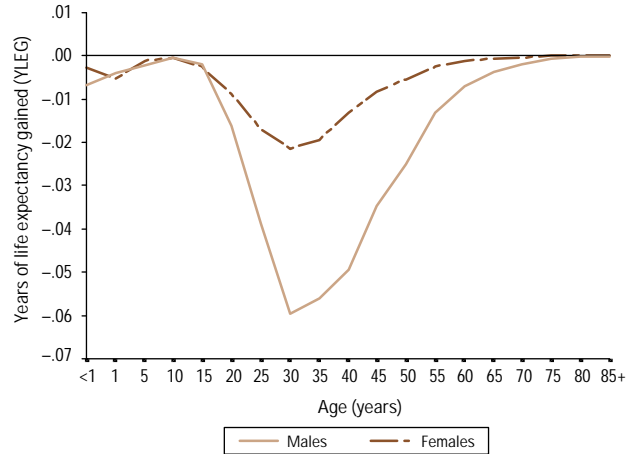
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 39. Distribution of years of life expectancy lost due to mortality from acute respiratory infections, by age and sex, Region of the Americas, end of the 1990s.



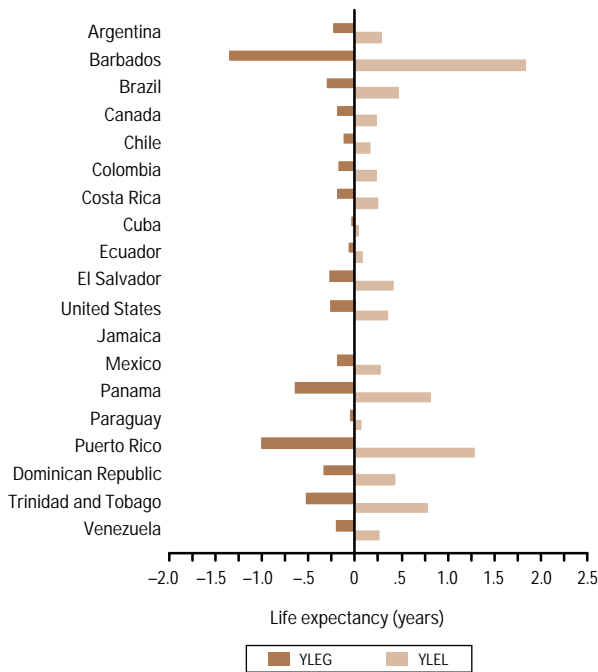
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 41. Distribution of years of life expectancy gained from changes in mortality from AIDS, by age and sex, Region of the Americas, beginning of the 1980s to the end of the 1990s.



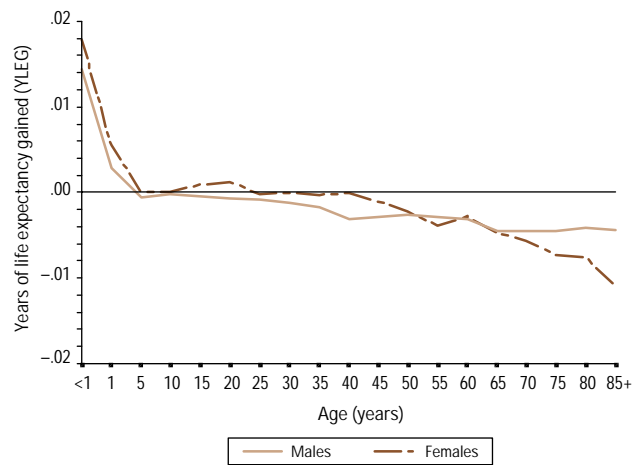
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 40. Impact of mortality from AIDS on men's life expectancy, Region of the Americas, beginning of the 1980s to the end of the 1990s.



Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

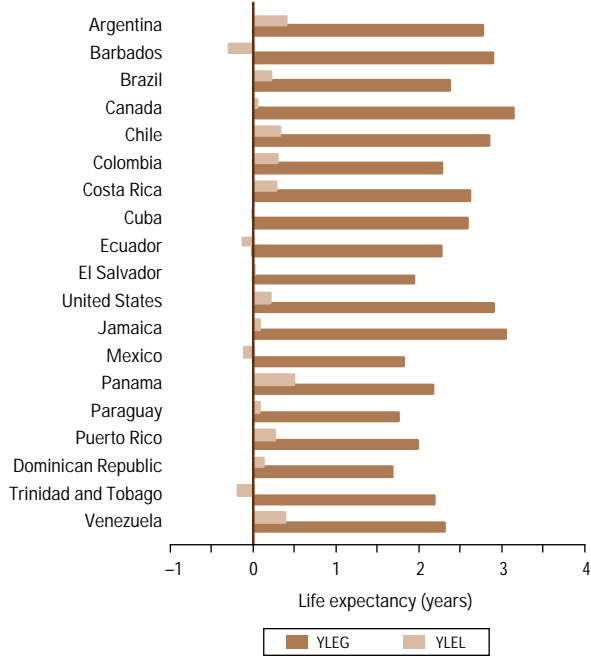
FIGURE 42. Distribution of years of life expectancy gained from changes in mortality from septicemia, by age and sex, Region of the Americas, beginning of the 1980s to the end of the 1990s.



Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

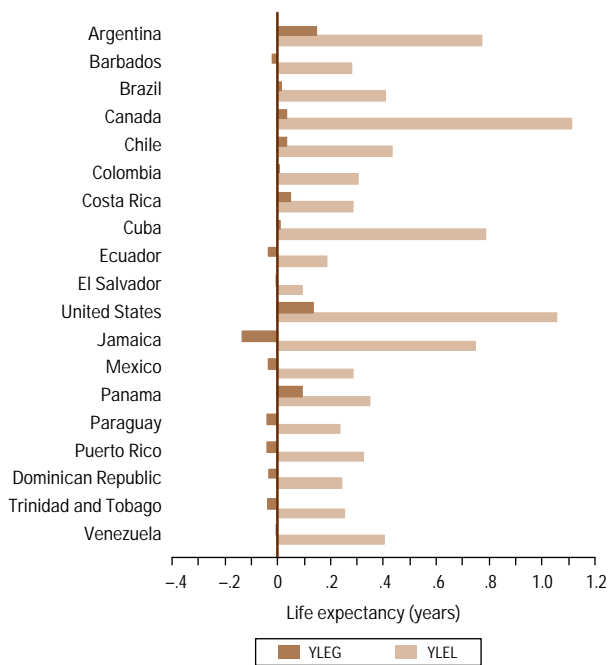


FIGURE 43. Impact of mortality from neoplasms on life expectancy at birth, Region of the Americas, beginning of the 1980s to the end of the 1990s.



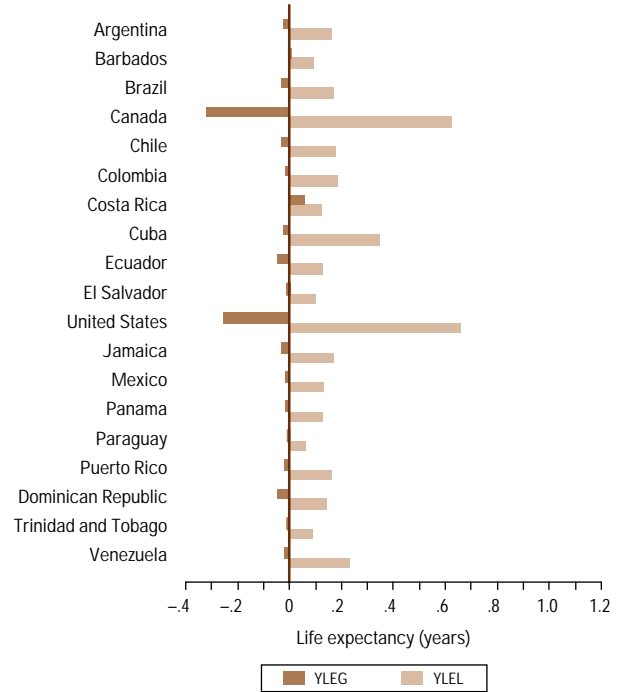
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 44. Impact of mortality from lung cancer on men's life expectancy, Region of the Americas, beginning of the 1980s to the end of the 1990s.



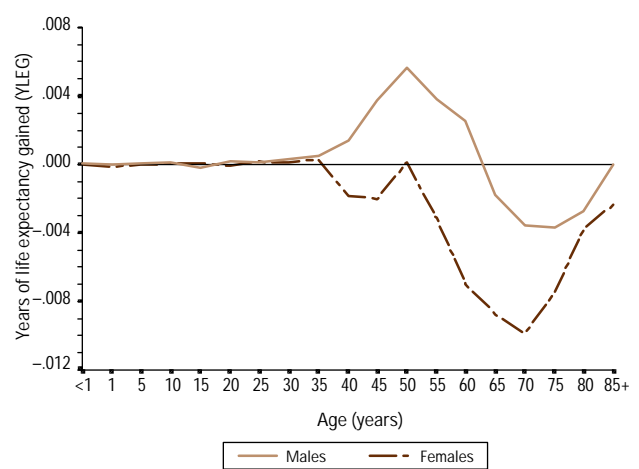
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 45. Impact of mortality from lung cancer on women's life expectancy, Region of the Americas, beginning of the 1980s to the end of the 1990s.



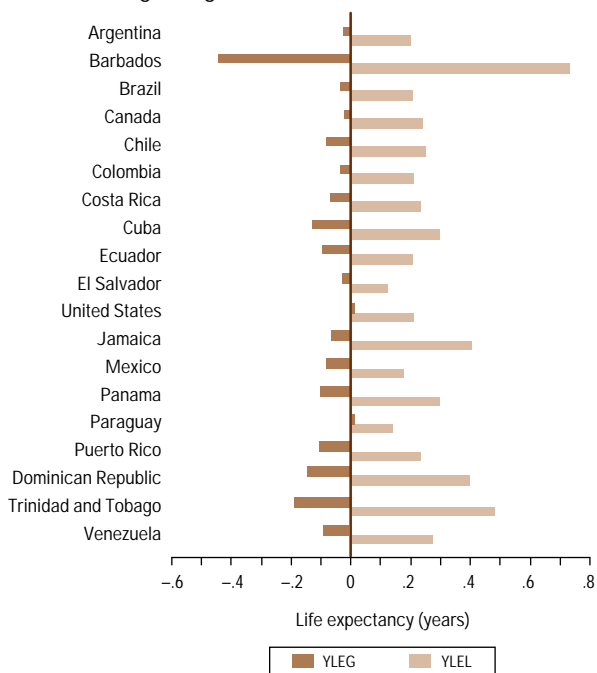
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 46. Distribution of years of life expectancy gained from changes in mortality from lung cancer, by age and sex, Region of the Americas, beginning of the 1980s to the end of the 1990s.



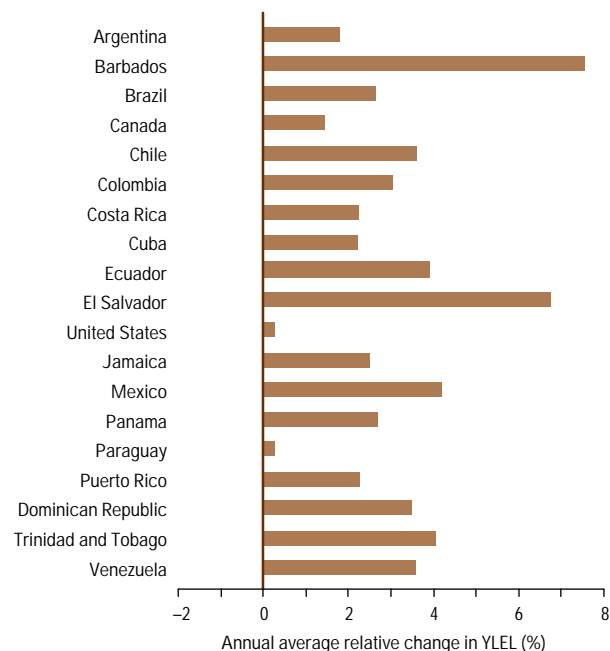
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 47. Impact of mortality from cancer of the prostate on men's life expectancy, selected countries of the Americas, beginning of the 1980s to the end of the 1990s.



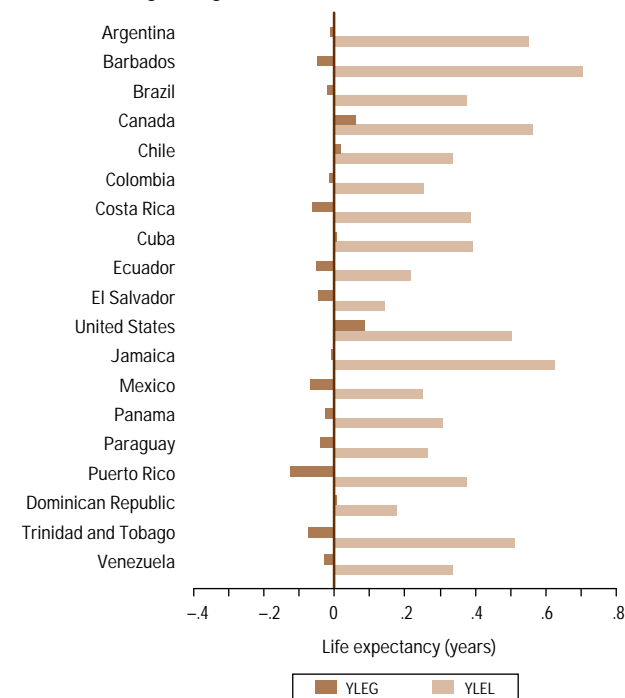
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 48. Rate of change in years of life expectancy lost due to mortality from prostate cancer, selected countries of the Americas, beginning of the 1980s to the end of the 1990s.



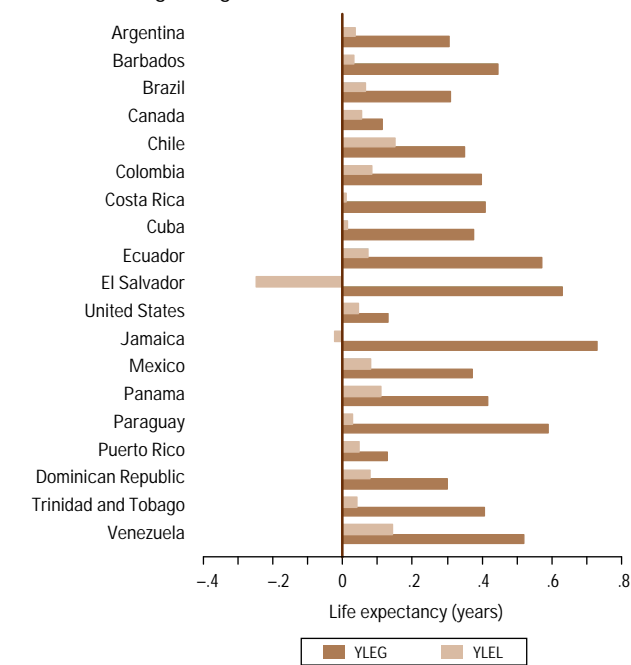
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 49. Impact of mortality from breast cancer on women's life expectancy, selected countries of the Americas, beginning of the 1980s to the end of the 1990s.



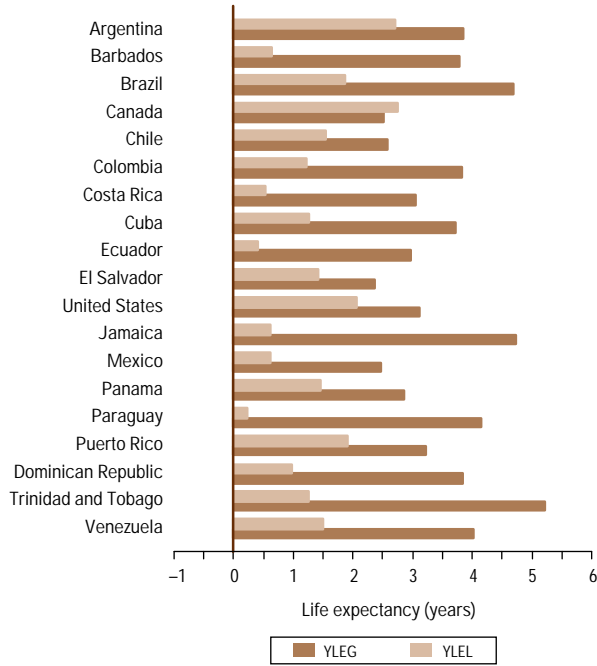
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 50. Impact of mortality from uterine cancer on women's life expectancy, selected countries of the Americas, beginning of the 1980s to the end of the 1990s.



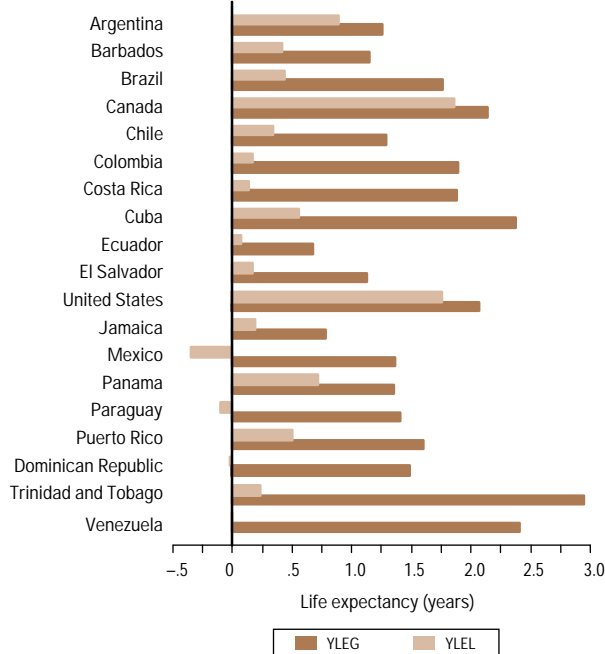
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 51. Impact of mortality from cardiovascular diseases on life expectancy at birth, selected countries of the Americas, beginning of the 1980s and end of the 1990s.



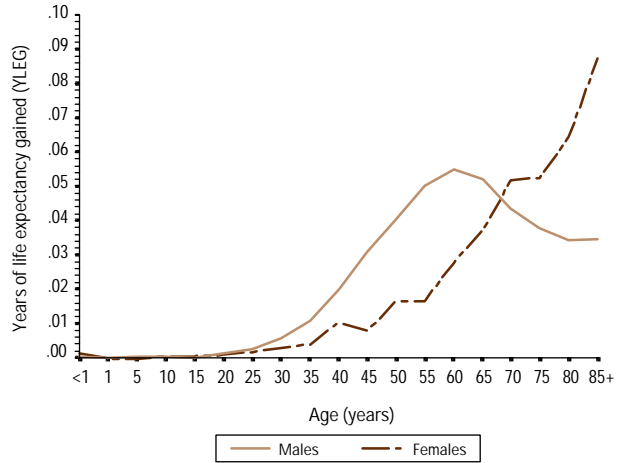
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 52. Impact of mortality from ischemic heart disease on men's life expectancy, selected countries of the Americas, beginning of the 1980s to the end of the 1990s.



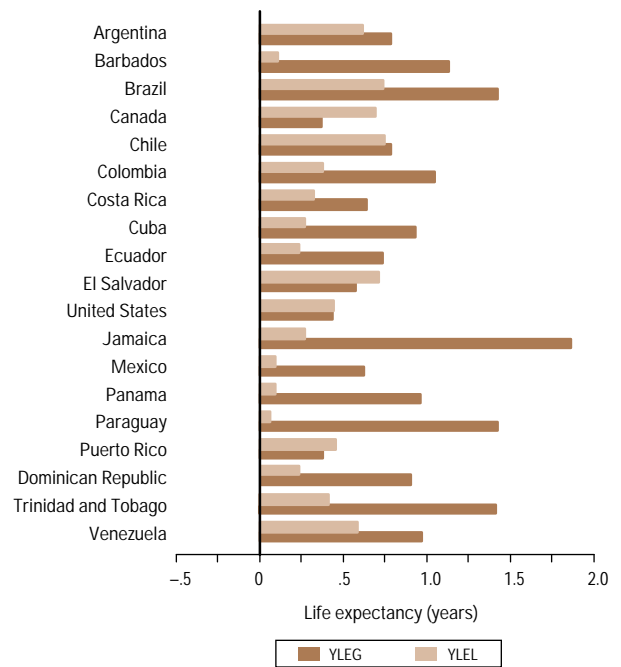
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 53. Distribution of years of life expectancy gained from changes in mortality from ischemic heart disease, by age and sex, Region of the Americas, beginning of the 1980s to the end of the 1990s.



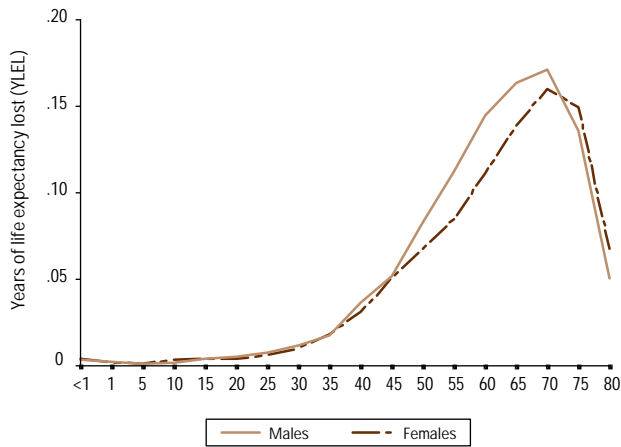
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 54. Impact of mortality from cerebrovascular disease on women's life expectancy, selected countries of the Americas, beginning of the 1980s to the end of the 1990s.



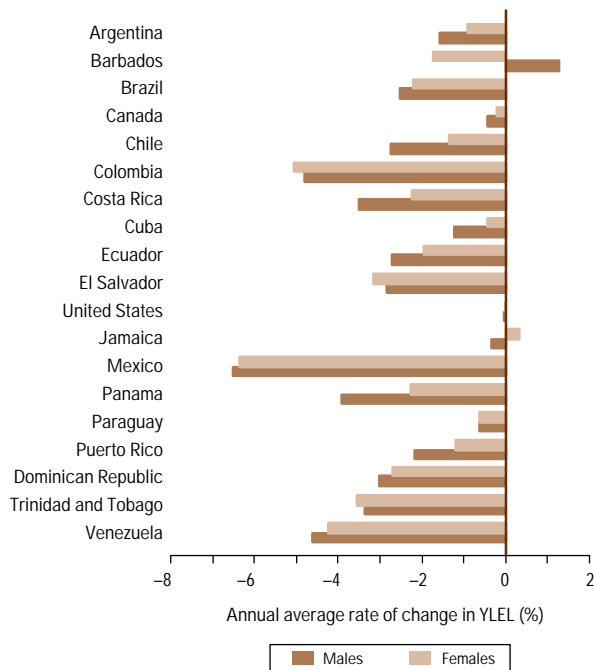
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 55. Distribution of years of life expectancy lost due to mortality from cerebrovascular diseases, by age and sex, Region of the Americas, end of the 1990s.



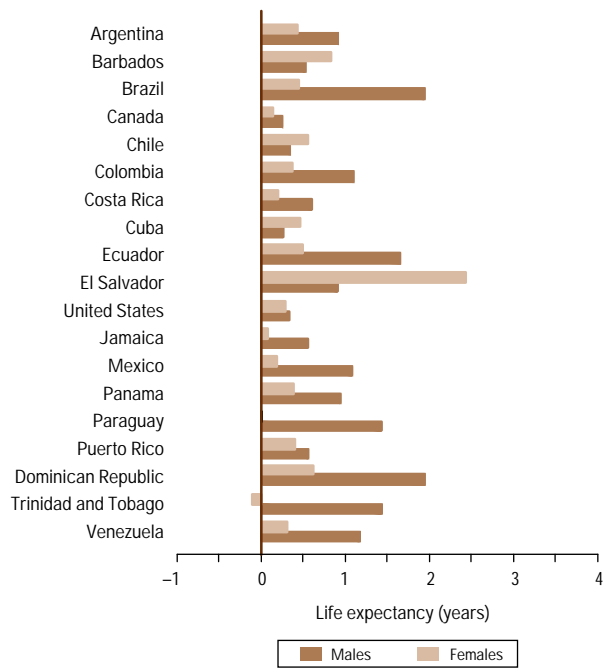
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 56. Rate of change in years of life expectancy lost due to mortality from other heart diseases, selected countries of the Americas, beginning of the 1980s to the end of the 1990s.



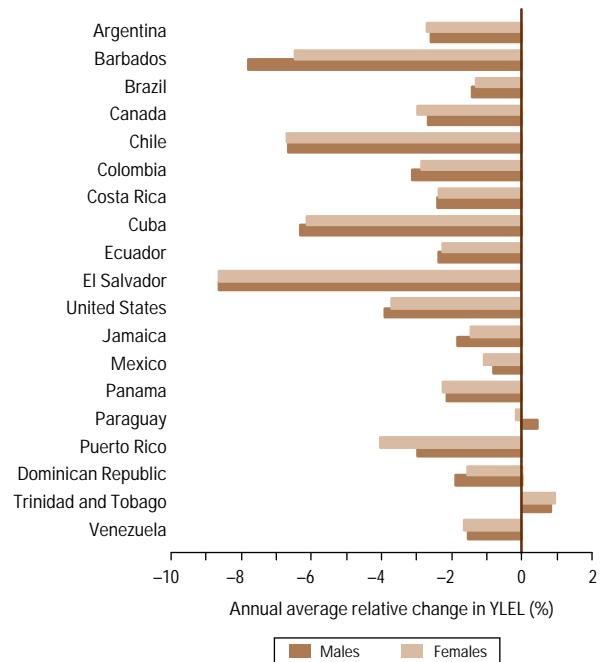
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 57. Impact of mortality from perinatal conditions on life expectancy at birth, selected countries of the Americas, beginning of the 1980s to the end of the 1990s.



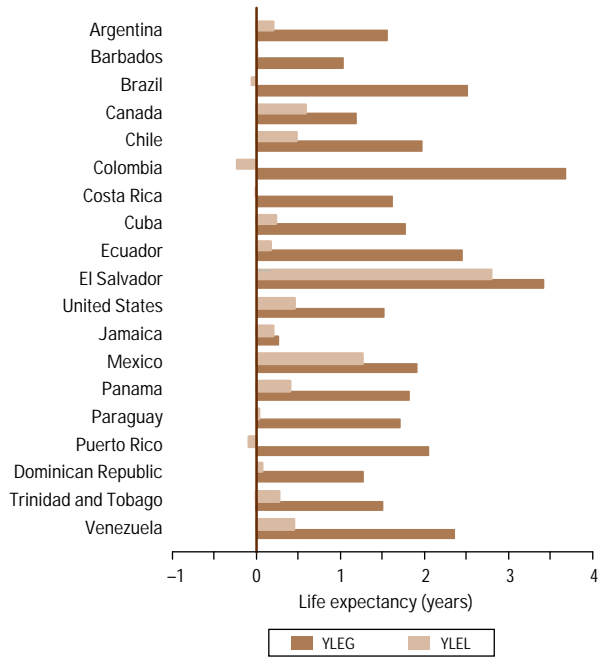
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 58. Rate of change in years of life expectancy lost from mortality due to conditions originating in the perinatal period, selected countries of the Americas, beginning of the 1980s to the end of the 1990s.



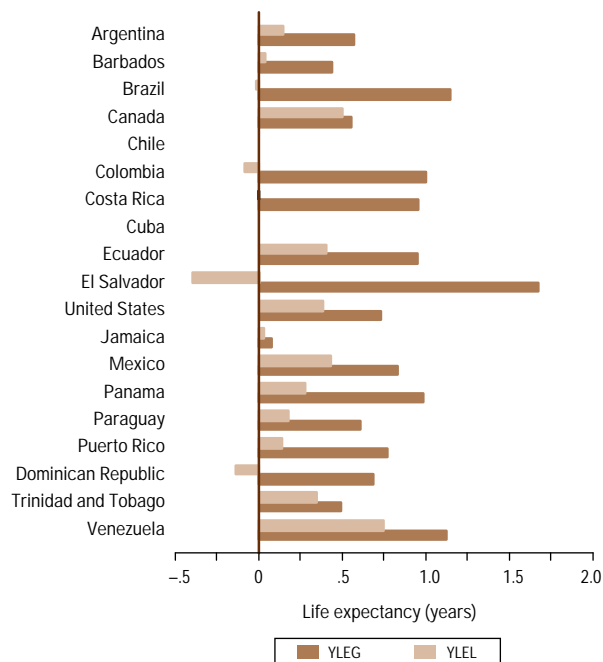
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 59. Impact of mortality from external causes on life expectancy at birth, selected countries of the Americas, beginning of the 1980s to the end of the 1990s.



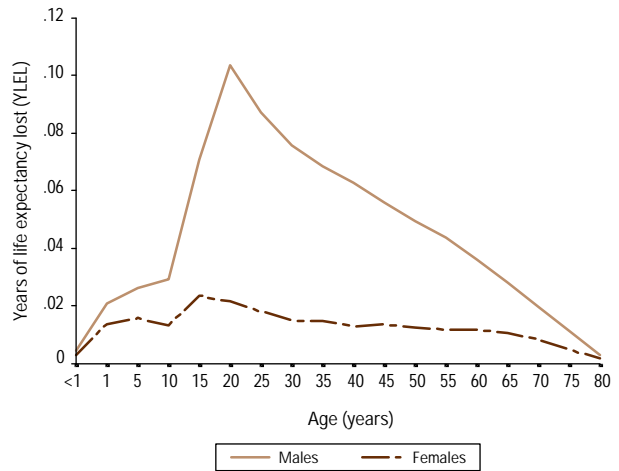
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 60. Impact of mortality from traffic accidents on men's life expectancy, selected countries of the Americas, beginning of the 1980s to the end of the 1990s.



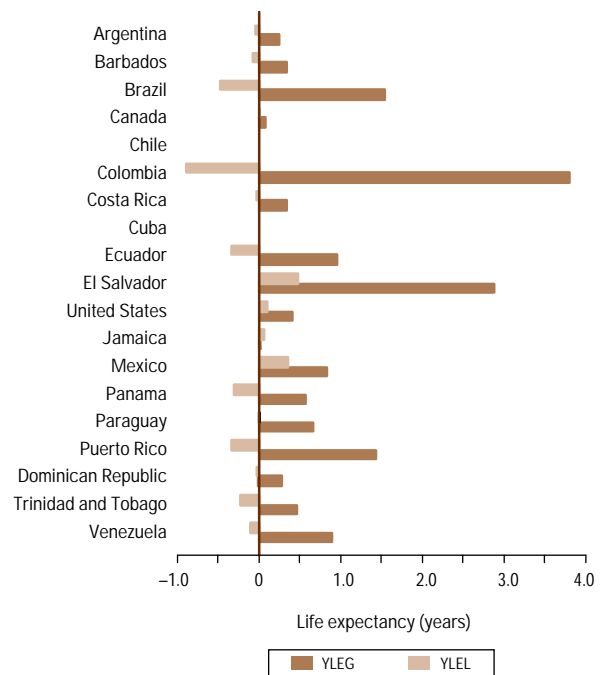
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 61. Distribution of years of life expectancy lost due to mortality from accidents, Region of the Americas, end of the 1990s.



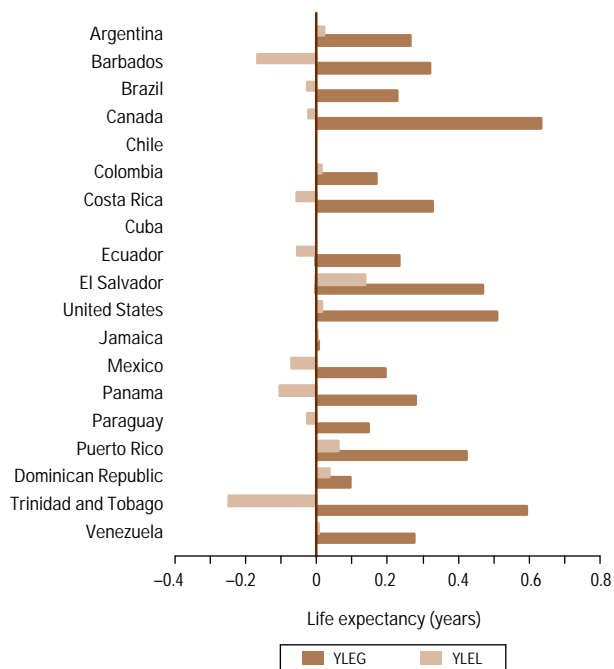
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 62. Impact of mortality from homicide on men's life expectancy, selected countries of the Americas, beginning of the 1980s to the end of the 1990s.



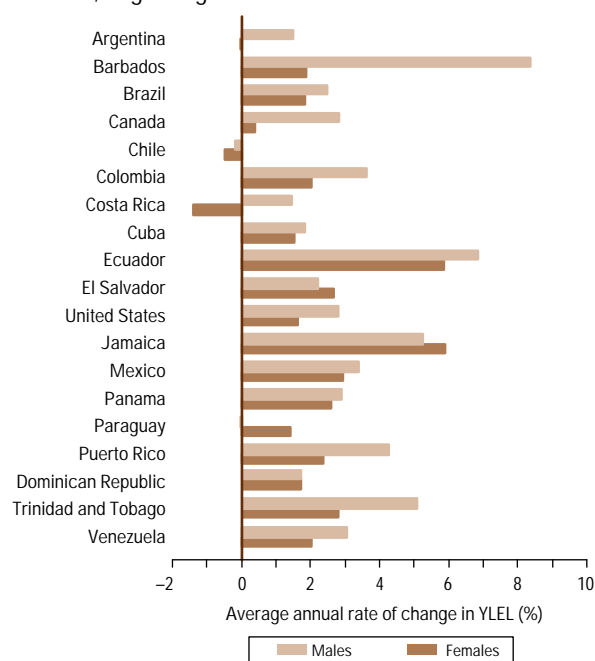
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 63. Impact of mortality from suicide on men's life expectancy, selected countries of the Americas, beginning of the 1980s to the end of the 1990s.



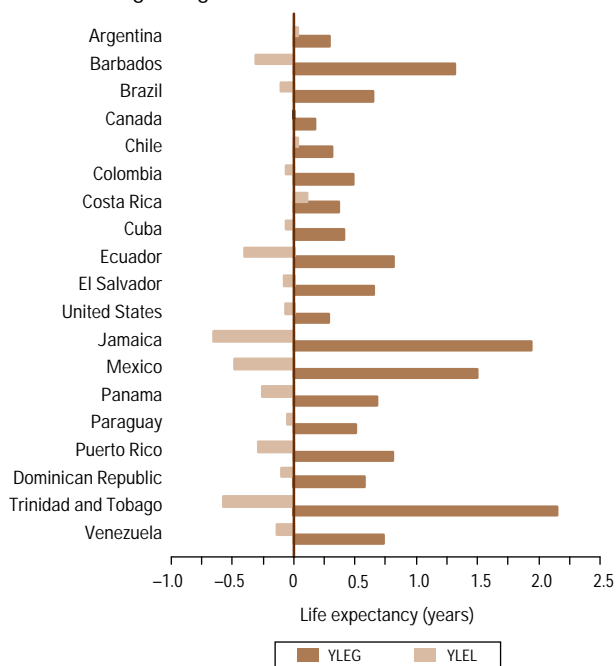
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 65. Rate of change in years of life expectancy lost due to mortality from diabetes, selected countries of the Americas, beginning of the 1980s to the end of the 1990s.



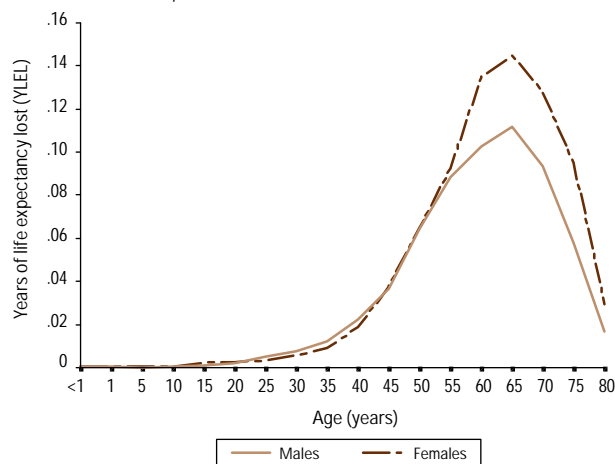
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 64. Impact of mortality from diabetes mellitus on women's life expectancy, selected countries of the Americas, beginning of the 1980s to the end of the 1990s.



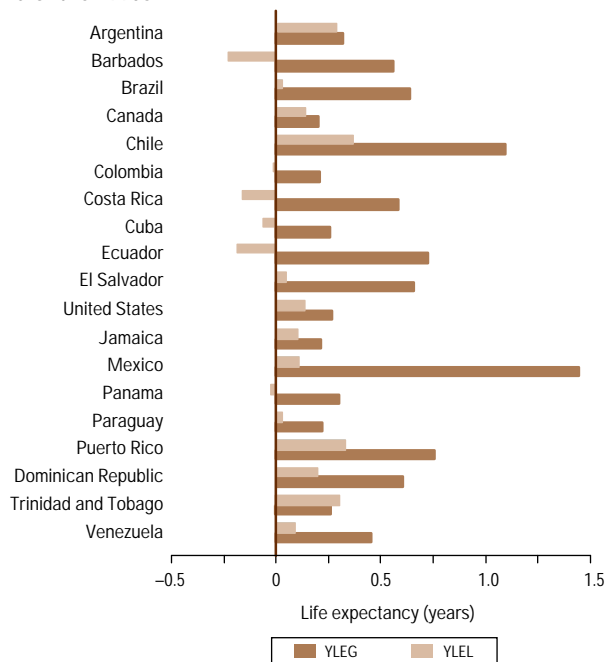
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 66. Distribution of years of life expectancy lost due to mortality from diabetes mellitus, by age and sex, Region of the Americas, end of the 1990s.



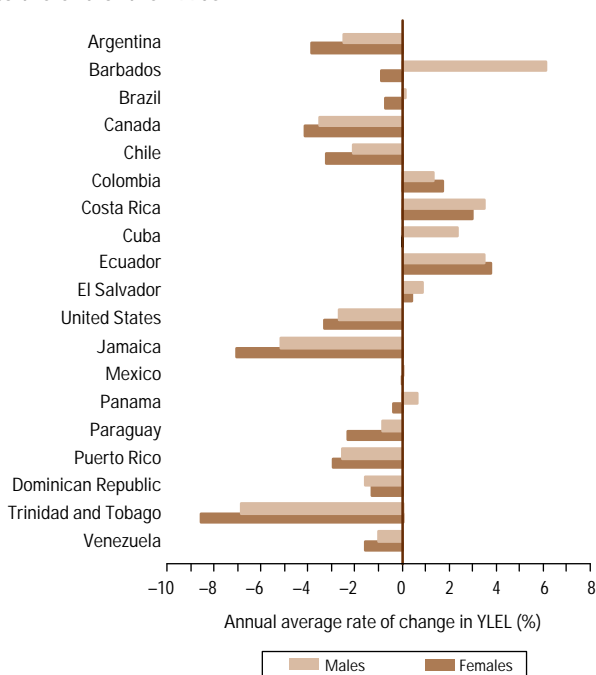
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 67. Impact of mortality from cirrhosis and other diseases of liver on men's life expectancy, selected countries of the Americas, beginning of the 1980s to the end of the 1990s.



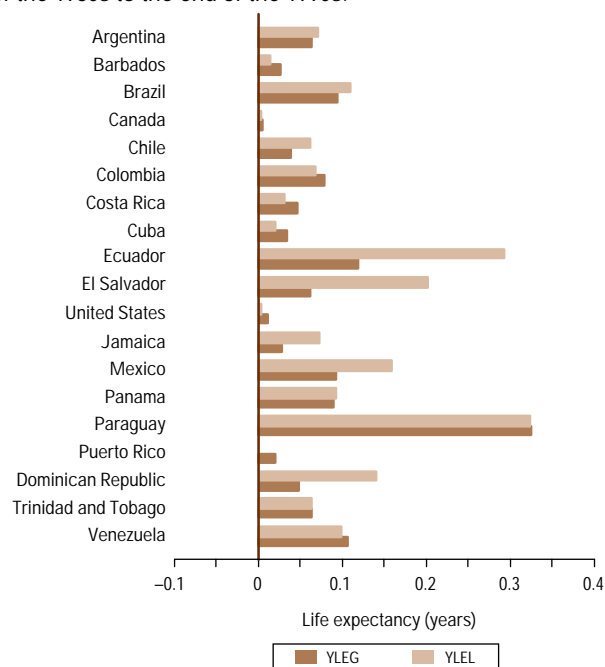
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 68. Rate of change in years of life expectancy lost due to mortality from cirrhosis and other diseases of liver, selected countries of the Americas, beginning of the 1980s to the end of the 1990s.



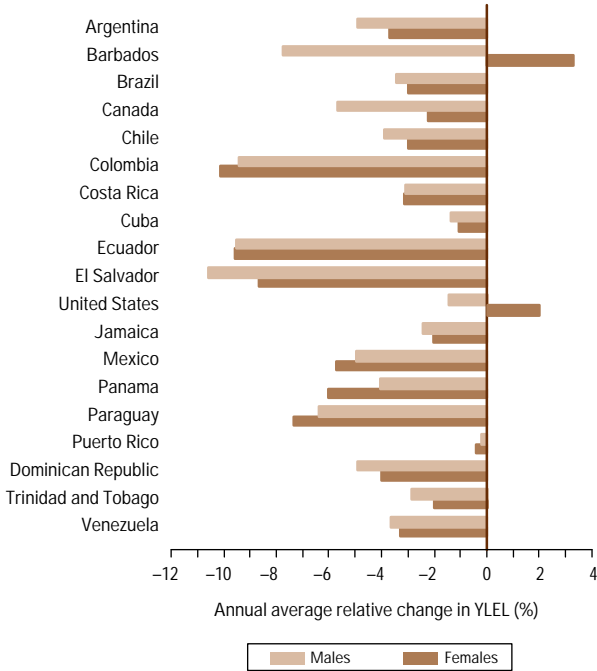
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 69. Impact of mortality from complications of pregnancy, childbirth, and the puerperium on women's life expectancy, selected countries of the Americas, beginning of the 1980s to the end of the 1990s.



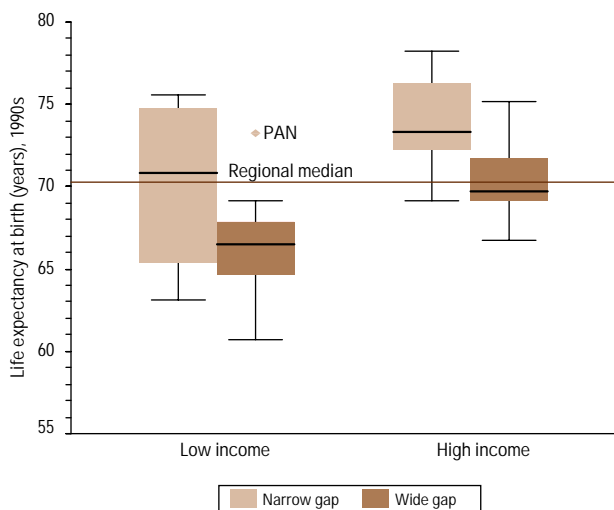
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 70. Rate of change in years of life expectancy lost due to mortality from chronic obstructive pulmonary diseases, selected countries of the Americas, beginning of the 1980s to the end of the 1990s.



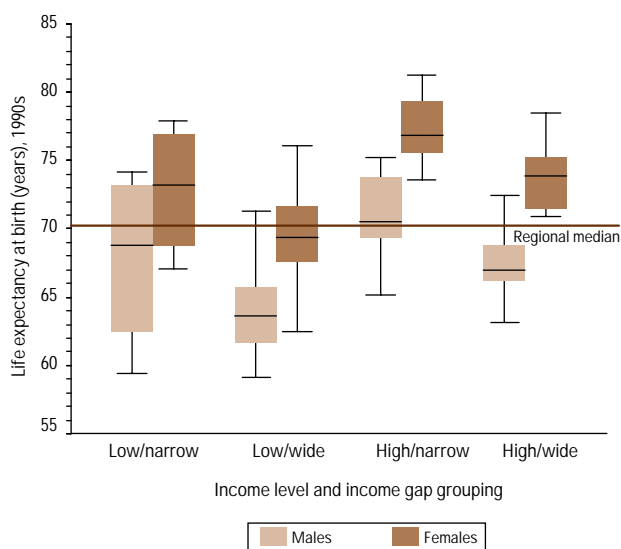
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 71. Summary distribution of life expectancy at birth, by country groupings according to income level and income gap, Region of the Americas, 1990s.



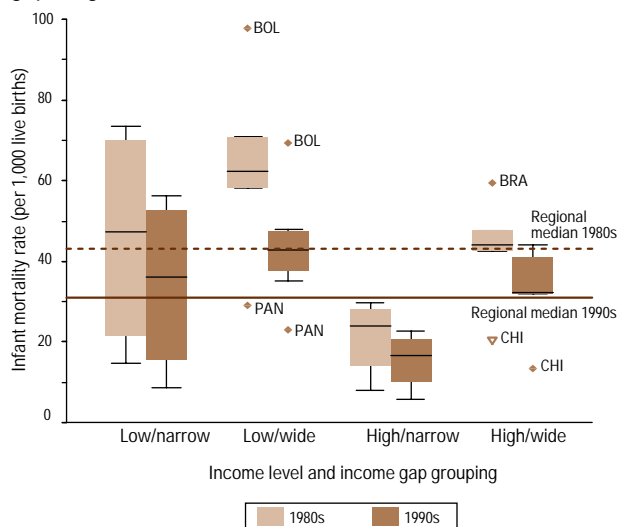
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 72. Summary distribution of life expectancy at birth, by country groupings according to income level and income gap, and by sex, Region of the Americas, 1990s.



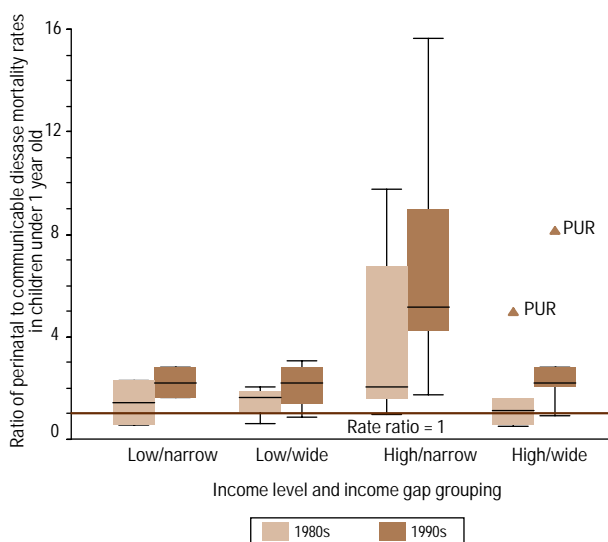
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 73. Summary distribution of infant mortality, by country groupings according to income level and income gap, Region of the Americas, 1980s and 1990s.



Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

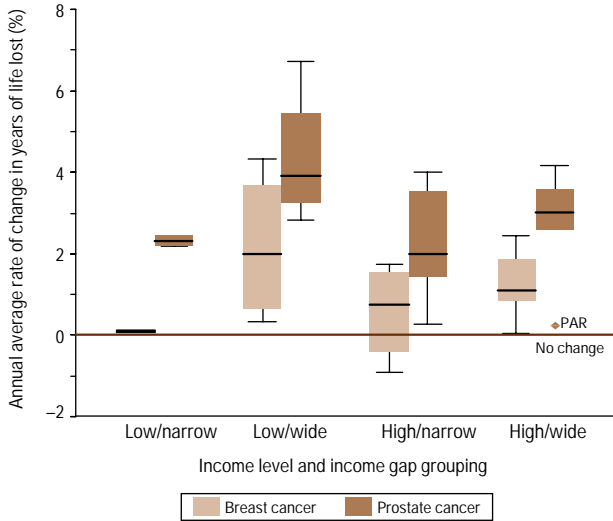
FIGURE 74. Ratio of perinatal mortality rates to communicable disease mortality rates in children under 1 year old, by country groupings according to income level and income gap, Region of the Americas, beginning of the 1980s to the end of the 1990s.



Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

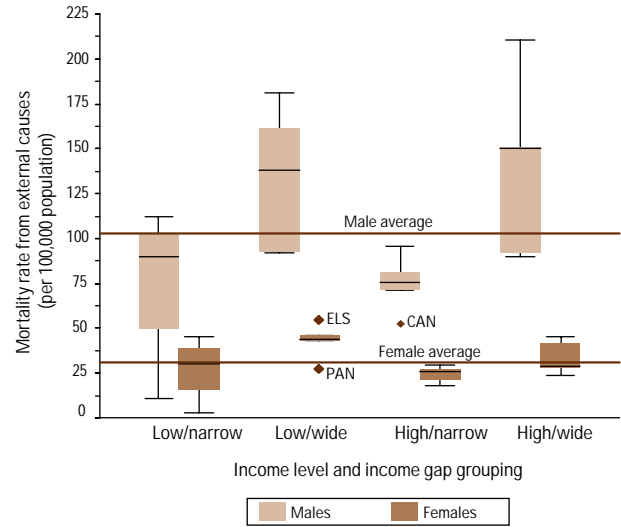


FIGURE 75. Rate of change in years of life expectancy lost due to mortality from breast cancer and prostate cancer, by country groupings according to income gap, Region of the Americas, beginning of the 1980s to the end of the 1990s.



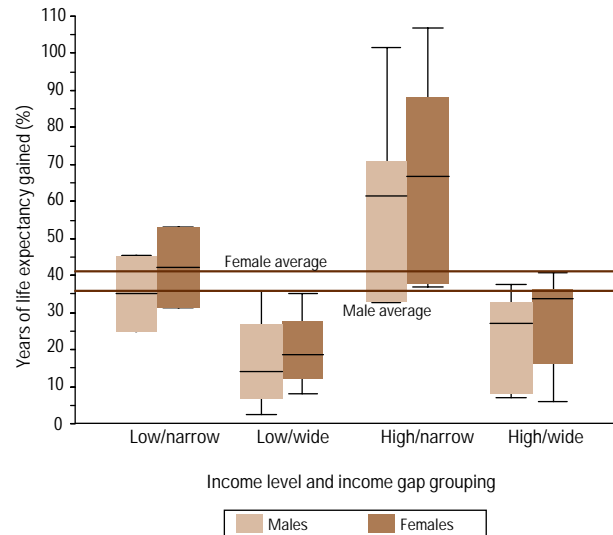
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 77. Summary distribution of mortality from external causes, by country groupings according to income level and income gap, Region of the Americas, end of the 1990s.



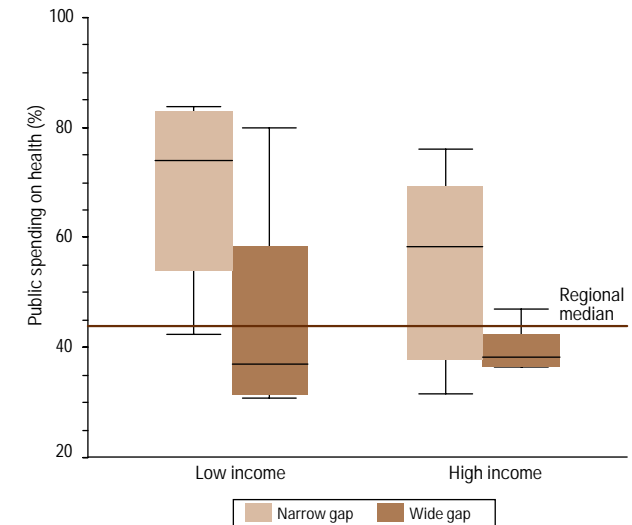
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 76. Contribution of mortality from cardiovascular disease to life expectancy gained, by country groupings according to income level and income gap, Region of the Americas, beginning of the 1980s and end of the 1990s.



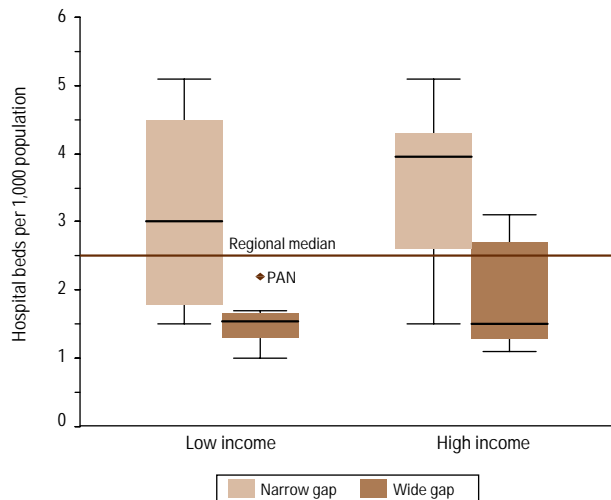
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 78. Summary distribution of public spending on health, by country groupings according to income level and income gap, Region of the Americas, 1978–1998 median value.



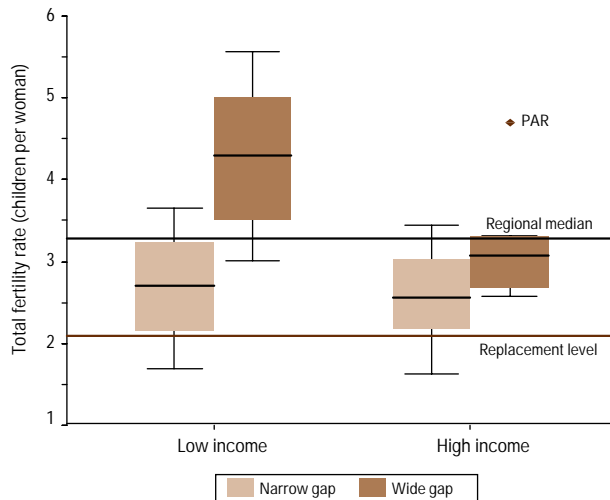
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 79. Summary distribution of hospital bed availability, by country groupings according to income level and income gap, Region of the Americas, 1996.



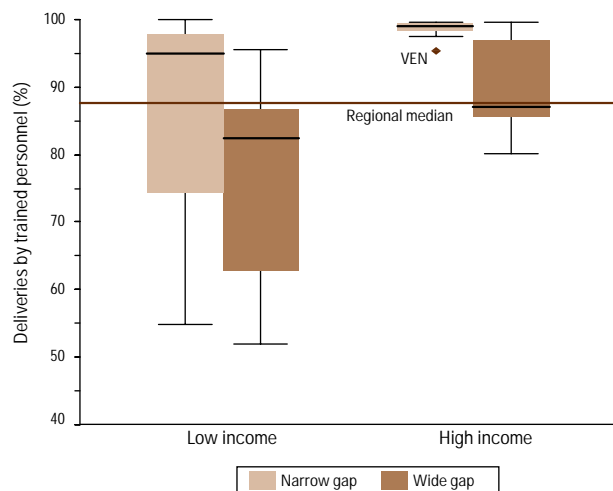
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 81. Summary distribution of the total fertility rate, by country groupings according to income level and income gap, Region of the Americas, beginning of the 1980s to the end of the 1990s.



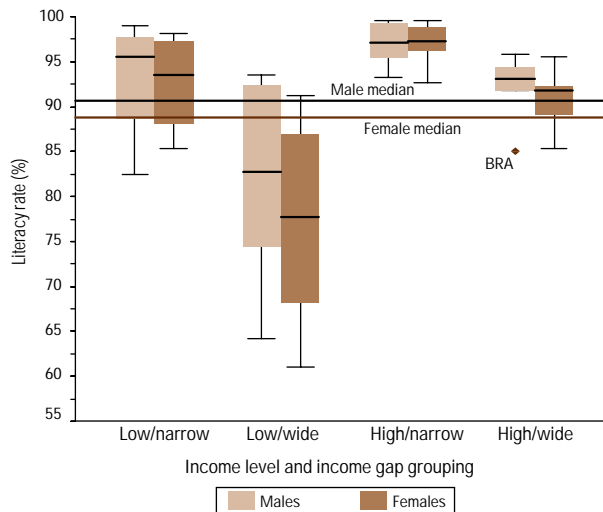
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 80. Summary distribution of institutional delivery coverage, by country groupings according to income level and income gap, Region of the Americas, 1999.



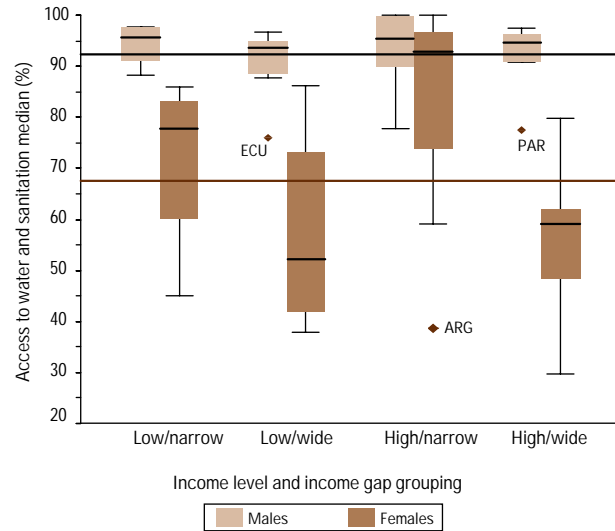
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 82. Summary distribution of literacy, by country groupings according to income level and income gap, Region of the Americas, 2000.



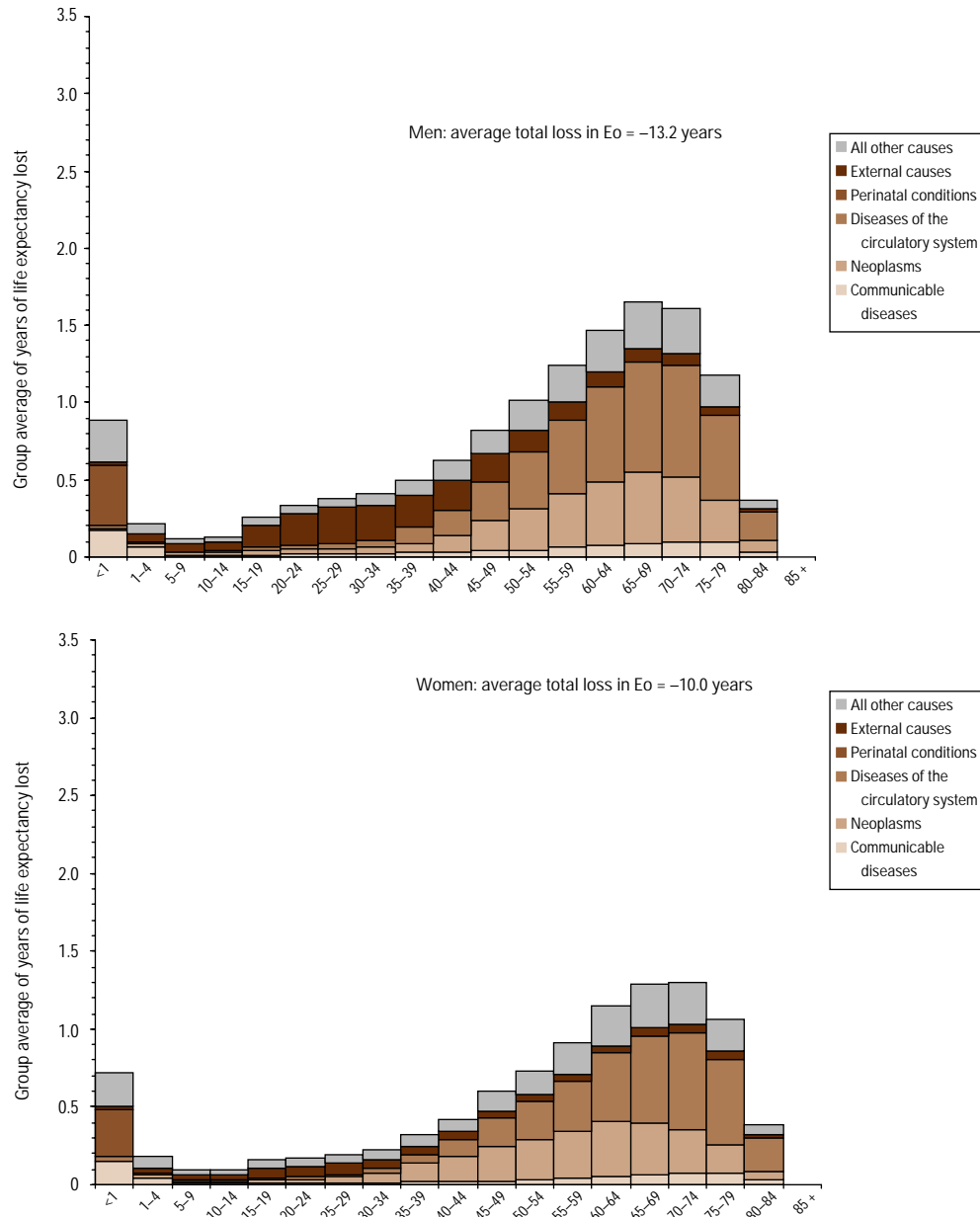
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 83. Summary distribution of access to water and sanitation, by country groupings according to income level and income gap, Region of the Americas, 1998.



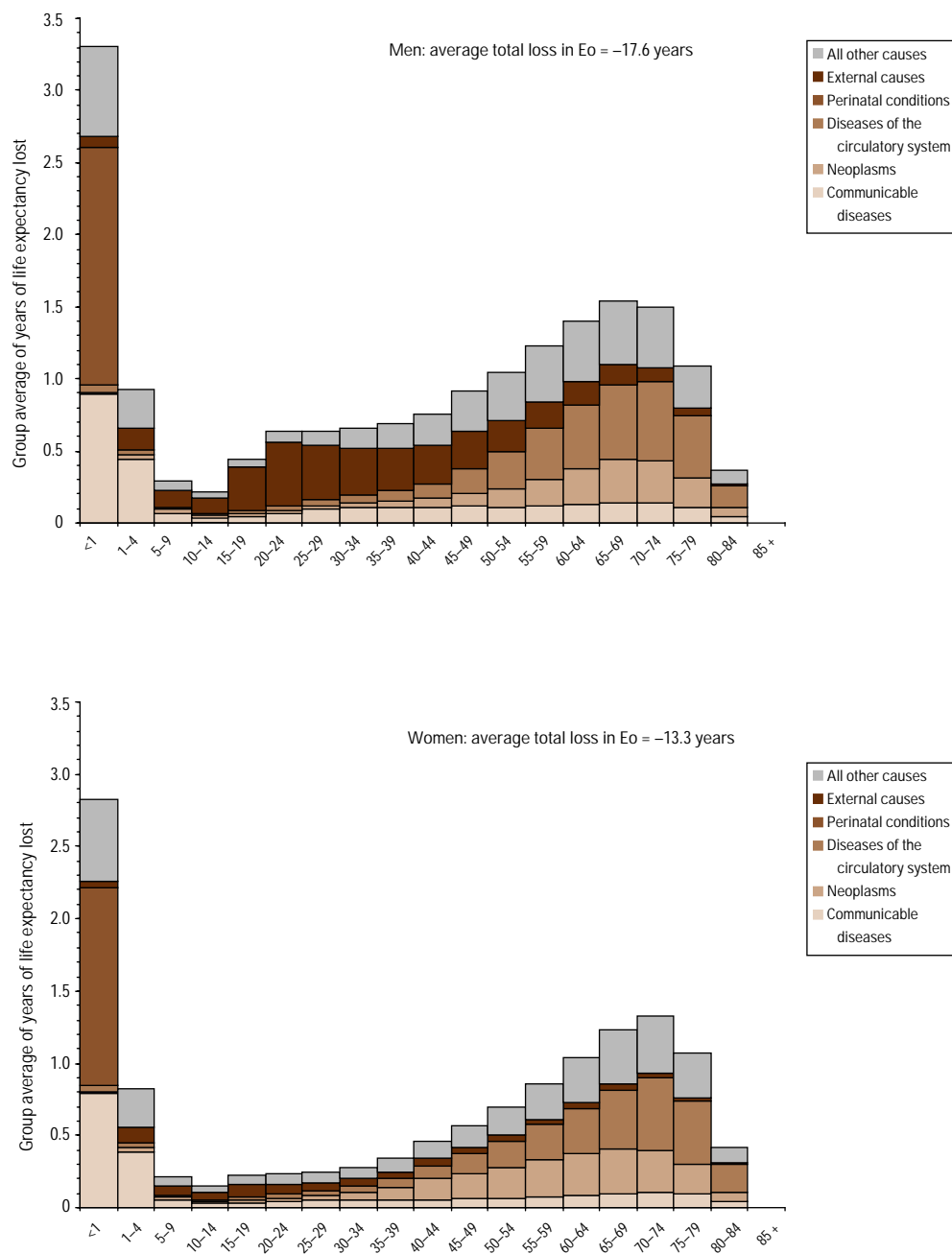
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 84. Loss of life expectancy at birth in countries with low income and narrow income gap, Region of the Americas, end of the 1990s.



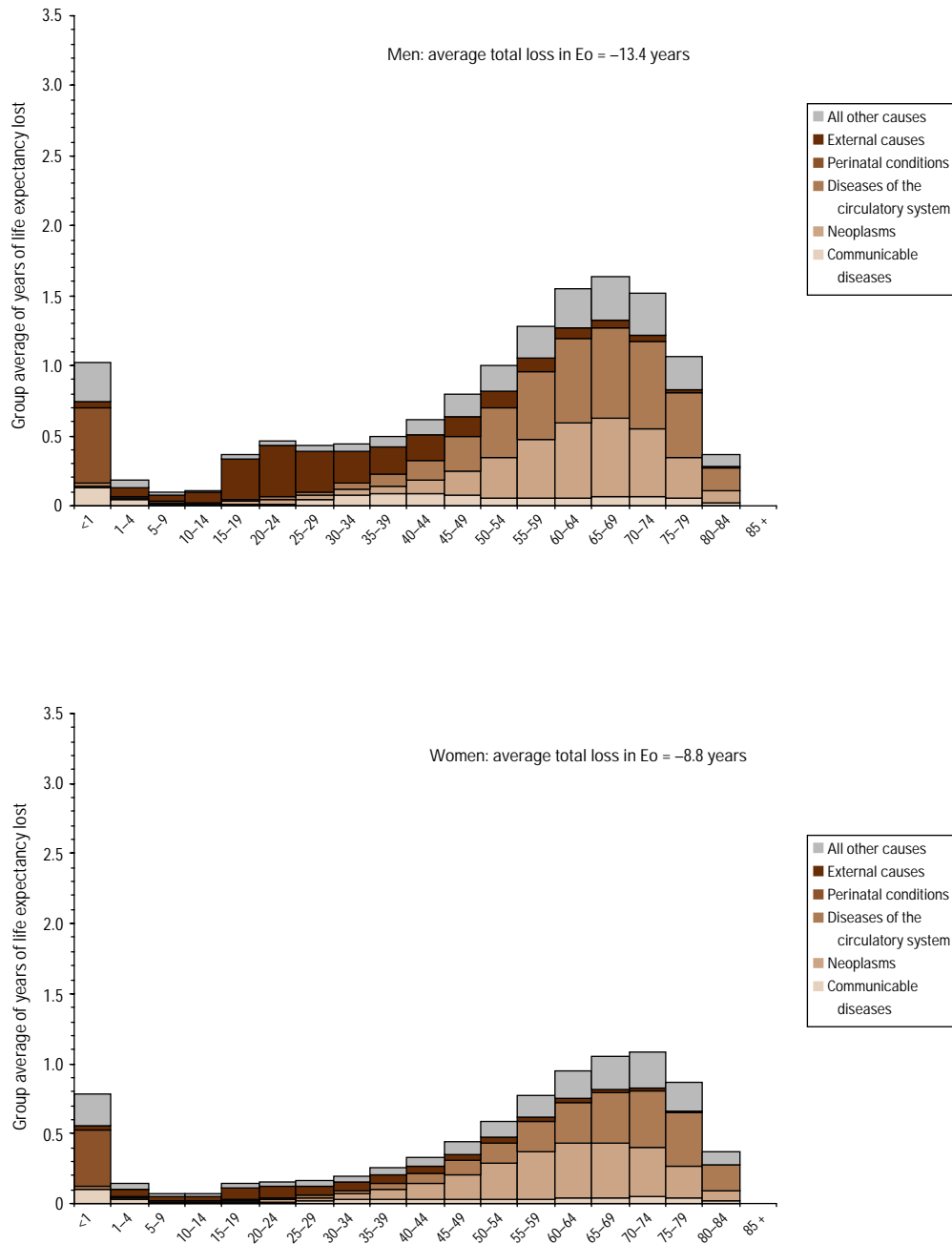
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 85. Loss of life expectancy at birth in countries with low income and wide income gap, Region of the Americas, end of the 1990s.



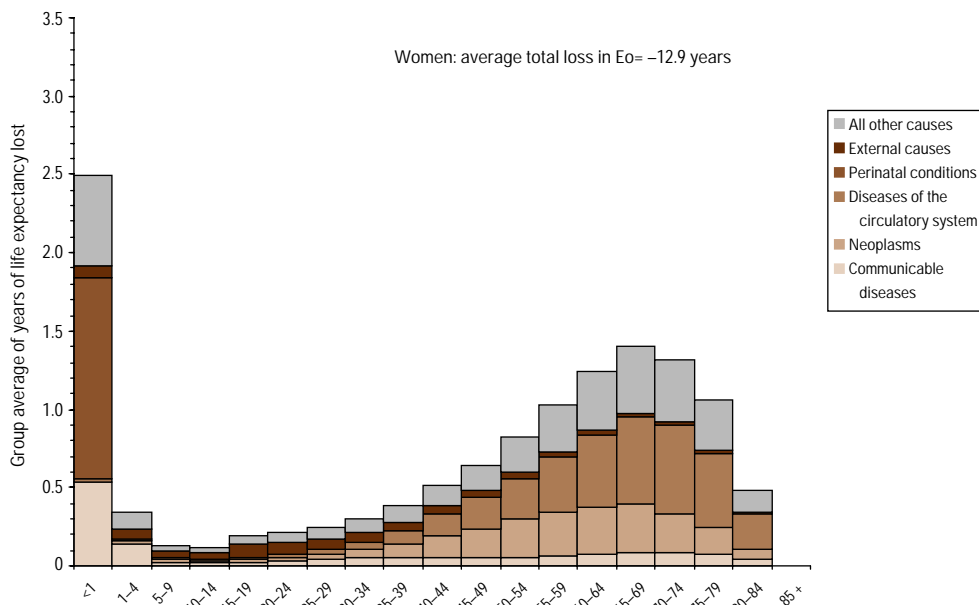
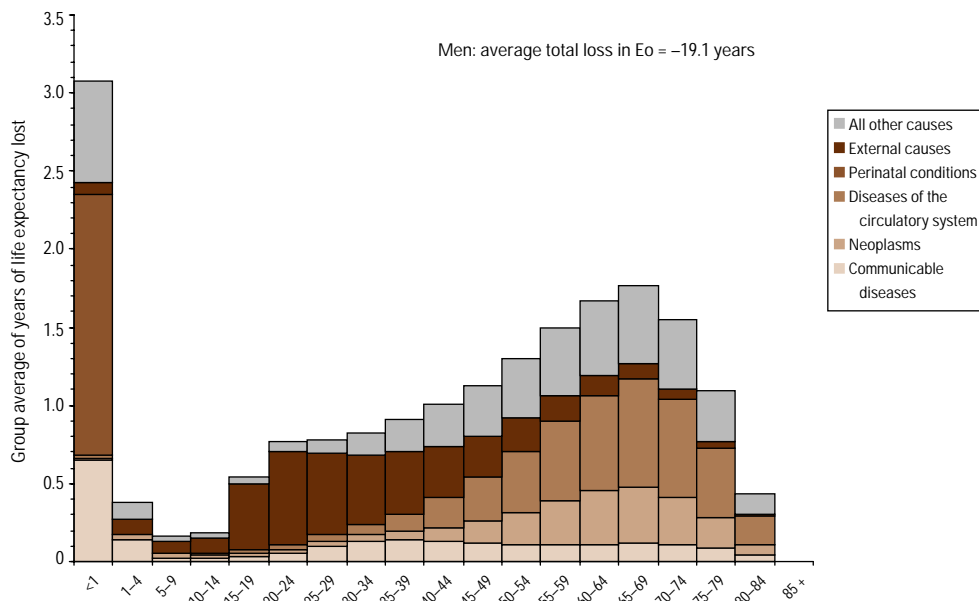
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 86. Loss of life expectancy at birth in countries with high income and narrow income gap, Region of the Americas, end of the 1990s.



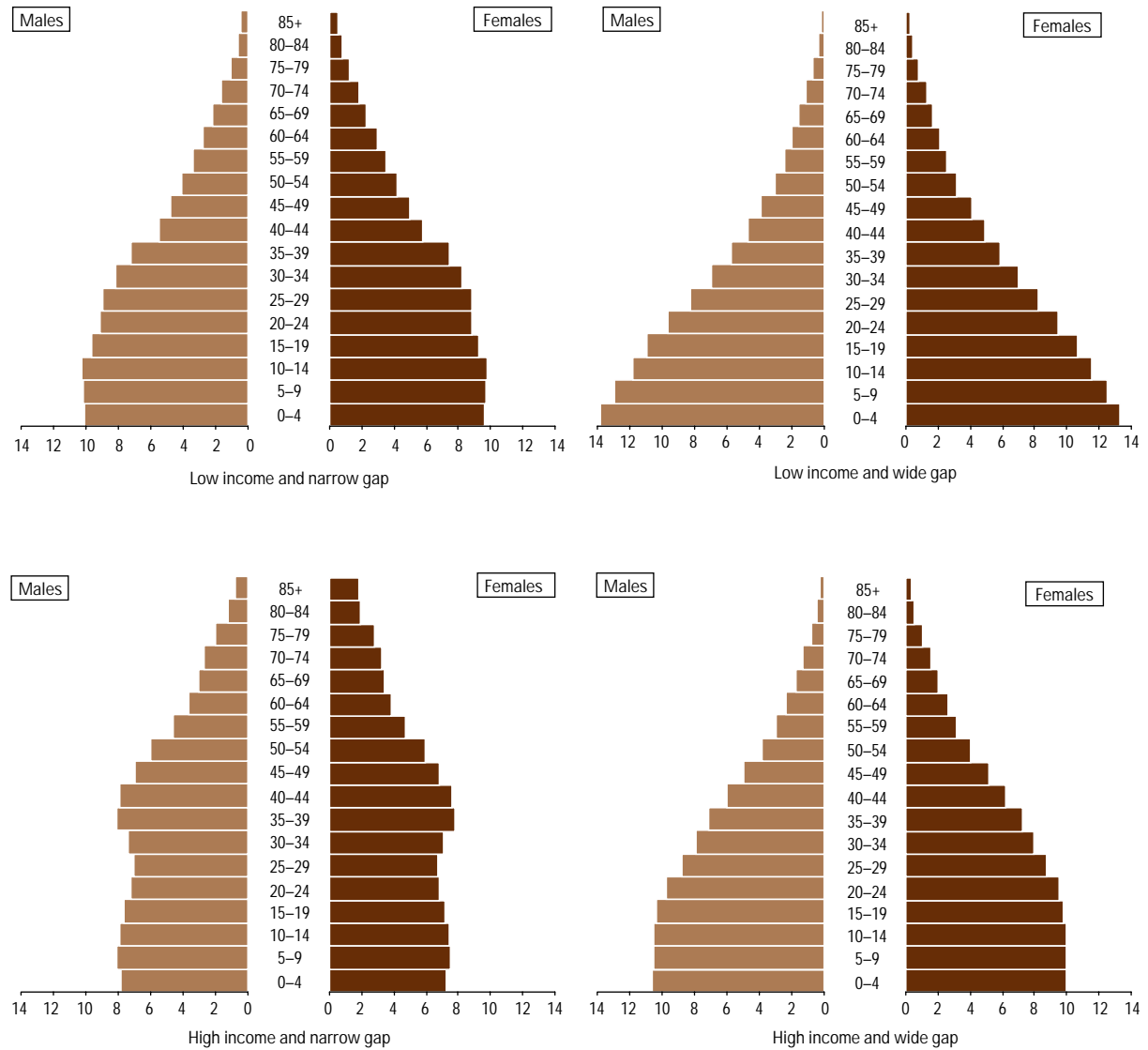
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 87. Loss of life expectancy at birth in countries with high income and wide income gap, Region of the Americas, end of the 1990s.



Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE 88. Population structure, by sex, of country groupings according to income level and income gap, by sex, Region of the Americas, 2000.



Source: Pan American Health Organization, Special Program for Health Analysis, 2002.



# A. METHODOLOGICAL ANNEX

## A.1. TECHNICAL NOTES

### Sources of Data

Demographic data come from the United Nations Population Division (1, 2) and the U.S. Census Bureau's International Programs Center (3). Financial data come from the World Bank (4–6), the United Nations Development Program (7), the Inter-American Development Bank (8), the Pan American Health Organization Core Health Data Initiative (9), and technical reports from PAHO/WHO's Country Offices in the Americas. Data on morbidity, as well as data on access to, resources for, and coverage of health services, come from PAHO/WHO's Core Health Data Initiative (9). Data on mortality and the information on basic causes of death come from PAHO/WHO's Regional Database on Mortality. Registered mortality data for the country and year used in the mortality analysis presented in Chapter 1 are summarized in Table A.1.

### Classification of Causes of Death

Registered causes of death are coded according to the International Classification of Diseases (ICD) revision in use in each country (see Table A.1). The six broad groups of causes of death used in this chapter were defined as indicated in Table A.2.

The 32 categories of basic causes of death selected for the partition analysis of the change in mortality on life expectancy at birth presented in this chapter are listed in Table A.3.

A more detailed comparative analysis of the impact of changes between the ninth and tenth ICD revisions on mortality statistics in the Americas may be consulted in the Organization's prior publications (10, 11).

### *Procedures for Estimating and Standardizing*

Registered mortality data available for analysis were subjected to standardized procedures for validating consistency and integrity. Death certificates that did not specify sex, age, or cause

were proportionally redistributed based on the frequency distributions observed in each country and period, assuming that deaths from unknown causes did not include deaths from external causes. The data were adjusted by the level of mortality under-registration and the proportion of deaths registered as ill defined causes, using previously published correction algorithms (12). The degree of under-registration and the percentage of ill-defined causes by country and period are presented in Table A.4.

To reduce the potential instability of mortality estimates for simple calendar years, the mortality indicators used in the analysis represent annualized values arrived at from information from three consecutive years for each period and country. The standard population used to calculate estimated mortality rates, adjusted for age and sex, corresponds to that proposed by the World Health Organization (13).

In the analysis of regional health inequalities presented in this chapter, the values of the ratio of extreme income quintiles (ratio of wealthiest 20%/poorest 20%) corresponded to an expanded set of 1,035 observations of the Gini coefficient between 1978 and 1998 in the selected countries; these values were obtained using an exponential regression model originally constructed for 334 data pairs (multiple  $r$  coefficient = 0.924). The annual average rates of growth of per capita income, the 20/20 ratio, and the Gini coefficient for each country were obtained through the ordinary method of least squares, if at least half the annual observations for 1978–1998 were available in a given country; otherwise, the compound growth method (geometric) for discrete periods was used, as recommended by the World Bank (14).

### *Abridged Life Tables*

To analyze the impact of mortality on life expectancy, using the Arriaga method (partition of the change in life expectancy, Annex A.2), 76 abridged life tables were constructed (15). The tables were internally consistent with the mortality experience by country, sex, and period, which was estimated using the PAHO Regional

Database on Mortality and according to life tables and projections of the U.S. Census Bureau's International Programs Center. It should be noted that life expectancy estimates ( ${}_ne_x$ ) and the  $l_x$  (number of survivors at exact age  $x$ ) and  ${}_nT_x$  (total number of person-years lived beyond exact age  $x$ ) functions in the mortality tables constructed for this analysis may differ slightly from those generated by the United Nations using five-year life tables (16).

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## A.2. PARTITION OF THE CHANGE IN LIFE EXPECTANCY

Life expectancy at birth is often used as a summary measure of a population's mortality. Therefore, changes in life expectancy at birth also are used to summarize changes in a population's mortality. This essentially reciprocal relationship between two dimensions of the survival function lends support to a partition method proposed by Arriaga, which attempts to explain the change in life expectancy in terms of changes in mortality, in specific age groups and for different causes of death. More specifically, this method makes it possible to measure the contribution that each cause of death and age group makes to the change observed in life expectancy at birth. This contribution is expressed in years of life expectancy (referred to, in this analysis, as "years of life expectancy," YLEG), and is attributable to the change observed in the absolute risk of dying from that cause. By definition, the reduction in mortality due to a specific cause will make a positive contribution to the change in life expectancy (i.e., positive YLEG), and the increase in mortality due to that cause will make a negative contribution (i.e., negative YLEG) to that change. Figure A.1 shows the change in life expectancy observed in the countries of the Region between the beginning of the 1980s and the end of the 1990s, and represents the sum of the individual contributions of each cause of death to that change (Table A.5).

Changes in the specific mortality rates by cause, age, or both, give an idea of the contribution that different causes and ages make to the change in life expectancy. However, the partition method has three comparative advantages: 1) it considers that similar changes in mortality rates at different ages have a different effect on life expectancy; 2) it provides information about the substitution of competing causes of death; and 3) it provides a quantitative measure that is easily interpreted. The contribution in YLEG attributable to a given cause of death has the relative disadvantage of being sensitive to extreme values of the base mortality level for that cause. In other words, if mortality from a cause has already reached a very low level, its subsequent reduction—even at young ages—will represent only a small contribution to YLEG. In contrast, if the base level is very high, any reduction will produce a large contribution to YLEG. Therefore, this analysis incorporates a measure of the level of mortality from each cause of death, expressed in years of life expectancy lost (YLEL) (Table A.6).

YLEL correspond to the difference between the maximum biologically achievable life expectancy and the life expectancy actually achieved (a definition that, conceptually, is not related to "years of potential life lost"). Figure A.2 shows the difference in YLEL between the biologically achievable 85 years of life and the life expectancy at birth actually achieved in the late 1990s in the Region's countries. This "gap" with respect to the 85 years of life is partitioned in a similar manner to that described for the change

in YLEG, in order to isolate the specific contributions (expressed in YLEL) of each cause of death or age group (or both) to that life expectancy gap. Thus, the contribution in YLEL of each cause of death reflects the level of mortality from that cause (i.e., the number of life expectancy years that could be gained if mortality from that cause were reduced). Moreover, based on the contribution in YLEL of each cause in two periods, e.g., the beginning of the 1980s and the end of the 1990s, it is possible to calculate the relative rate of change of YLEL (Table A.7). This is a useful indicator for detecting causes of death that have rapid rates of change, but are not necessarily the ones that contribute most to changes in years of life.

## A.3. THE 20% WEALTHIEST/20% POOREST INCOME RATIO AND THE GINI COEFFICIENT

These two indicators are a numerical expression of the degree of equity with which income is distributed in a population. In a hypothetical situation with perfect equity in income distribution, each individual would have the same share or portion of income. The observed income distribution is generally represented by a cumulative curve, called the Lorenz curve, which indicates the percentage of total income that corresponds to each population percentage, ordered by income level. Figure A.3 shows the Lorenz curve for the Region during 1978–1998, and illustrates the extent of income distribution inequality. Thus, one can see that the poorest 20% of the population (the poorest quintile) has less than 5% of total income, which is far from equitable (represented by the diagonal line), in that this population quintile should have precisely 20% of total income. In contrast, more than 45% of total income is concentrated in the wealthiest population quintile.

The 20%/20% income ratio is the income quotient of these two extreme quintiles, and defines the income gap that separates the wealthiest 20% from the poorest 20% of the population. Theoretically, this indicator can have values between 1 (perfect equality) and  $+\infty$  (complete inequality, when the poorest quintile's income tends toward 0). The Gini coefficient, in turn, corresponds to the area that separates the Lorenz curve from the diagonal line of equality, expressed as a percentage (or proportion) of the triangular area located below that line of equality. Theoretically, this indicator can have values between 0 (perfect equality) and 1 (or 100) (complete inequality).

The 20%/20% income ratio and the Gini coefficient generate highly correlated results and, therefore, both are valid indicators of the income gap. Figure A.4 shows the relationship between the two indicators for a set of 334 data pairs from countries of the Region that were available for 1978–1998. An obvious feature of this high correlation (multiple  $r$  0.924) is its exponential nature: the change in the 20%/20% income ratio for each unit of increase

of the Gini coefficient is not constant, and it reaches its maximum at high levels of inequality. For example, when the Gini coefficient increases from 25 to 30, the 20%/20% ratio changes by just 1 point (from 4.3 to 5.6), but when the Gini coefficient increases from 60 to 65, the 20%/20% ratio changes by 8 points (from 26.8 to 34.8). In terms of interpretation, the 20%/20% ratio is more intuitive than the Gini coefficient for capturing the notion of income gap; it also is more sensitive to extreme changes in inequality. Therefore, the analysis of health inequalities presented in this section has used the 20%/20% ratio as an indicator of the income gap. Finally, the exponential model illustrated in Figure A.4 made it possible to obtain, by regression, the expected values of the 20%/20% ratio for an expanded set of 1,035 values of the Gini coefficient from countries of the Region, which were available for the period analyzed.

#### A.4. INCOME LEVEL AND INCOME GAP

In the Regional analysis of health inequalities presented in this Chapter, the socioeconomic dimension has been defined in terms of two of its principal components: income level and income gap. Figure A.5 shows the correlation between these two variables in a conventional dispersion diagram; it also includes a linear regression line with a spline at 6,500 international dollars of income, to better show the possible changes in the relationship of those variables at the extremes of the income scale. In both cases, the slope (beta) of the regression line is very close to zero and statistically insignificant, which is glaringly obvious below spline level. This suggests that income level and income gap are independent of one another. In other words, countries with low income levels do not necessarily have wide income gaps, and countries with high income levels do not necessarily have narrow gaps. The magnitude of one variable does not explain the other, which means that each one is a complementary attribute of the socioeconomic dimension. Consequently, a more precise representation of this macrodeterminant of health will be achieved by considering both socioeconomic attributes, and not just one (typically, the income level).

#### A.5. GRAPHIC REPRESENTATION OF DISTRIBUTION USING BOXPLOTS

The analysis of health inequalities presented in this chapter uses boxplots to reflect the variability of the indicators of the health situation within each socioeconomic cluster, defined by income level and income gap. The boxplot is a graphic element of exploratory data analysis, which summarizes and captures, in a simultaneous and visually intuitive manner, an indicator's central trend, dispersion, and symmetry of distribution.

Figure A.6 shows the regional summary distribution of the availability of doctors per person in 1999 using a boxplot. The central box identifies the interquartile range (the amplitude of the middle 50% of the observations) and contains the median of the distribution, represented by the intermediate horizontal line. The vertical lines below and above the interquartile range (called whiskers) represent the range of the first and last quartiles (25% below and above) of the observations, respectively, and include the full distribution. The observations whose position is between 1.5 and 3 times the amplitude of the interquartile range, either above or below it, are considered outside values (outliers), and those situated more than 3 times above or below that range are considered extreme values of the distribution.

The boxplot summarizes valuable information about the availability of doctors, as observed in the Region in 1999. The Regional median is 12.7 doctors per 10,000 population and, in fact, half the countries have between 9 and 19 doctors per 10,000 population (interquartile range). The other half magnifies the distribution asymmetry: the amplitude of the lowest quartile is 7 doctors per 10,000 population (9–2), while that of the highest quartile is 39 (58–19). Considering the presence of one outside value (37.0, Uruguay) and one extreme value (58.2, Cuba), which considerably exceed the experience of the group, the summary distribution illustrated by the boxplot assigns a total amplitude between 2 and 28 doctors per 10,000 population; i.e., the availability of doctors is at least 14 times greater in the highest extreme than in the lowest of the Regional distribution, which reflects the level of inequality of this basic indicator of health resources.

Table A.1. ICD revisions and periods used to analyze registered mortality, selected countries of the Americas, beginning of the 1980s and end of the 1990s.

Country	Beginning of the 1980s		End of the 1990s	
	Years	ICD	Years	ICD
Argentina <sup>a</sup>	1979–1981	9	1995–1997	9
Barbados	1979–1981	9	1993–1995	9
Brazil	1979–1981	9	1996–1998	10
Canada	1979–1981	9	1995–1997	9
Chile <sup>a</sup>	1980–1982	9	1995–1997	9
Colombia <sup>a</sup>	1984–1986	9	1995–1997	9
Costa Rica	1980–1982	9	1993–1995	9
Cuba	1979–1981	9	1996–1997/1999	9
Dominican Republic	1979–1981	9	1996–1998	10
Ecuador <sup>a</sup>	1979–1981	9	1995/1997–1998	9
El Salvador	1981–1983	9	1997–1999	10
Jamaica <sup>a</sup>	1980–1982	9	1989–1991	9
Mexico <sup>b</sup>	1979–1981	9	1997–1999	10
Panama	1979–1981	9	1996–1997	9
Paraguay	1979–1981	9	1990–1991/1994	9
Puerto Rico	1979–1981	9	1996–1998	9
Trinidad and Tobago	1979–1981	9	1993–1995	9
United States	1979–1981	9	1996–1998	9
Venezuela <sup>b</sup>	1979–1981	9	1994/1996–1997	10

<sup>a</sup>Last year ICD-10.<sup>b</sup>First year ICD-9.

Table A.2. Definition of broad groups of causes of death, by ICD revision number used on the death record.

Causes of death	ICD-9 code	ICD-10 code
Communicable diseases	001-139, 320-322, 460-466, 480-487	A00-B99, G00-G03, J00-J22
Neoplasms	140-239	C00-D48
Cardiovascular diseases	390-459	I00-I99
Perinatal conditions	770-779	P00-P96
External causes	E800-E999	V01-Y89
Residual causes	Rest of 001-779	D50-D89, E00-E90, F00-F99, G04-G99, H00-H59, H60-H95, J30-J98, K00-K93, L00-L99, M00-M99, N00-N99, O00-O99, Q00-Q99

Table A.3. Basic causes of death selected for the partition analysis of the change in mortality on life expectancy at birth.

Selected causes of death	ICD-9 code	ICD-10 code
Intestinal infectious diseases	001-009	A00-A09
Tuberculosis, all forms	010-018	A15-A19
Diseases preventable by immunization (diphtheria, whooping cough, tetanus, acute poliomyelitis, and measles)	032, 033, 037, 045, 055	A33, A35-A37, A80, B05
Septicemia	038	A40-A41
Acquired immunodeficiency syndrome	279.1, 279.4-279.6, 042-044	B20-B24
Malignant neoplasms of the stomach	151	C16
Malignant neoplasms of the colon, rectum, and anus	153-154	C18-C21
Malignant neoplasms of the trachea, bronchi, and lung	162	C33-C34
Malignant neoplasms of the female breast	174	C50
Malignant neoplasms of the uterus and placenta	179-182	C53-C55, C58
Malignant neoplasms of the prostate	185	C61
Leukemias and other malignant neoplasms of the hematopoietic and lymphatic systems	200-208	C81-C96
Diabetes mellitus	250	E10-E14
Nutritional deficiencies and anemias <sup>a</sup>	260-269, 280-285	E40-E64, D50-D53
Hypertensive disease	401-404	I10-I13
Ischemic heart disease	410-414	I20-I25
Diseases of pulmonary circulation and other forms of heart disease	415-429	I26-I51
Cerebrovascular diseases	430-438	I60-I69
Arteriosclerosis	440	I70
Acute respiratory infections	460-466, 480-487	J00-J22
Chronic, non-specific bronchitis, emphysema, and asthma	490-493	J40-J43, J45-J46
Cirrhosis of the liver and other chronic liver diseases	571	K70, K73, K74, K76
Diseases of the urinary system	580-599	N00-N39
Complications of pregnancy, childbirth, and the puerperium	630-676	O00-O99
Congenital malformations, deformities, and chromosomal abnormalities	740-759	Q00-Q99
Certain conditions originating in the perinatal period	760-779	P00-P96
Transport accidents (all)	E800-E848	V01-V99
Accidental falls <sup>b</sup>	E880-E888	W00-W19
Accidental choking and drowning	E910	W65-W74
Suicide and intentionally self-inflicted injuries	E950-E959	X60-X84
Homicide and injuries intentionally inflicted by another person	E960-E969	X85-Y09
All other causes	rest	rest

<sup>a</sup> ICD-9 category: 260–269, 280–285 includes all anemias.<sup>b</sup> ICD-10 category: W00-W19 does not include death from non-specific fracture (ICD-9: E887).

Table A.4. Under-registration of deaths and ill-defined deaths, by period, selected countries of the Americas, beginning of the 1980s and end of the 1990s.

Country	Under-registration of deaths (annual average %)		Ill-defined deaths (annual average %)	
	Beginning of 1980s	End of 1990s	Beginning of 1980s	End of 1990s
	Argentina	1.0	0.1	3.5
Barbados	5.8	4.0	3.6	3.0
Brazil	25.7	20.4	20.9	14.9
Canada	0.9	1.0	1.2	2.0
Chile	2.5	2.0	8.9	4.8
Colombia	18.5	13.1	5.4	5.0
Costa Rica	18.5	7.5	8.0	2.0
Cuba	0.6	0.0	0.7	0.5
Dominican Republic	28.7	34.7	25.0	10.6
Ecuador	14.4	20.5	16.2	14.7
El Salvador	31.4	24.0	21.0	16.4
Jamaica	29.7	28.6	15.3	12.9
Mexico	7.6	4.6	6.7	1.8
Panama	27.7	13.6	10.5	11.7
Paraguay	42.2	44.5	19.8	11.1
Puerto Rico	0.5	0.7	1.6	0.7
Trinidad and Tobago	8.9	2.5	2.6	2.2
United States	2.7	2.4	1.5	1.1
Venezuela	11.2	10.0	14.9	1.7

Table A.5. Years of life expectancy gained, by broad groups of causes of death, and by sex, selected countries of the Americas, 1980–1990.

Country	Communicable diseases		Neoplasms		Cardiovascular diseases		Perinatal conditions		External causes		All other causes	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Argentina	0.44	0.48	0.46	0.33	2.33	3.06	0.48	0.39	0.19	0.20	0.14	0.44
Barbados	-1.02	-0.03	-0.51	-0.08	0.95	0.34	0.73	0.91	-0.01	0.05	-0.62	-0.35
Brazil	2.43	2.42	0.24	0.20	1.65	2.09	0.46	0.43	-0.22	0.09	0.49	0.52
Canada	-0.14	0.01	0.02	0.07	2.50	2.98	0.15	0.11	0.77	0.40	0.21	-0.19
Chile	0.52	0.61	0.23	0.42	1.11	1.94	0.59	0.51	0.60	0.36	1.05	0.92
Colombia	0.88	1.07	0.20	0.37	1.05	1.40	0.38	0.37	-0.53	0.07	0.82	0.87
Costa Rica	0.27	0.44	0.32	0.23	0.35	0.70	0.21	0.19	-0.03	0.00	-0.06	0.30
Cuba	0.48	0.67	-0.07	0.04	0.78	1.73	0.52	0.40	0.14	0.33	-0.14	0.08
Dominican Republic	1.15	1.55	0.01	0.20	0.79	1.11	0.55	0.65	0.09	0.02	1.89	1.85
Ecuador	4.09	4.58	-0.15	-0.09	0.16	0.63	0.51	0.46	0.14	0.22	1.62	1.92
El Salvador	1.47	2.06	-0.03	0.07	1.25	1.58	2.55	2.31	4.84	0.86	1.92	2.54
Jamaica	1.06	0.83	-0.01	0.15	0.68	0.53	0.07	0.09	0.31	0.09	0.62	0.00
Mexico	2.84	3.00	-0.23	0.01	0.48	0.75	0.24	0.15	2.09	0.45	0.37	0.30
Panama	0.71	1.43	0.53	0.44	1.39	1.54	0.42	0.35	0.56	0.23	0.29	0.40
Paraguay	2.53	2.23	-0.01	0.16	0.26	0.19	0.04	-0.05	0.16	-0.11	0.69	0.74
Puerto Rico	-0.86	-0.29	0.22	0.29	1.33	2.43	0.49	0.32	-0.17	-0.03	-0.80	-0.74
Trinidad and Tobago	0.63	0.96	-0.26	-0.11	1.22	1.27	-0.13	-0.10	0.39	0.18	-0.65	-0.41
United States	-0.18	-0.27	0.05	0.33	1.86	2.26	0.25	0.29	0.21	0.68	-0.45	0.15
Venezuela	1.05	1.35	0.24	0.52	1.25	1.76	0.34	0.27	0.56	0.34	0.38	0.51

Source: Pan American Health Organization, Special Program for Health Analysis, 2001.



TABLE A.6. Years of life expectancy lost (YLEL), by broad groups of causes of death, and by sex, selected countries of the Americas, end of the 1990s.

Country	Infectious diseases		Neoplasms		Cardiovascular diseases		Perinatal conditions		External causes		All other causes	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Argentina	1.21	0.85	3.06	2.47	4.88	2.83	1.02	0.79	2.38	0.73	3.47	2.29
Barbados	2.65	0.97	2.99	2.80	4.12	3.46	0.58	0.48	1.69	0.41	4.04	3.31
Brazil	2.65	1.80	2.48	2.25	5.20	4.20	2.19	1.69	4.16	0.91	4.50	3.45
Canada	0.55	0.24	3.52	2.77	3.31	1.71	0.28	0.22	1.77	0.60	2.04	1.44
Chile	1.59	0.91	2.92	2.76	3.10	2.07	0.38	0.30	3.26	0.70	3.44	2.31
Colombia	1.71	1.26	2.16	2.38	4.08	3.57	1.23	0.97	6.37	1.05	2.95	2.78
Costa Rica	1.01	0.56	2.65	2.57	3.45	2.65	0.67	0.54	2.59	0.61	3.14	2.66
Cuba	0.87	0.63	2.76	2.40	4.19	3.26	0.31	0.21	2.55	0.98	2.28	2.06
Dominican Republic	2.33	1.75	1.68	1.63	4.21	3.43	2.05	1.80	1.88	0.62	3.30	2.76
Ecuador	3.03	2.45	2.01	2.54	3.27	2.67	1.83	1.46	3.91	0.99	4.53	3.81
El Salvador	3.57	2.66	1.39	2.49	2.28	2.44	1.01	0.82	5.78	1.19	6.51	4.18
Jamaica	1.11	0.86	3.20	2.89	5.05	4.41	0.58	0.53	0.42	0.11	4.26	3.71
Mexico	1.59	1.10	1.69	1.93	2.68	2.25	1.23	0.94	3.14	0.70	5.93	4.54
Panama	2.02	1.15	2.09	2.24	3.24	2.47	1.02	0.85	2.92	0.69	3.62	3.09
Paraguay	3.34	2.64	1.64	1.86	4.52	3.76	1.59	1.26	2.62	0.80	2.98	2.71
Puerto Rico	2.13	0.53	2.14	1.85	3.36	3.09	0.58	0.52	3.60	0.59	4.37	2.28
Trinidad and Tobago	1.94	0.97	2.07	2.31	5.60	4.79	1.62	1.23	2.32	0.68	5.61	4.72
United States	0.83	0.46	3.14	2.65	3.91	2.35	0.37	0.28	2.25	0.80	2.35	1.88
Venezuela	2.05	1.44	2.17	2.44	4.56	3.47	1.31	1.02	3.87	0.80	3.34	2.92

YLEL calculated in terms of a biologically plausible life expectancy of 85 years.

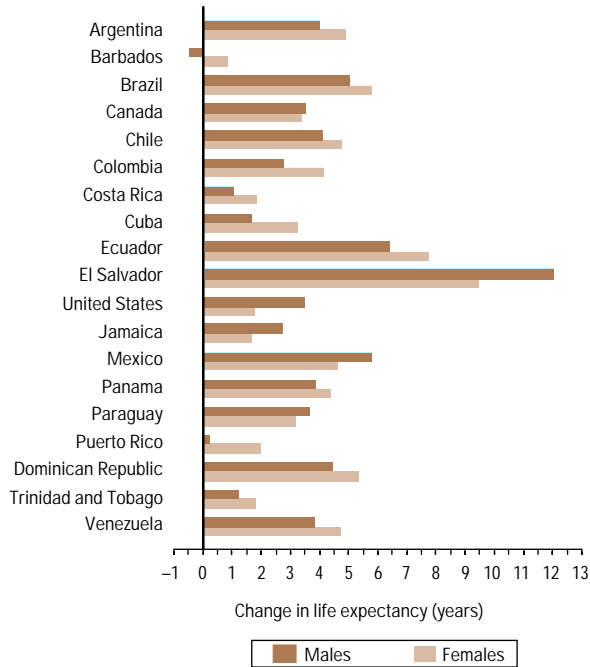
Table A.7. Rate of change of years of life expectancy lost, by broad groups of causes of death, and by sex, selected countries of the Americas, beginning of the 1980s and end of the 1990s.

Country	Infectious diseases		Neoplasms		Cardiovascular diseases		Perinatal conditions		External causes		All other causes	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Argentina	-2.11	-3.01	-0.55	-0.28	-1.93	-2.69	-2.70	-2.62	-0.31	-1.11	0.05	-1.04
Barbados	5.56	0.13	1.20	0.13	-1.93	-0.70	-6.44	-7.84	0.28	-0.65	1.34	0.86
Brazil	-4.35	-5.30	-0.17	-0.09	-1.67	-1.87	-1.31	-1.43	0.86	-0.27	-0.31	-0.73
Canada	3.20	0.01	0.53	0.23	-2.88	-3.20	-2.99	-2.67	-2.41	-2.91	-0.60	-0.45
Chile	-2.05	-3.57	-0.10	-0.54	-1.67	-2.98	-6.73	-6.67	-1.14	-2.57	-1.84	-2.24
Colombia	-4.20	-5.76	-0.47	-0.89	-1.84	-2.37	-2.86	-3.14	1.32	-0.25	-2.31	-2.33
Costa Rica	-1.89	-4.49	-0.94	-0.58	-0.57	-1.18	-2.39	-2.40	0.15	-0.13	0.34	-0.80
Cuba	-2.37	-3.13	0.32	0.31	-0.63	-0.98	-6.14	-6.32	-0.38	-2.05	0.27	-0.16
Dominican Republic	-2.41	-3.72	0.39	-0.23	-0.73	-1.22	-1.56	-1.92	0.01	0.22	-2.67	-2.82
Ecuador	-5.19	-6.08	0.91	0.78	0.21	-0.57	-0.11	-0.23	0.34	-0.63	-1.61	-2.17
El Salvador	-1.82	-3.36	2.58	0.84	-1.62	-2.09	-8.58	-8.60	-4.11	-3.39	-0.71	-2.35
Jamaica	-8.15	-8.04	0.59	-0.70	-1.26	-1.87	-1.45	-1.88	-6.98	-7.44	-1.46	-0.06
Mexico	-6.07	-7.29	1.65	0.32	-0.85	-1.62	-1.08	-0.82	-3.13	-2.88	-0.10	-0.32
Panama	-1.54	-4.41	-1.11	-0.65	-1.47	-1.81	-2.27	-2.13	-0.99	-1.66	-0.25	-0.74
Paraguay	-5.07	-5.21	0.55	-0.59	-0.13	-0.24	-0.17	0.45	-0.27	1.66	-1.69	-2.04
Puerto Rico	4.53	-0.94	-0.70	-0.25	-1.44	-0.42	-4.04	-2.77	0.35	0.18	0.85	-0.54
Trinidad and Tobago	-2.09	-5.16	1.24	0.57	-1.75	-1.54	0.89	0.76	-1.39	-1.89	1.50	0.90
United States	2.90	2.29	-2.11	1.49	-1.57	-2.79	-3.53	-4.05	0.40	-3.39	-1.20	0.97
Venezuela	-2.47	-3.75	-0.11	-0.66	-0.74	-1.32	-1.65	-1.56	-0.84	-2.05	-0.35	-0.69

Rate of change is the pace or speed of annual average relative change (%) in years of life expectancy lost (YLEL) in a given period.

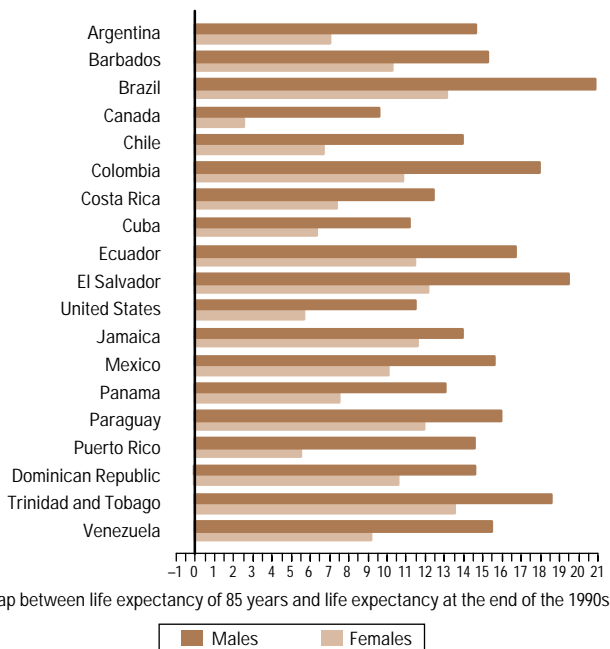
Source: Pan American Health Organization, Special Program for Health Analysis, 2001.

FIGURE A.1. Years of life expectancy lost, by sex, selected countries of the Americas, beginning of the 1980s to end of the 1990s.



Source: Pan American Health Organization, Special Program for Health Analysis, 2001.

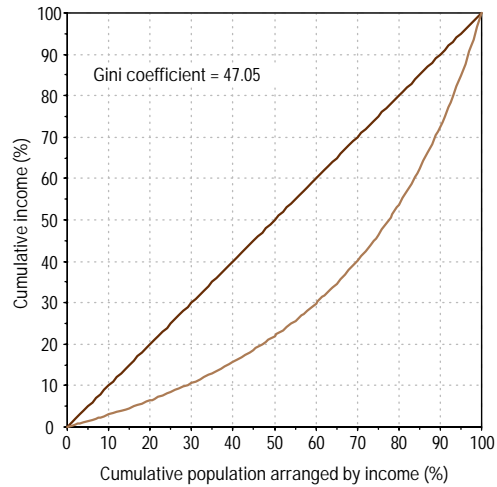
FIGURE A.2. Years of life expectancy gained, by sex, selected countries of the Americas, end of the 1990s.



Gap between life expectancy of 85 years and life expectancy at the end of the 1990s

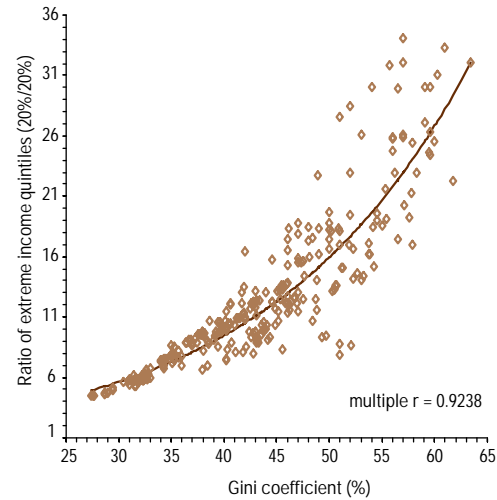
Source: Pan American Health Organization, Special Program for Health Analysis.

FIGURE A.3. Lorenz curve for income distribution, Region of the Americas, 1978–1998.



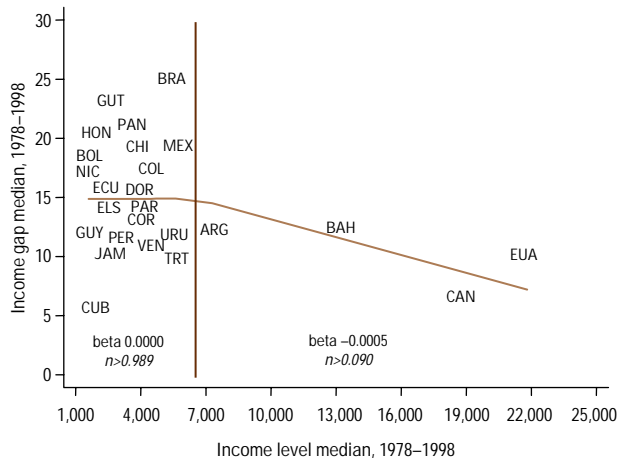
Source: Pan American Health Organization, Special Program for Health Analysis.

FIGURE A.4. Relationship between the 20/20 income ratio and the Gini coefficient, Region of the Americas, 1978–1998.



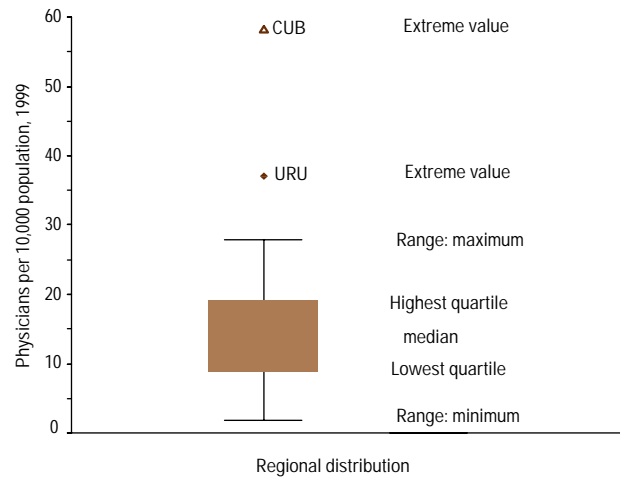
Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE A.5. Linear regression with spline for income level and income gap, Region of the Americas, 1978–1998.



Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

FIGURE A.6. Boxplot of the distribution of availability of physicians per person, Region of the Americas, 1999.



Source: Pan American Health Organization, Special Program for Health Analysis, 2002.

## B. STATISTICAL ANNEX

TABLE B.1. Population, change, and annual growth rates, by subregion and country, Region of the Americas, 1996, 2002, and 2008.

Subregion and country	Population (in thousands)		2008	Change (in thousands)		Average annual growth rate	
	1996	2002		1996–2002	2002–2008	1996–2002	2002–2008
Region of the Americas	788,990	854,042	915,852	65,053	61,810	1.3	1.2
Latin America	480,208	526,444	571,418	46,235	44,974	1.5	1.4
Rest of the Americas	308,781	327,599	344,434	18,817	16,836	1.0	0.8
Andean Area	104,808	116,928	128,923	12,120	11,996	1.8	1.6
Bolivia	7,593	8,705	9,844	1,112	1,139	2.3	2.0
Colombia	39,260	43,495	47,727	4,234	4,232	1.7	1.5
Ecuador	11,699	13,112	14,465	1,413	1,353	1.9	1.6
Peru	23,944	26,523	29,063	2,578	2,540	1.7	1.5
Venezuela	22,311	25,093	27,825	2,782	2,732	2.0	1.7
Southern Cone	57,839	62,697	67,473	4,858	4,777	1.3	1.2
Argentina	35,219	37,944	40,621	2,725	2,677	1.2	1.1
Chile	14,421	15,589	16,660	1,169	1,071	1.3	1.1
Paraguay	4,957	5,778	6,670	821	892	2.6	2.4
Uruguay	3,242	3,385	3,522	143	138	0.7	0.7
Brazil	161,698	174,706	187,341	13,008	12,635	1.3	1.2
Central America	32,906	37,971	43,182	5,065	5,211	2.4	2.1
Belize	207	236	261	28	25	2.1	1.7
Costa Rica	3,652	4,200	4,699	547	499	2.3	1.9
El Salvador	5,791	6,520	7,219	729	699	2.0	1.7
Guatemala	10,244	11,995	13,952	1,751	1,957	2.6	2.5
Honduras	5,781	6,732	7,659	950	928	2.5	2.2
Nicaragua	4,553	5,347	6,204	794	857	2.7	2.5
Panama	2,677	2,942	3,188	265	246	1.6	1.3
Mexico	92,710	101,842	110,244	9,133	8,402	1.6	1.3
Latin Caribbean	30,248	32,299	34,253	2,052	1,954	1.1	1.0
Cuba	11,018	11,273	11,457	255	185	0.4	0.3
Dominican Republic	7,830	8,639	9,391	810	752	1.6	1.4
Haiti	7,643	8,400	9,216	757	816	1.6	1.5
Puerto Rico	3,757	3,988	4,188	230	201	1.0	0.8
Caribbean	7,400	7,737	8,079	337	342	0.7	0.7
* Anguilla	10	12	14	2	1	3.0	1.8
* Antigua and Barbuda	64	67	74	3	6	0.8	1.5
* Aruba	68	70	72	2	2	0.6	0.5
Bahamas	288	312	334	24	22	1.3	1.1
Barbados	264	269	275	6	6	0.4	0.3
* Cayman Islands	32	36	40	5	4	2.3	1.8
* Dominica	73	70	69	-3	-1	-0.7	-0.3
French Guiana	143	176	211	33	35	3.4	3.0
* Grenada	90	89	90	-1	1	-0.2	0.2
Guadeloupe	413	435	454	22	19	0.9	0.7

TABLE B.1. (continued).

Subregion and country	Population (in thousands)		Change (in thousands)			Average annual growth rate	
	1996	2002	2008	1996–2002	2002–2008	1996–2002	2002–2008
Guyana	746	765	767	19	1	0.4	0.0
Jamaica	2,493	2,621	2,769	129	147	0.8	0.9
Martinique	374	388	399	13	11	0.6	0.5
* Montserrat	11	8	10	–3	1	–4.4	2.2
Netherlands Antilles	208	219	230	11	11	0.9	0.8
* Saint Kitts and Nevis	40	39	40	–1	1	–0.3	0.4
Saint Lucia	141	151	160	10	9	1.1	1.0
* Saint Vincent and the Grenadines	113	116	118	4	2	0.6	0.3
Suriname	410	421	431	10	10	0.4	0.4
Trinidad and Tobago	1,270	1,306	1,344	36	38	0.5	0.5
* Turks and Caicos Islands	15	19	22	4	4	3.7	2.9
* Virgin Islands (UK)	19	21	24	3	3	2.3	2.0
* Virgin Islands (US)	115	123	131	8	8	1.1	1.0
North America	301,382	319,862	336,355	18,480	16,493	1.0	0.8
* Bermuda	61	64	66	3	2	0.8	0.6
Canada	29,653	31,268	32,733	1,615	1,465	0.9	0.8
United States	271,668	288,530	303,555	16,862	15,026	1.0	0.8

Source: United Nations. *World Population Prospects, The 2000 Revision*, except (\*), in which the source is the U.S. Census Bureau.

TABLE B.2. Births, birth rates, and total fertility rates, by subregion and country, Region of the Americas, 1996, 2002, and 2008.

Subregion and country	Births (in thousands)			Birth rate (per 1,000)			Total fertility rates		
	1996	2002	2008	1996	2002	2008	1996	2002	2008
Region of the Americas	15,922	15,674	15,749	20.2	18.4	17.2	2.5	2.3	2.2
Latin America	11,394	11,397	11,367	23.7	21.6	19.9	2.8	2.5	2.4
Rest of the Americas	4,528	4,276	4,382	14.7	13.1	12.7	2.0	1.9	1.9
Andean Area	2,741	2,733	2,724	26.2	23.4	21.1	3.1	2.8	2.5
Bolivia	259	268	270	33.7	30.5	27.2	4.4	3.9	3.4
Colombia	988	976	975	25.0	22.3	20.3	2.8	2.6	2.5
Ecuador	309	307	302	26.2	23.2	20.8	3.2	2.8	2.5
Peru	614	603	595	25.4	22.6	20.3	3.1	2.6	2.4
Venezuela	571	578	582	25.4	22.8	20.8	3.0	2.7	2.5
Southern Cone	1,223	1,243	1,255	21.1	19.8	18.6	2.7	2.5	2.4
Argentina	711	727	726	20.1	19.0	17.8	2.7	2.4	2.3
Chile	294	285	285	20.3	18.2	17.0	2.5	2.4	2.3
Paraguay	160	174	187	31.9	29.6	27.7	4.2	3.8	3.5
Uruguay	58	57	56	17.8	16.9	15.9	2.4	2.3	2.2
Brazil	3,361	3,374	3,395	20.7	19.2	18.0	2.3	2.2	2.1
Central America	1,071	1,121	1,139	32.5	29.5	26.4	4.1	3.6	3.1
Belize	6	6	5	29.4	25.2	20.8	3.6	2.9	2.3
Costa Rica	87	93	96	23.7	21.9	20.4	2.9	2.7	2.5
El Salvador	164	166	162	28.1	25.3	22.3	3.2	2.9	2.6
Guatemala	385	416	433	37.0	34.2	30.7	5.0	4.4	3.8
Honduras	200	205	205	34.3	30.1	26.6	4.4	3.7	3.2
Nicaragua	166	175	177	35.9	32.2	28.3	4.4	3.8	3.3
Panama	62	60	59	23.0	20.3	18.4	2.7	2.4	2.2
Mexico	2,342	2,273	2,195	25.1	22.2	19.8	2.8	2.5	2.3
Latin Caribbean	657	654	660	21.7	20.2	19.3	2.7	2.5	2.4
Cuba	148	131	129	13.5	11.7	11.2	1.6	1.6	1.6
Dominican Republic	198	203	203	25.1	23.3	21.6	2.9	2.7	2.5
Haiti	248	259	267	32.2	30.6	28.8	4.5	4.0	3.5
Puerto Rico	62	61	60	16.5	15.1	14.4	2.0	1.9	1.9
Caribbean	147	141	136	19.9	18.2	16.8	2.3	2.1	2.0
* Anguilla	0	0	0	16.8	14.9	13.9	1.9	1.8	1.7
* Antigua and Barbuda	1	1	1	22.2	18.8	16.4	2.3	2.3	2.2
* Aruba	1	1	1	14.9	12.2	10.8	1.8	1.8	1.8
Bahamas	6	6	6	21.6	19.6	17.5	2.4	2.3	2.1
Barbados	3	3	3	13.2	12.2	11.5	1.5	1.5	1.5
* Cayman Islands	1	0	0	16.4	13.5	12.1	2.1	2.0	2.0
* Dominica	1	1	1	19.4	17.3	14.5	2.1	2.0	1.9
French Guiana	5	5	6	31.0	28.3	26.3	4.1	3.9	3.6
* Grenada	2	2	2	23.2	23.1	21.6	2.8	2.5	2.3
Guadeloupe	7	7	7	17.3	16.0	14.4	2.1	2.0	2.0
Guyana	18	17	15	23.9	21.8	19.0	2.5	2.3	2.2
Jamaica	55	53	52	22.1	20.2	18.6	2.6	2.4	2.2
Martinique	6	5	5	15.1	13.4	12.5	1.8	1.7	1.7
* Montserrat	0	0	0	16.7	17.5	17.3	1.9	1.8	1.8
Netherlands Antilles	3	3	3	16.7	15.3	14.8	2.1	2.1	2.1
* Saint Kitts and Nevis	1	1	1	21.1	18.6	17.8	2.6	2.4	2.3
Saint Lucia	3	3	3	24.4	22.7	20.2	2.8	2.5	2.3
* Saint Vincent and the Grenadines	2	2	2	20.8	17.6	15.8	2.5	2.0	1.8
Suriname	8	8	7	20.7	18.4	16.2	2.3	2.1	1.8
Trinidad and Tobago	19	18	19	14.7	13.5	14.0	1.7	1.5	1.6
* Turks and Caicos Islands	0	0	0	28.7	24.2	21.1	3.4	3.2	3.0
* Virgin Islands (UK)	0	0	0	15.9	15.1	14.8	1.7	1.7	1.7
* Virgin Islands (US)	2	2	2	17.3	15.9	15.5	2.4	2.2	2.1
North America	4,381	4,136	4,245	14.5	12.9	12.6	2.0	1.9	1.9
* Bermuda	1	1	1	13.7	11.8	10.8	1.8	1.8	1.8
Canada	364	341	351	12.2	10.9	10.7	1.6	1.6	1.6
United States	4,016	3,794	3,893	14.7	13.1	12.8	2.0	1.9	1.9

Source: United Nations. *World Population Prospects, The 2000 Revision*, except (\*), in which the source is the U.S. Census Bureau.

Note: 0 under "Births" means fewer than 500.

## I. REGIONAL HEALTH ANALYSIS

TABLE B.3. Deaths, crude mortality rates, and life expectancy at birth, by subregion and country, Region of the Americas, 1996, 2002, and 2008.

Subregion and country	Deaths (in thousands)			Mortality rates (per 1,000)			Life expectancy at birth		
	1996	2002	2008	1996	2002	2008	1996	2002	2008
Region of the Americas	5,775	6,144	6,524	7.3	7.2	7.1	72.0	73.2	74.3
Latin America	3,161	3,426	3,676	6.6	6.5	6.4	69.2	70.4	71.6
Rest of the Americas	2,614	2,718	2,848	8.5	8.3	8.3	76.5	77.6	78.6
Andean Area	640	713	731	6.1	6.1	5.7	69.2	70.9	72.2
Bolivia	72	72	73	9.3	8.2	7.3	61.0	63.5	65.9
Colombia	235	281	263	5.9	6.4	5.5	70.0	71.9	73.2
Ecuador	71	77	84	6.0	5.8	5.8	69.3	70.5	71.5
Peru	158	165	176	6.5	6.2	6.0	67.7	69.5	71.1
Venezuela	105	119	136	4.7	4.7	4.8	72.2	73.3	74.3
Southern Cone	423	448	479	7.3	7.2	7.1	73.0	74.1	75.0
Argentina	283	297	312	8.0	7.8	7.7	72.7	73.8	74.9
Chile	81	90	102	5.6	5.7	6.1	74.8	75.6	76.4
Paraguay	28	30	33	5.5	5.1	4.8	69.4	70.7	71.9
Uruguay	31	32	32	9.5	9.3	9.2	73.7	75.0	76.1
Brazil	1,152	1,238	1,340	7.1	7.0	7.1	66.9	68.3	69.8
Central America	209	227	246	6.4	6.0	5.7	67.6	68.9	70.3
Belize	1	1	1	4.6	4.3	4.1	73.5	74.4	75.2
Costa Rica	14	17	20	3.8	4.0	4.2	75.9	76.7	77.5
El Salvador	36	39	42	6.2	5.9	5.8	68.7	70.3	71.7
Guatemala	78	82	87	7.5	6.8	6.1	63.7	65.6	67.4
Honduras	39	45	50	6.6	6.5	6.4	65.5	65.8	66.8
Nicaragua	27	28	30	5.8	5.2	4.8	67.3	69.1	70.9
Panama	14	15	17	5.2	5.1	5.3	73.4	74.5	75.4
Mexico	475	520	576	5.1	5.1	5.2	72.0	73.0	74.0
Latin Caribbean	260	280	303	8.6	8.7	8.8	67.3	67.8	68.3
Cuba	77	82	89	7.0	7.2	7.8	75.5	76.4	77.1
Dominican Republic	50	60	74	6.4	6.9	7.8	67.1	66.9	66.1
Haiti	103	107	106	13.4	12.6	11.4	52.0	53.3	55.9
Puerto Rico	29	31	34	7.7	7.8	8.1	74.7	75.6	76.3
Caribbean	48	49	52	6.4	6.4	6.5	73.0	73.9	74.9
* Anguilla	0	0	0	6.1	5.5	5.3	75.7	76.5	77.6
* Antigua and Barbuda	0	0	0	6.7	5.8	5.2	69.2	71.0	72.7
* Aruba	0	0	1	5.9	6.3	6.9	77.7	78.7	79.6
Bahamas	2	2	2	6.7	7.1	7.2	69.0	69.4	70.9
Barbados	2	2	2	8.5	7.8	7.4	76.2	77.2	78.0
* Cayman Islands	0	0	0	5.0	5.2	5.8	78.1	79.2	80.1
* Dominica	1	0	0	7.9	7.1	6.6	72.4	73.9	75.3
French Guiana	1	1	1	4.5	4.2	4.2	74.7	75.9	76.8
* Grenada	1	1	1	8.7	7.6	6.4	65.3	64.5	65.6
Guadeloupe	3	3	3	6.0	6.1	6.3	77.0	78.3	79.5
Guyana	6	7	8	8.3	9.4	10.4	63.9	62.4	61.7
Jamaica	15	15	15	6.0	5.7	5.5	74.6	75.7	76.7
Martinique	2	3	3	6.3	6.7	7.2	78.6	79.1	79.6
* Montserrat	0	0	0	8.4	7.5	7.0	77.1	78.2	78.9
Netherlands Antilles	1	1	2	6.3	6.2	6.6	75.3	76.3	77.3
* Saint Kitts and Nevis	0	0	0	11.9	9.0	8.0	66.4	71.3	72.9
Saint Lucia	1	1	1	5.8	5.4	5.2	72.8	73.8	74.8
* Saint Vincent and the Grenadines	1	1	1	7.1	6.1	6.0	70.1	72.8	74.3
Suriname	2	3	3	6.0	6.0	6.0	69.9	71.1	72.4
Trinidad and Tobago	8	8	8	5.9	6.0	6.2	73.6	74.8	76.0
* Turks and Caicos Islands	0	0	0	5.1	4.4	4.2	72.2	73.8	75.2
* Virgin Islands (UK)	0	0	0	4.6	4.4	4.5	75.1	75.9	77.1
* Virgin Islands (US)	1	1	1	4.8	5.6	6.3	77.9	78.4	79.3
North America	2,566	2,669	2,796	8.5	8.3	8.3	76.5	77.7	78.7
* Bermuda	0	0	1	6.8	7.5	8.1	76.9	77.3	78.4
Canada	216	241	267	7.3	7.7	8.1	78.4	79.0	79.6
United States	2,350	2,427	2,528	8.6	8.4	8.3	76.3	77.5	78.6

Source: United Nations. *World Population Prospects, The 2000 Revision*, except (\*), in which the source is the U.S. Census Bureau.

Note: 0 under "Deaths" means fewer than 500.



TABLE B.4. Infant deaths and mortality rates, by subregion and country, Region of the Americas, 1996, 2002, and 2008.

Subregion and country	Infant mortality rates (per 1,000)			Infant deaths (in thousands)		
	1996	2002	2008	1996	2002	2008
Region of the Americas	28.5	25.3	21.9	454,720	396,903	344,598
Latin America	36.6	32.1	27.8	417,591	365,825	316,761
Rest of the Americas	8.1	7.2	6.4	37,129	31,078	27,838
Andean Area	37.8	31.5	26.3	103,497	86,129	71,785
Bolivia	67.5	55.6	44.1	17,335	14,841	11,923
Colombia	31.0	25.6	21.5	30,658	25,020	20,881
Ecuador	46.4	41.5	36.5	14,294	12,751	11,061
Peru	47.1	37.4	30.6	29,018	22,626	18,223
Venezuela	21.4	18.9	16.7	12,191	10,890	9,697
Southern Cone	22.2	20.1	18.0	27,025	24,904	22,544
Argentina	22.3	20.0	17.5	15,801	14,499	12,761
Chile	13.0	11.6	10.4	3,833	3,321	2,946
Paraguay	40.0	37.0	33.4	6,349	6,335	6,170
Uruguay	18.0	13.1	11.8	1,041	749	666
Brazil	43.1	38.3	33.0	145,276	129,072	112,122
Central America	38.1	32.8	28.3	40,415	36,558	32,213
Belize	32.8	30.0	27.4	205	180	150
Costa Rica	12.4	10.9	9.6	1,075	1,006	925
El Salvador	33.7	26.4	20.7	5,492	4,389	3,366
Guatemala	47.0	41.2	35.9	17,816	16,911	15,505
Honduras	38.8	33.1	28.7	7,718	6,758	5,898
Nicaragua	41.2	35.7	30.6	6,732	6,187	5,433
Panama	22.2	18.6	15.9	1,377	1,127	936
Mexico	31.6	28.2	25.2	74,050	64,471	55,520
Latin Caribbean	41.4	37.8	34.2	27,328	24,691	22,576
Cuba	8.0	7.3	6.9	1,220	973	886
Dominican Republic	41.8	36.3	31.1	8,276	7,319	6,352
Haiti	69.4	61.3	55.2	17,134	15,771	14,756
Puerto Rico	11.1	10.3	9.6	698	627	582
Caribbean	23.7	21.3	18.2	3,527	3,004	2,488
* Anguilla	27.5	23.7	18.9	5	4	4
* Antigua and Barbuda	26.5	21.6	17.7	38	27	20
* Aruba	7.1	6.3	5.6	7	5	4
Bahamas	19.1	17.2	14.9	120	106	87
Barbados	12.7	10.9	9.6	45	36	31
* Cayman Islands	12.1	9.9	8.4	6	5	4
* Dominica	19.5	15.9	12.8	28	19	13
French Guiana	32.5	28.7	25.9	144	143	143
* Grenada	13.7	14.6	13.6	29	30	27
Guadeloupe	8.5	7.4	6.6	61	52	44
Guyana	56.1	52.5	44.4	1,007	888	660
Jamaica	22.4	19.9	17.8	1,252	1,063	923
Martinique	7.1	6.8	6.6	41	36	33
* Montserrat	9.4	8.0	7.2	2	1	1
Netherlands Antilles	14.6	12.6	10.8	52	42	37
* Saint Kitts and Nevis	24.6	15.8	13.3	20	11	9
Saint Lucia	14.6	13.1	11.7	51	45	39
* Saint Vincent and the Grenadines	17.0	16.2	13.6	40	33	25
Suriname	30.0	25.7	21.7	259	203	155
Trinidad and Tobago	14.6	12.5	10.7	285	221	201
* Turks and Caicos Islands	21.6	17.5	14.2	9	8	6
* Virgin Islands (UK)	25.7	19.6	15.5	8	6	5
* Virgin Islands (US)	10.1	9.2	8.0	20	18	16
North America	7.6	6.7	6.0	33,602	28,074	25,350
* Bermuda	10.0	9.3	7.8	8	7	6
Canada	5.7	5.4	5.2	2108	1845	1801
United States	7.8	6.8	6.1	31,486	26,222	23,543

Source: United Nations. *World Population Prospects, The 2000 Revision*, except (\*), in which the source is the U.S. Census Bureau.

TABLE B.5. Life expectancy at birth, by sex, subregion, and country, Region of the Americas, 2002.

Subregion and country	Both sexes	Men	Women	Difference between sexes
Region of the Americas	73.2	70.3	76.5	6.3
Latin America	70.4	67.6	74.1	6.6
Rest of the Americas	77.6	74.6	80.4	5.8
Andean Area	70.9	68.5	74.0	5.5
Bolivia	63.5	61.9	65.3	3.5
Colombia	71.9	69.2	75.3	6.1
Ecuador	70.5	68.3	73.5	5.2
Peru	69.5	67.3	72.4	5.1
Venezuela	73.3	70.9	76.7	5.8
Southern Cone	74.1	71.1	77.7	6.6
Argentina	73.8	70.6	77.7	7.1
Chile	75.6	73.0	79.0	6.1
Paraguay	70.7	68.6	73.1	4.5
Uruguay	75.0	71.6	78.9	7.3
Brazil	68.3	64.7	72.6	8.0
Central America	68.9	66.6	72.1	5.5
Belize	74.4	73.0	75.9	2.9
Costa Rica	76.7	75.0	79.7	4.7
El Salvador	70.3	67.7	73.7	6.1
Guatemala	65.6	63.0	68.9	5.9
Honduras	65.8	63.2	69.1	5.9
Nicaragua	69.1	67.2	71.9	4.8
Panama	74.5	72.6	77.3	4.7
Mexico	73.0	70.4	76.4	6.0
Latin Caribbean	67.8	65.2	70.8	5.6
Cuba	76.4	74.8	78.7	3.9
Dominican Republic	66.9	64.4	70.1	5.7
Haiti	53.3	50.2	56.5	6.2
Puerto Rico	75.6	71.2	80.1	8.9
Caribbean	73.9	71.2	76.7	5.5
* Anguilla	76.5	73.6	79.5	5.9
* Antigua and Barbuda	71.0	68.7	73.5	4.7
* Aruba	78.7	75.3	82.2	6.9
Bahamas	69.4	65.2	73.9	8.7
Barbados	77.2	74.5	79.5	5.0
* Cayman Islands	79.2	76.4	81.6	5.2
* Dominica	73.9	71.0	76.9	5.9
French Guiana	75.9	72.4	80.1	7.6
* Grenada	64.5	62.7	66.3	3.6
Guadeloupe	78.3	74.8	81.7	6.9
Guyana	62.4	58.0	66.9	8.9
Jamaica	75.7	73.7	77.8	4.1
Martinique	79.1	75.8	82.3	6.5
* Montserrat	78.2	76.1	80.4	4.3
Netherlands Antilles	76.3	73.3	79.2	5.9
* Saint Kitts and Nevis	71.3	68.5	74.3	5.8
Saint Lucia	73.8	71.1	76.4	5.3
* Saint Vincent and the Grenadines	72.8	71.1	74.6	3.6
Suriname	71.1	68.5	73.7	5.2
Trinidad and Tobago	74.8	72.5	77.2	4.7
* Turks and Caicos Islands	73.8	71.6	76.0	4.4
* Virgin Islands (UK)	75.9	74.9	76.8	1.9
* Virgin Islands (US)	78.4	74.6	82.5	8.0
North America	77.7	74.7	80.5	5.8
* Bermuda	77.3	75.2	79.3	4.1
Canada	79.0	76.2	81.8	5.5
United States	77.5	74.6	80.4	5.8

Source: United Nations. *World Population Prospects, The 2000 Revision*, except (\*), in which the source is the U.S. Census Bureau.

TABLE B.6. Migration balance and change, by subregion and country, Region of the Americas, 1996, 2002, and 2008.

Subregion and country	Migratory balance			Change	
	1996	2002	2008	1996–2002	2002–2008
Region of the Americas	839,703	937,354	908,066	97,651	–29,288
Latin America	–472,333	–378,743	–361,300	93,590	17,443
Rest of the Americas	1,312,036	1,316,097	1,269,366	4,061	–46,731
Andean Area	–84,800	–17,000	–11,600	67,800	5,400
Bolivia	–7,600	–7,000	–5,600	600	1,400
Colombia	–40,000	0	0	40,000	0
Ecuador	0	0	0	0	0
Peru	–37,200	–10,000	–6,000	27,200	4,000
Venezuela	0	0	0	0	0
Southern Cone	11,640	12,000	4,400	360	–7,600
Argentina	24,000	24,000	14,400	0	–9,600
Chile	–8,000	–10,000	–8,000	–2,000	2,000
Paraguay	–1,000	0	0	1,000	0
Uruguay	–3,360	–2,000	–2,000	1,360	0
Brazil	0	0	0	0	0
Central America	–38,341	–30,881	–25,281	7,460	5,600
Belize	–800	–500	–500	300	0
Costa Rica	22,000	10,000	3,200	–12,000	–6,800
El Salvador	–8,360	–7,600	–7,600	760	0
Guatemala	–32,000	–20,000	–10,000	12,000	10,000
Honduras	–4,800	–4,000	–4,000	800	0
Nicaragua	–11,600	–6,000	–3,600	5,600	2,400
Panama	–2,781	–2,781	–2,781	0	0
Mexico	–312,000	–299,800	–288,000	12,200	11,800
Latin Caribbean	–48,832	–43,062	–40,819	5,770	2,243
Cuba	–20,000	–15,811	–11,200	4,189	4,611
Dominican Republic	–13,912	–12,251	–13,419	1,661	–1,168
Haiti	–21,000	–21,000	–21,000	0	0
Puerto Rico	6,080	6,000	4,800	–80	–1,200
Caribbean	–41,273	–34,070	–28,386	7,203	5,684
* Anguilla	233	187	46	–46	–141
* Antigua and Barbuda	–420	–420	–420	0	0
* Aruba	–360	0	0	360	0
Bahamas	200	0	0	–200	0
Barbados	–250	–250	–250	0	0
* Cayman Islands	493	438	383	–55	–55
* Dominica	–833	–1,281	–321	–448	960
French Guiana	1,234	1,320	1,320	86	0
* Grenada	–1,701	–1,357	–1,015	344	342
Guadeloupe	–920	–900	–900	20	0
Guyana	–8,400	–8,000	–8,000	400	0
Jamaica	–19,328	–14,860	–10,372	4,468	4,488
Martinique	–1,056	–500	–480	556	20
* Montserrat	0	626	0	626	–626
Netherlands Antilles	192	–100	–100	–292	0
* Saint Kitts and Nevis	–644	–368	–92	276	276
Saint Lucia	–1,000	–1,000	–1,000	0	0
* Saint Vincent and the Grenadines	–642	–895	–895	–253	0
Suriname	–4,416	–3,400	–3,160	1,016	240
Trinidad and Tobago	–4,160	–3,800	–3,560	360	240
* Turks and Caicos Islands	253	243	212	–10	–31
* Virgin Islands (UK)	237	232	203	–5	–29
* Virgin Islands (US)	15	15	15	0	0
North America	1,353,309	1,350,167	1,297,752	–3,142	–52,415
* Bermuda	164	167	152	3	–15
Canada	142,945	150,000	157,600	7,055	7,600
United States	1,210,200	1,200,000	1,140,000	–10,200	–60,000

Source: United Nations. *World Population Prospects, The 2000 Revision*, except (\*), in which the source is the U.S. Census Bureau.

## I. REGIONAL HEALTH ANALYSIS

TABLE B.7. Urban and rural population and percentage urban population, by subregion and country, Region of the Americas, 1996, 2002, and 2008.

Subregion and country	Urban population (in thousands)			Rural population (in thousands)			Urban percentage		
	1996	2002	2008	1996	2002	2008	1996	2002	2008
Region of the Americas	589,829	654,581	717,963	199,160	199,461	197,889	74.8	76.6	78.4
Latin America	354,978	401,181	446,538	125,230	125,263	124,880	73.9	76.2	78.1
Rest of the Americas	234,851	253,400	271,425	73,930	74,199	73,009	76.1	77.4	78.8
Andean Area	76,315	88,280	100,342	28,493	28,647	28,581	72.8	75.5	77.8
Bolivia	4,565	5,542	6,580	3,028	3,164	3,264	60.1	63.7	66.8
Colombia	28,355	32,496	36,712	10,905	10,999	11,015	72.2	74.7	76.9
Ecuador	7,179	8,802	10,376	4,520	4,310	4,089	61.4	67.1	71.7
Peru	17,066	19,502	21,980	6,878	7,021	7,082	71.3	73.5	75.6
Venezuela	19,149	21,939	24,693	3,162	3,154	3,132	85.8	87.4	88.7
Southern Cone	49,018	54,149	59,128	8,821	8,547	8,345	84.7	86.4	87.6
Argentina	31,247	34,302	37,217	3,973	3,642	3,403	88.7	90.4	91.6
Chile	12,206	13,428	14,566	2,214	2,161	2,094	84.6	86.1	87.4
Paraguay	2,638	3,317	4,080	2,319	2,462	2,590	53.2	57.4	61.2
Uruguay	2,927	3,102	3,265	314	283	258	90.3	91.6	92.7
Brazil	127,718	143,632	158,448	33,981	31,074	28,894	79.0	82.2	84.6
Central America	15,221	18,507	22,236	17,685	19,465	20,946	46.3	48.7	51.5
Belize	106	131	156	101	104	105	51.3	55.8	59.8
Costa Rica	1,717	2,035	2,371	1,935	2,165	2,328	47.0	48.5	50.5
El Salvador	2,629	3,095	3,614	3,162	3,425	3,605	45.4	47.5	50.1
Guatemala	3,978	4,841	5,950	6,266	7,154	8,002	38.8	40.4	42.6
Honduras	2,814	3,684	4,577	2,967	3,048	3,082	48.7	54.7	59.8
Nicaragua	2,496	3,047	3,688	2,057	2,301	2,516	54.8	57.0	59.4
Panama	1,479	1,674	1,879	1,197	1,268	1,309	55.3	56.9	58.9
Mexico	68,268	76,217	84,010	24,441	25,626	26,234	73.6	74.8	76.2
Latin Caribbean	18,439	20,396	22,374	11,809	11,903	11,879	61.0	63.1	65.3
Cuba	8,233	8,531	8,806	2,784	2,741	2,651	74.7	75.7	76.9
Dominican Republic	4,893	5,724	6,527	2,936	2,915	2,864	62.5	66.3	69.5
Haiti	2,542	3,113	3,778	5,101	5,287	5,438	33.3	37.1	41.0
Puerto Rico	2,770	3,028	3,263	987	960	925	73.7	75.9	77.9
Caribbean	4,554	4,977	5,409	2,846	2,760	2,670	61.5	64.3	67.0
* Anguilla	1	1	2	9	11	12	12.5	11.9	11.1
* Antigua and Barbuda	23	25	30	41	42	44	36.4	37.5	39.9
* Aruba	0	0	0	68	70	72	0.0	0.0	0.0
Bahamas	250	278	303	38	34	31	86.9	89.2	90.6
Barbados	126	138	150	137	132	125	47.9	51.2	54.6
* Cayman Islands	32	36	40	0	0	0	100.0	100.0	100.0
* Dominica	51	51	51	22	20	18	69.5	72.0	73.9
French Guiana	110	139	170	33	37	41	76.6	78.7	80.6
* Grenada	33	35	38	58	54	52	36.4	39.2	42.6
Guadeloupe	411	434	453	2	1	1	99.6	99.8	99.8
Guyana	269	303	333	478	463	433	36.0	39.6	43.5
Jamaica	1,351	1,497	1,663	1,142	1,124	1,105	54.2	57.1	60.1
Martinique	350	370	384	24	18	15	93.5	95.3	96.2
* Montserrat	2	2	2	9	7	8	18.2	18.9	20.0
Netherlands Antilles	144	156	168	63	63	62	69.5	71.0	73.0
* Saint Kitts and Nevis	14	13	14	26	25	25	34.8	34.6	35.7
Saint Lucia	53	58	64	89	93	96	37.3	38.2	40.2
* Saint Vincent and the Grenadines	56	66	75	57	50	44	49.5	56.7	63.0
Suriname	292	317	339	118	103	92	71.2	75.4	78.7
Trinidad and Tobago	917	978	1,038	353	328	307	72.2	74.9	77.2
* Turks and Caicos Islands	7	9	11	8	10	11	43.8	47.2	49.1
* Virgin Islands (UK)	11	14	16	8	8	8	57.0	64.0	67.4
* Virgin Islands (US)	53	58	65	63	65	66	45.5	47.0	49.7
North America	230,297	248,423	266,016	71,084	71,439	70,339	76.4	77.7	79.1
* Bermuda	61	64	66	0	0	0	100.0	100.0	100.0
Canada	22,769	24,199	25,651	6,884	7,069	7,082	76.8	77.4	78.4
United States	207,467	224,160	240,299	64,201	64,370	63,257	76.4	77.7	79.2

Source: United Nations. *World Population Prospects, The 2000 Revision*, except (\*), in which the source is the U.S. Census Bureau.

Note: 0 means fewer than 500.

TABLE B.8. Annual growth rates of the urban and rural populations, and rate of change of the urbanization process, by subregion and country, Region of the Americas, 1996–2002 and 2002–2008.

Subregion and country	Annual growth rates				Rate of change in urbanization	
	Urban		Rural		1996–2002	2002–2008
	1996–2002	2002–2008	1996–2002	2002–2008		
Region of the Americas	1.74	1.54	0.03	-0.13	1.71	1.67
Latin America	2.04	1.79	0.00	-0.05	2.03	1.84
Rest of the Americas	1.27	1.15	0.06	-0.27	1.21	1.41
Andean Area	2.43	2.13	0.09	-0.04	2.34	2.17
Bolivia	3.23	2.86	0.73	0.52	2.50	2.34
Colombia	2.27	2.03	0.14	0.02	2.13	2.01
Ecuador	3.40	2.74	-0.79	-0.88	4.19	3.62
Peru	2.22	1.99	0.34	0.14	1.88	1.85
Venezuela	2.27	1.97	-0.04	-0.12	2.31	2.09
Southern Cone	1.66	1.47	-0.53	-0.40	2.18	1.86
Argentina	1.56	1.36	-1.45	-1.13	3.00	2.49
Chile	1.59	1.36	-0.41	-0.52	2.00	1.88
Paraguay	3.82	3.45	0.99	0.85	2.82	2.61
Uruguay	0.97	0.85	-1.76	-1.55	2.73	2.41
Brazil	1.96	1.64	-1.49	-1.21	3.45	2.85
Central America	3.26	3.06	1.60	1.22	1.66	1.84
Belize	3.52	2.85	0.54	0.12	2.98	2.73
Costa Rica	2.83	2.55	1.87	1.21	0.96	1.33
El Salvador	2.72	2.58	1.33	0.85	1.39	1.73
Guatemala	3.27	3.44	2.21	1.87	1.06	1.57
Honduras	4.49	3.62	0.45	0.18	4.04	3.44
Nicaragua	3.32	3.19	1.87	1.49	1.45	1.69
Panama	2.06	1.93	0.95	0.53	1.11	1.39
Mexico	1.84	1.62	0.79	0.39	1.05	1.23
Latin Caribbean	1.68	1.54	0.13	-0.03	1.55	1.58
Cuba	0.59	0.53	-0.26	-0.56	0.85	1.08
Dominican Republic	2.61	2.19	-0.12	-0.29	2.73	2.48
Haiti	3.38	3.23	0.60	0.47	2.78	2.76
Puerto Rico	1.48	1.25	-0.47	-0.62	1.96	1.87
Caribbean	1.48	1.39	-0.51	-0.55	1.99	1.94
* Anguilla	2.17	0.64	3.09	1.93	-0.93	-1.30
* Antigua and Barbuda	1.30	2.57	0.55	0.85	0.75	1.72
* Aruba	0.00	0.00	0.57	0.48	-0.57	-0.48
Bahamas	1.78	1.40	-1.85	-1.22	3.63	2.62
Barbados	1.47	1.42	-0.73	-0.86	2.19	2.28
* Cayman Islands	2.34	1.79	0.00	0.00	2.34	1.79
* Dominica	-0.09	0.18	-2.11	-1.45	2.02	1.64
French Guiana	3.88	3.38	1.84	1.52	2.04	1.86
* Grenada	1.05	1.57	-0.99	-0.74	2.04	2.31
Guadeloupe	0.92	0.72	-10.27	-0.42	11.18	1.14
Guyana	1.98	1.61	-0.54	-1.09	2.52	2.70
Jamaica	1.71	1.76	-0.25	-0.28	1.96	2.04
Martinique	0.90	0.64	-4.82	-3.05	5.72	3.69
* Montserrat	-3.83	3.19	-4.58	1.98	0.76	1.21
Netherlands Antilles	1.26	1.29	0.05	-0.37	1.21	1.66
* Saint Kitts and Nevis	-0.48	0.92	-0.28	0.08	-0.20	0.83
Saint Lucia	1.52	1.84	0.88	0.47	0.64	1.37
* Saint Vincent and the Grenadines	2.86	2.02	-2.03	-2.29	4.89	4.31
Suriname	1.39	1.10	-2.24	-2.02	3.62	3.12
Trinidad and Tobago	1.07	0.99	-1.22	-1.11	2.29	2.10
* Turks and Caicos Islands	4.90	3.59	2.64	2.32	2.26	1.27
* Virgin Islands (UK)	4.21	2.89	-0.67	0.33	4.87	2.56
* Virgin Islands (US)	1.68	1.89	0.66	0.14	1.02	1.74
North America	1.26	1.14	0.08	-0.26	1.18	1.40
* Bermuda	0.83	0.59	0.00	0.00	0.83	0.59
Canada	1.02	0.97	0.44	0.03	0.57	0.94
United States	1.29	1.16	0.04	-0.29	1.25	1.45

Source: United Nations. *World Population Prospects, The 2000 Revision*, except (\*), in which the source is the U.S. Census Bureau.

TABLE B.9. Urban population in cities with more than 750,000 population and with less than 750,000 population for 1996, 2002, and 2008, and their annual growth rates for 1996–2002 and 2002–2008, by subregion and country, Region of the Americas.

Subregion and country	Urban population (in thousands)						Annual growth rates			
	Cities with more than 750,000 population			Cities with less than 750,000 population			Cities with more than 750,000 population		Cities with less than 750,000 population	
	1996	2002	2008	1996	2002	2008	1996–2002	2002–2008	1996–2002	2002–2008
Region of the Americas	283,531	311,483	333,765	306,298	343,098	384,198	1.6	1.2	1.9	1.9
Latin America	158,976	179,481	196,304	196,002	221,700	250,234	2.0	1.5	2.1	2.0
Rest of the Americas	124,555	132,002	137,461	110,297	121,398	133,964	1.0	0.7	1.6	1.6
Andean Area	32,764	38,516	43,724	43,551	49,764	56,618	2.7	2.1	2.2	2.2
Bolivia	2,195	2,720	3,241	2,369	2,822	3,340	3.6	2.9	2.9	2.8
Colombia	12,299	14,344	16,202	16,056	18,152	20,510	2.6	2.0	2.0	2.0
Ecuador	3,385	4,328	5,122	3,795	4,474	5,255	4.1	2.8	2.7	2.7
Peru	6,822	7,740	8,580	10,244	11,762	13,400	2.1	1.7	2.3	2.2
Venezuela	8,062	9,385	10,579	11,087	12,554	14,114	2.5	2.0	2.1	2.0
Southern Cone	22,904	24,886	26,659	26,114	29,263	32,469	1.4	1.1	1.9	1.7
Argentina	15,415	16,592	17,608	15,832	17,710	19,610	1.2	1.0	1.9	1.7
Chile	5,131	5,709	6,183	7,075	7,719	8,383	1.8	1.3	1.5	1.4
Paraguay	1,117	1,346	1,615	1,520	1,971	2,465	3.1	3.0	4.3	3.7
Uruguay	1,241	1,239	1,254	1,687	1,863	2,011	0.0	0.2	1.7	1.3
Brazil	55,434	61,239	66,218	72,284	82,393	92,230	1.7	1.3	2.2	1.9
Central America	7,586	9,287	11,048	7,634	9,220	11,188	3.4	2.9	3.1	3.2
Costa Rica	898	1,038	1,196	820	997	1,175	2.4	2.4	3.3	2.7
El Salvador	1,253	1,490	1,736	1,376	1,605	1,878	2.9	2.5	2.6	2.6
Guatemala	2,710	3,493	4,273	1,268	1,348	1,678	4.2	3.4	1.0	3.6
Honduras	841	1,020	1,247	1,973	2,663	3,330	3.2	3.3	5.0	3.7
Nicaragua	852	1,022	1,221	1,644	2,024	2,467	3.0	3.0	3.5	3.3
Panama	1,033	1,223	1,374	446	451	505	2.8	1.9	0.2	1.9
Mexico	30,685	34,567	36,391	37,583	41,649	47,619	2.0	0.9	1.7	2.2
Latin Caribbean	9,604	10,985	12,265	8,835	9,411	10,110	2.2	1.8	1.1	1.2
Cuba	2,198	2,276	2,328	6,036	6,255	6,478	0.6	0.4	0.6	0.6
Dominican Republic	4,592	5,390	6,102	302	335	426	2.7	2.1	1.7	4.0
Haiti	1,495	1,910	2,348	1,046	1,203	1,430	4.1	3.4	2.3	2.9
Puerto Rico	1,319	1,409	1,487	1,451	1,619	1,776	1.1	0.9	1.8	1.5
North America	124,555	132,002	137,461	105,743	116,421	128,555	1.0	0.7	1.6	1.7
Canada	12,369	13,338	14,112	10,401	10,861	11,540	1.3	0.9	0.7	1.0
United States	112,186	118,664	123,350	95,281	105,496	116,949	0.9	0.6	1.7	1.7

Source: United Nations. *World Population Prospects, The 2000 Revision*.

TABLE B.10. Twenty most populous cities, Region of the Americas, 1996, 2002 and 2008.

City	1996		2002		2008	
	Population (thousands)	City	Population (thousands)	City	Population (thousands)	City
Mexico City	16,876	Mexico City	18,259	São Paulo	19,372	
São Paulo	16,777	São Paulo	18,182	Mexico City	18,590	
New York	16,393	New York	16,756	New York	17,083	
Los Angeles	12,555	Los Angeles	13,320	Los Angeles	13,752	
Buenos Aires	12,003	Buenos Aires	12,819	Buenos Aires	13,519	
Rio de Janeiro	10,261	Rio de Janeiro	10,756	Rio de Janeiro	11,304	
Chicago	6,865	Lima	7,740	Lima	8,580	
Lima	6,822	Chicago	7,006	Bogotá	7,276	
Bogotá	5,762	Bogotá	6,543	Chicago	7,177	
Santiago de Chile	5,131	Santiago de Chile	5,709	Santiago de Chile	6,183	
Toronto	4,375	Toronto	4,761	Toronto	5,044	
Philadelphia	4,322	Philadelphia	4,446	Belo Horizonte	4,689	
San Francisco	3,901	Belo Horizonte	4,308	Philadelphia	4,579	
Belo Horizonte	3,854	San Francisco	4,112	Guatemala	4,273	
Detroit	3,736	Washington, D.C.	3,998	San Francisco	4,267	
Washington, D.C.	3,734	Dallas	3,993	Santo Domingo	4,219	
Dallas	3,670	Guadalajara	3,991	Guadalajara	4,209	
Guadalajara	3,526	Porto Alegre	3,834	Dallas	4,184	
Porto Alegre	3,418	Detroit	3,824	Porto Alegre	4,182	
Montreal	3,349	Santo Domingo	3,759	Washington, D.C.	4,169	

Source: United Nations. *World Population Prospects, The 2000 Revision*.

TABLE B.11. Population distribution by broad age groups in 2002 and expected population growth for 2002–2008, by country and subregion, Region of the Americas.

Subregion and country	Population in specified age groups (in thousands)					Expected population growth between 2002–2008 (in thousands)				
	Total	0–14	15–64	65+	85+	Total	0–14	15–64	65+	85+
Region of the Americas	854,042	231,277	553,555	69,210	6,863	61,807	-720	53,423	9,107	1,498
Latin America	526,444	161,811	335,329	29,304	1,831	44,974	956	38,176	5,843	507
Rest of the Americas	327,599	69,467	218,226	39,906	5,033	16,833	-1,676	15,247	3,264	990
Andean Area	116,928	38,567	72,775	5,585	353	11,996	586	10,183	1,226	104
Bolivia	8,705	3,406	4,943	357	14	1,139	228	839	72	5
Colombia	43,495	13,976	27,413	2,106	168	4,232	203	3,611	418	39
Ecuador	13,112	4,310	8,165	637	42	1,353	42	1,168	144	11
Peru	26,523	8,579	16,612	1,332	75	2,540	-20	2,258	301	27
Venezuela	25,093	8,297	15,643	1,154	54	2,732	132	2,307	292	22
Southern Cone	62,697	17,761	39,434	5,502	387	4,777	356	3,761	660	108
Argentina	37,944	10,361	23,875	3,708	248	2,677	239	2,077	361	75
Chile	15,589	4,331	10,108	1,150	87	1,071	-75	921	225	23
Paraguay	5,778	2,234	3,340	204	11	892	187	653	52	2
Uruguay	3,385	834	2,111	439	41	138	6	110	22	8
Brazil	174,706	48,600	116,714	9,392	449	12,635	-380	10,991	2,024	131
Central America	37,971	14,732	21,677	1,563	78	5,211	966	3,921	324	32
Belize	236	87	138	10	1	25	-2	26	1	0
Costa Rica	4,200	1,319	2,658	222	13	499	49	395	55	5
El Salvador	6,520	2,282	3,906	332	18	699	84	557	59	8
Guatemala	11,995	5,157	6,408	430	18	1,957	524	1,357	77	7
Honduras	6,732	2,751	3,746	234	10	928	130	741	56	4
Nicaragua	5,347	2,241	2,940	166	8	857	195	624	37	4
Panama	2,942	894	1,880	168	12	246	-14	221	39	3
Mexico	101,842	32,814	64,022	5,007	374	8,402	-431	7,631	1,201	100
Latin Caribbean	32,299	9,337	20,708	2,255	189	1,954	-141	1,688	407	32
Cuba	11,273	2,292	7,853	1,128	108	185	-252	224	213	15
Dominican Republic	8,639	2,805	5,446	388	16	752	32	627	93	4
Haiti	8,400	3,306	4,780	313	16	816	93	681	42	3
Puerto Rico	3,988	934	2,628	426	49	201	-14	156	59	10
Caribbean	7,737	2,140	5,042	554	58	342	-98	380	60	10
*Anguilla	12	3	8	1	0	1	0	1	0	0
*Antigua and Barbuda	67	19	45	3	0	6	1	6	-1	0
*Aruba	70	15	48	7	1	2	-1	1	2	0
Bahamas	312	91	204	18	2	22	0	18	4	0
Barbados	269	53	189	27	3	6	-4	10	0	0
*Cayman Islands	36	8	25	3	0	4	0	3	1	0
*Dominica	70	20	45	6	1	-1	-3	2	0	0
French Guiana	176	62	106	8	1	35	12	20	3	0
*Grenada	89	32	54	3	0	1	-3	5	-1	0
Guadeloupe	435	105	288	42	5	19	-1	15	6	1
Guyana	765	229	498	38	3	1	-11	10	2	0
Jamaica	2,621	802	1,631	188	22	147	-28	162	13	3
Martinique	388	85	258	45	6	11	-6	13	4	1
*Montserrat	8	2	5	1	0	1	0	1	0	0
Netherlands Antilles	219	53	148	18	1	11	-2	9	4	0
*Saint Kitts and Nevis	39	11	24	3	1	1	-1	2	0	0
Saint Lucia	151	48	95	8	1	9	1	8	0	0
*Saint Vincent and the Grenadines	116	34	75	7	1	2	-4	6	0	0
Suriname	421	123	274	24	1	10	-10	18	2	0
Trinidad and Tobago	1,306	302	914	90	8	38	-36	59	15	2
*Turks and Caicos Islands	19	6	12	1	0	4	1	3	0	0
*Virgin Islands (UK)	21	5	15	1	0	3	0	2	0	0
*Virgin Islands (US)	123	33	79	11	1	8	-3	6	4	0
North America	319,862	67,326	213,183	39,352	4,975	16,491	-1,578	14,867	3,204	980
*Bermuda	64	12	44	7	1	2	-1	2	1	0
Canada	31,268	5,803	21,464	4,001	443	1,465	-292	1,294	462	116
United States	288,530	61,512	191,675	35,343	4,531	15,026	-1,286	13,571	2,741	864

Source: United Nations. *World Population Prospects, The 2000 Revision*, except (\*), in which the source is the U.S. Census Bureau.

Note: 0 means fewer than 500.

TABLE B.12. Percentage distribution of the population by broad age groups in 2002, and annual growth rates in 2002–2008, by subregion and country, Region of the Americas.

Subregion and country	Percentage of population in the selected ages (2002)				Total	Annual growth rates in the selected ages (2002–2008)			
	0–14	15–64	65+	85+		0–14	15–64	65+	85+
Region of the Americas	27.1	64.8	8.1	0.8	1.4	-0.1	1.8	2.5	3.9
Latin America	30.7	63.7	5.6	0.3	1.6	0.1	2.2	3.6	4.9
Rest of the Americas	21.2	66.6	12.2	1.5	1.0	-0.5	1.4	1.6	3.6
Andean Area	33.0	62.2	4.8	0.3	2.0	0.3	2.6	4.0	5.2
Bolivia	39.1	56.8	4.1	0.2	2.5	1.3	3.1	3.7	6.0
Colombia	32.1	63.0	4.8	0.4	1.9	0.3	2.5	3.6	4.2
Ecuador	32.9	62.3	4.9	0.3	2.0	0.2	2.7	4.1	4.8
Peru	32.3	62.6	5.0	0.3	1.8	0.0	2.5	4.1	6.1
Venezuela	33.1	62.3	4.6	0.2	2.1	0.3	2.8	4.5	6.9
Southern Cone	28.3	62.9	8.8	0.6	1.5	0.4	1.8	2.3	4.9
Argentina	27.3	62.9	9.8	0.7	1.4	0.5	1.7	1.9	5.3
Chile	27.8	64.8	7.4	0.6	1.3	-0.4	1.7	3.6	4.7
Paraguay	38.7	57.8	3.5	0.2	2.9	1.6	3.6	4.6	3.8
Uruguay	24.6	62.4	13.0	1.2	0.8	0.1	1.0	1.0	3.5
Brazil	27.8	66.8	5.4	0.3	1.4	-0.2	1.8	3.9	5.1
Central America	38.8	57.1	4.1	0.2	2.6	1.3	3.3	3.8	6.8
Belize	37.0	58.7	4.3	0.4	2.0	-0.5	3.5	2.6	4.6
Costa Rica	31.4	63.3	5.3	0.3	2.2	0.7	2.8	4.4	7.1
El Salvador	35.0	59.9	5.1	0.3	2.0	0.7	2.7	3.2	7.5
Guatemala	43.0	53.4	3.6	0.1	3.0	1.9	3.8	3.3	6.7
Honduras	40.9	55.6	3.5	0.1	2.6	0.9	3.6	4.3	7.0
Nicaragua	41.9	55.0	3.1	0.1	3.0	1.7	3.9	4.1	8.1
Panama	30.4	63.9	5.7	0.4	1.6	-0.3	2.2	4.2	4.3
Mexico	32.2	62.9	4.9	0.4	1.6	-0.3	2.3	4.3	4.7
Latin Caribbean	28.9	64.1	7.0	0.6	1.2	-0.3	1.6	3.3	3.2
Cuba	20.3	69.7	10.0	1.0	0.3	-2.3	0.6	3.5	2.7
Dominican Republic	32.5	63.0	4.5	0.2	1.7	0.2	2.2	4.3	4.2
Haiti	39.4	56.9	3.7	0.2	1.9	0.6	2.7	2.5	3.7
Puerto Rico	23.4	65.9	10.7	1.2	1.0	-0.3	1.2	2.6	3.7
Caribbean	27.7	65.2	7.2	0.7	0.9	-0.9	1.5	2.1	3.2
*Anguilla	24.9	68.1	6.9	1.2	2.1	-0.5	3.0	2.4	-0.8
*Antigua and Barbuda	28.0	67.3	4.7	0.7	1.8	1.0	2.5	-3.5	0.0
*Aruba	21.0	68.4	10.6	1.1	0.6	-1.9	0.5	4.8	5.5
Bahamas	29.0	65.3	5.6	0.5	1.4	-0.1	1.7	4.5	4.5
Barbados	19.8	70.0	10.2	1.3	0.4	-1.5	1.0	-0.3	-0.3
*Cayman Islands	22.0	69.6	8.3	0.9	2.1	0.1	2.3	6.0	5.4
*Dominica	28.3	63.8	7.9	1.1	-0.3	-3.2	0.9	-0.3	0.4
French Guiana	35.4	60.3	4.3	0.4	3.6	3.4	3.5	6.2	6.5
*Grenada	36.0	60.3	3.8	0.3	0.2	-1.9	1.6	-4.6	0.0
Guadeloupe	24.2	66.2	9.6	1.1	0.9	-0.3	1.0	2.7	5.1
Guyana	30.0	65.0	5.0	0.3	0.0	-1.0	0.4	1.1	3.4
Jamaica	30.6	62.2	7.2	0.8	1.1	-0.7	1.9	1.3	2.5
Martinique	21.9	66.6	11.5	1.4	0.6	-1.4	1.0	1.9	4.2
*Montserrat	23.6	65.0	11.4	2.8	2.7	2.6	2.9	1.2	-15.6
Netherlands Antilles	24.0	67.8	8.3	0.6	1.0	-0.8	1.2	4.2	3.4
*Saint Kitts and Nevis	29.4	61.9	8.7	1.6	0.5	-1.4	1.5	-1.7	-1.2
Saint Lucia	31.6	62.8	5.6	0.6	1.2	0.2	1.7	0.9	3.3
*Saint Vincent and the Grenadines	28.9	64.8	6.4	0.9	0.3	-2.4	1.4	0.8	1.9
Suriname	29.2	65.0	5.8	0.3	0.5	-1.7	1.3	1.7	3.0
Trinidad and Tobago	23.1	70.0	6.9	0.6	0.6	-2.5	1.2	3.1	4.4
*Turks and Caicos Islands	32.6	63.6	3.8	0.4	3.5	2.4	4.0	4.7	1.4
*Virgin Islands (UK)	22.3	72.7	4.9	0.6	2.4	0.1	2.9	4.8	1.0
*Virgin Islands (US)	26.7	64.2	9.2	0.9	1.2	-1.6	1.4	6.3	6.4
North America	21.0	66.6	12.3	1.6	1.0	-0.5	1.3	1.6	3.6
*Bermuda	19.2	69.4	11.4	1.2	0.7	-1.0	0.7	3.3	4.7
Canada	18.6	68.6	12.8	1.4	0.9	-1.0	1.2	2.2	4.6
United States	21.3	66.4	12.2	1.6	1.0	-0.4	1.4	1.5	3.5

Source: United Nations. *World Population Prospects, The 2000 Revision*, except (\*), in which the source is the U.S. Census Bureau.



TABLE B.13. Ratio of adults to elderly persons and ratio of potential relatives to elderly persons in 1996, 2002, and 2008, and changes in these ratios between 1996–2002 and 2002–2008, by subregion and country, Region of the Americas.

Subregion and country	Ratio of adults to elderly persons <sup>a</sup>			Change <sup>c</sup>		Ratio of potential relatives to elderly persons <sup>b</sup>			Change <sup>c</sup>	
	1996	2002	2008	1996–2002	2002–2008	1996	2002	2008	1996–2002	2002–2008
	Andean Area	13.8	13.0	12.2	-0.7	-0.9	7.3	7.2	7.0	-0.1
Bolivia	14.4	13.9	13.5	-0.6	-0.4	7.3	7.1	7.1	-0.2	0.0
Colombia	13.5	13.0	12.3	-0.5	-0.7	7.3	7.5	7.3	0.2	-0.2
Ecuador	13.5	12.8	12.0	-0.7	-0.9	6.9	6.9	6.8	0.0	-0.1
Peru	13.5	12.5	11.6	-1.1	-0.9	7.0	6.7	6.6	-0.3	-0.1
Venezuela	14.5	13.6	12.4	-0.9	-1.1	7.8	7.6	7.1	-0.3	-0.4
Southern Cone	7.3	7.2	7.0	-0.2	-0.2	4.3	4.3	4.3	-0.1	0.0
Argentina	6.5	6.4	6.4	-0.1	-0.1	3.9	3.8	3.9	-0.1	0.1
Chile	9.5	8.8	8.0	-0.7	-0.8	5.7	5.5	5.1	-0.2	-0.4
Paraguay	15.7	16.4	15.6	0.7	-0.8	8.1	8.5	8.2	0.4	-0.4
Uruguay	5.0	4.8	4.8	-0.2	0.0	3.1	3.0	3.1	-0.1	0.1
Brazil	13.3	12.4	11.2	-0.9	-1.2	7.4	7.1	6.8	-0.3	-0.4
Central America	14.4	13.9	13.6	-0.6	-0.3	7.0	6.9	7.0	-0.1	0.1
Belize	12.9	13.7	14.3	0.7	0.6	6.1	6.6	7.4	0.6	0.8
Costa Rica	13.0	12.0	11.0	-1.0	-1.0	7.2	6.8	6.4	-0.4	-0.4
El Salvador	12.5	11.8	11.4	-0.7	-0.3	5.9	5.9	6.3	0.0	0.4
Guatemala	15.2	14.9	15.3	-0.3	0.4	7.1	6.9	7.3	-0.2	0.4
Honduras	17.1	16.0	15.5	-1.1	-0.5	8.0	7.6	7.6	-0.4	-0.1
Nicaragua	17.7	17.7	17.5	0.0	-0.2	8.2	8.3	8.5	0.1	0.3
Panama	11.6	11.2	10.2	-0.4	-1.0	6.3	6.5	6.2	0.2	-0.3
Mexico	13.9	12.8	11.5	-1.1	-1.2	6.9	6.9	6.8	0.0	-0.1
Latin Caribbean	9.6	9.2	8.4	-0.4	-0.8	5.4	5.5	5.1	0.0	-0.4
Cuba	7.6	7.0	6.0	-0.6	-0.9	4.7	4.8	4.3	0.1	-0.5
Dominican Republic	15.3	14.0	12.6	-1.3	-1.4	8.1	7.7	7.2	-0.4	-0.6
Haiti	14.6	15.3	15.4	0.7	0.1	7.2	7.2	7.2	0.0	0.0
Puerto Rico	6.5	6.2	5.7	-0.3	-0.4	3.9	3.9	3.8	0.0	-0.1
Caribbean	9.0	9.1	8.8	0.1	-0.3	4.9	5.2	5.3	0.3	0.1
*Anguilla	8.5	9.8	10.1	1.4	0.3	4.9	6.1	6.6	1.2	0.5
*Antigua and Barbuda	12.0	14.4	19.3	2.3	5.0	6.7	9.3	13.1	2.5	3.9
*Aruba	8.1	6.5	5.2	-1.7	-1.2	5.7	4.7	3.7	-0.9	-1.0
Bahamas	13.0	11.6	10.1	-1.4	-1.5	7.3	6.9	6.2	-0.4	-0.7
Barbados	6.1	6.9	7.4	0.8	0.5	3.7	4.5	5.2	0.8	0.6
*Cayman Islands	10.0	8.4	9.4	-1.6	1.0	7.1	6.2	6.9	-0.9	0.7
*Dominica	7.7	8.1	8.6	0.4	0.5	3.8	4.9	5.5	1.0	0.6
French Guiana	14.8	13.9	12.1	-0.9	-1.8	8.9	8.4	7.2	-0.5	-1.1
*Grenada	11.2	16.0	21.8	4.7	5.8	4.8	6.8	10.4	2.0	3.6
Guadeloupe	7.5	6.9	6.3	-0.6	-0.6	4.5	4.4	4.3	-0.1	-0.1
Guyana	12.8	13.0	12.6	0.2	-0.4	6.3	7.0	7.5	0.6	0.5
Jamaica	8.1	8.7	8.9	0.6	0.3	4.2	4.7	5.1	0.5	0.4
Martinique	6.3	5.8	5.5	-0.5	-0.3	3.8	3.8	3.8	0.0	0.0
*Montserrat	4.9	5.7	6.2	0.9	0.5	2.4	3.0	3.7	0.5	0.7
Netherlands Antilles	9.0	8.2	7.1	-0.8	-1.1	5.9	5.4	4.7	-0.5	-0.7
*Saint Kitts and Nevis	6.0	7.1	8.4	1.1	1.2	3.4	4.3	5.1	0.9	0.8
Saint Lucia	10.0	11.2	11.7	1.3	0.5	5.0	6.0	6.8	1.0	0.8
*Saint Vincent and the Grenadines	9.3	10.2	10.5	0.9	0.3	4.5	5.3	5.1	0.8	-0.2
Suriname	12.2	11.3	9.3	-0.9	-2.0	6.1	6.0	5.7	-0.1	-0.3
Trinidad and Tobago	10.0	10.2	11.0	0.2	0.8	5.8	5.9	6.2	0.1	0.3
*Turks and Caicos Islands	14.9	16.6	16.1	1.7	-0.5	9.0	10.8	10.6	1.8	-0.2
*Virgin Islands (UK)	13.4	14.7	13.4	1.4	-1.3	8.3	9.3	8.6	1.1	-0.7
*Virgin Islands (US)	8.6	7.0	5.5	-1.6	-1.5	5.6	4.5	3.6	-1.1	-1.0
North America	5.3	5.4	5.4	0.1	-0.1	3.6	3.8	3.7	0.1	-0.1
*Bermuda	7.1	6.1	5.4	-1.0	-0.7	5.1	4.5	3.9	-0.6	-0.6
Canada	5.6	5.4	5.1	-0.2	-0.3	3.9	3.8	3.6	-0.1	-0.2
United States	5.3	5.4	5.4	0.2	0.0	3.6	3.8	3.7	0.2	0.0

<sup>a</sup> The ratio of adults to elderly individuals is the number of persons between 15 and 64 years old for each person aged 65 years or older.

<sup>b</sup> The ratio of potential relatives to elderly individuals is the number of persons between 30 and 34 years old for each person aged 65 or older.

<sup>c</sup> The change in both ratios results from subtracting the quotients of the two years. A positive number indicates an increase in the number of persons in the selected ages per elderly individual. A negative number indicates a decrease in the number of persons in the selected ages per elderly individual.

Source: United Nations. *World Population Prospects, The 2000 Revision*, except (\*), in which the source is the U.S. Census Bureau.

TABLE B.14. Ratio of women per 100 men in 1980, and change in the ratio for 1980–2000 and 2000–2020, by subregion and country, Region of the Americas.

Subregion and country	Ratio of women per 100 men						Change <sup>a</sup>			
	1980		2000		2020		1980–2000		2000–2020	
	65 and +	85 and +	65 and +	85 and +	65 and +	85 and +	65 and +	85 and +	65 and +	85 and +
Andean Area	120	159	123	169	126	176	3	10	3	8
Bolivia	120	200	124	160	126	167	4	-40	1	7
Colombia	123	166	128	175	132	192	5	10	4	17
Ecuador	115	136	118	160	120	168	2	24	2	8
Peru	119	154	118	158	124	162	-1	4	6	4
Venezuela	118	158	121	172	121	175	3	14	0	3
Southern Cone	131	179	143	234	139	232	13	54	-4	-2
Argentina	128	174	144	245	144	243	16	71	0	-3
Chile	138	189	141	216	131	210	3	27	-10	-6
Paraguay	136	180	139	175	115	188	3	-5	-24	13
Uruguay	132	190	147	225	148	227	15	35	1	2
Brazil	112	142	129	167	137	195	17	25	8	28
Central America	114	135	116	150	122	162	2	15	7	12
Belize	109	100	40	0	113	100	-69	-100	73	100
Costa Rica	115	100	115	140	116	150	0	40	1	10
El Salvador	124	167	129	220	134	200	5	53	5	-20
Guatemala	105	114	108	129	120	148	3	14	11	19
Honduras	117	150	116	167	124	160	-1	17	8	-7
Nicaragua	130	300	125	133	123	175	-6	-167	-2	42
Panama	100	133	108	120	117	144	8	-13	9	24
Mexico	122	146	122	154	126	160	0	7	4	7
Latin Caribbean	101	107	116	129	129	162	15	22	13	33
Cuba	93	94	111	120	119	144	18	26	8	24
Dominican Republic	100	120	108	114	123	144	8	-6	15	29
Haiti	119	129	124	133	146	164	5	5	22	30
Puerto Rico	110	125	134	156	156	226	24	31	21	71
Caribbean	125	225	130	176	134	198	6	-49	3	21
*Anguilla	...	...	127	176	115	163	...	...	-12	-13
*Antigua and Barbuda	...	...	137	119	129	268	...	...	-7	149
*Aruba	...	...	141	209	142	211	...	...	1	2
Bahamas	136	...	129	100	154	200	-7	...	25	100
Barbados	150	200	170	200	144	300	20	0	-26	100
*Cayman Islands	...	...	118	179	121	141	...	...	3	-37
*Dominica	...	...	144	186	134	249	...	...	-10	63
French Guiana	119	...	133	0	110	100	14	...	-23	100
*Grenada	...	...	121	154	54	122	...	...	-67	-32
Guadeloupe	136	...	135	300	138	200	0	...	3	-100
Guyana	...	200	131	200	159	300	...	0	28	100
Jamaica	118	217	124	163	125	173	6	-54	0	10
Martinique	142	200	139	200	148	233	-3	0	9	33
*Montserrat	...	...	87	85	112	115	...	...	25	29
Netherlands Antilles	142	100	143	0	147	200	1	-100	4	200
*Saint Kitts and Nevis	...	...	142	182	123	193	...	...	-19	11
Saint Lucia	134	...	167	0	140	0	32	...	-27	0
*Saint Vincent and the Grenadines	...	...	133	172	115	163	...	...	-19	-8
Suriname	112	100	130	100	150	200	18	0	20	100
Trinidad and Tobago	124	300	121	133	126	200	-3	-167	6	67
*Turks and Caicos Islands	...	...	123	177	91	161	...	...	-32	-16
*Virgin Islands (UK)	...	...	84	72	95	102	...	...	11	30
*Virgin Islands (US)	...	...	131	175	163	176	...	...	32	1
North America	147	241	140	255	130	235	-7	13	-10	-20
*Bermuda	...	...	132	195	124	171	...	...	-8	-24
Canada	132	204	134	231	125	204	1	28	-9	-27
United States	149	245	141	257	130	239	-8	13	-11	-19

<sup>a</sup> The change in the ratio results from subtracting the quotients of the two years. A positive number indicates an increase in the number of women per 100 men. A negative number indicates a decrease in the number of women per 100 men.

Source: United Nations. *World Population Prospects, The 2000 Revision*, except (\*), in which the source is the U.S. Census Bureau.

TABLE B.15. Estimated mortality rates per 100,000 population, by cause, selected countries of the Americas, beginning of the 1980s.

Cause of death	ARG	BAR	BRA	CAN	CHI	COL	COR	CUB	DOR	ECU	ELS	JAM	MEX	PAN	PAR	PUR	TRT	USA	VEN
Intestinal infections	9.2	2.9	43.4	0.2	8.0	15.3	6.2	3.5	28.6	95.3	73.5	21.2	62.9	14.4	44.9	0.6	20.8	0.2	29.0
Diseases preventable by immunization	1.6	1.9	5.6	0.0	0.5	1.6	1.0	0.2	4.8	33.5	15.6	0.9	6.3	7.6	6.8	0.3	0.7	0.0	4.1
Septicemia	8.6	5.9	6.5	0.9	5.3	3.0	1.8	2.4	7.8	3.1	3.3	3.6	5.2	2.8	9.2	3.6	4.2	4.2	7.5
AIDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neoplasm of the stomach	13.0	18.4	9.0	9.6	24.2	12.6	18.7	7.0	2.3	14.3	4.7	13.7	4.9	6.6	4.8	9.4	8.7	6.4	10.6
Neoplasm of the colon, rectum, and anus	14.1	10.7	3.3	21.8	5.8	2.7	3.7	9.7	2.2	1.6	0.7	7.1	1.4	4.0	2.1	6.0	6.8	24.0	3.1
Neoplasm of the trachea, bronchus, and lung	25.7	9.8	6.4	37.7	10.6	5.8	6.4	25.5	2.8	2.6	1.6	8.4	4.7	6.1	2.3	9.8	5.4	46.0	6.7
Neoplasm of the breast (female)	11.8	14.3	3.6	14.6	5.8	2.7	3.3	6.8	1.7	1.6	0.8	6.9	1.9	2.6	2.2	4.3	6.5	15.9	3.0
Neoplasm of the uterus and placenta	6.8	13.8	4.1	4.0	8.2	5.8	4.5	6.5	3.9	7.2	2.8	8.6	5.4	4.9	5.9	3.1	7.3	4.8	6.7
Neoplasm of the prostate	6.4	12.6	2.5	8.8	4.1	2.7	3.3	8.1	3.3	2.3	0.9	7.5	1.8	3.4	2.1	7.0	7.0	10.2	2.7
Leukemia and other hematopoietic neoplasms	9.8	9.3	5.0	14.8	6.9	5.5	7.4	9.4	2.7	4.3	3.2	5.2	4.3	6.2	3.5	8.5	6.4	16.8	6.2
Diabetes mellitus	16.9	54.2	10.7	12.1	13.5	9.0	8.3	11.6	9.1	7.0	10.0	31.8	22.7	9.0	9.2	25.8	45.2	15.3	12.4
Nutritional deficiency	6.4	10.6	14.9	2.0	3.2	10.5	4.2	2.1	21.1	32.5	17.1	13.1	12.3	7.3	5.6	3.5	9.5	2.5	7.0
Hypertensive disease	15.8	25.7	13.0	6.1	9.3	13.8	5.1	7.5	12.1	6.5	1.2	35.2	5.1	5.6	4.9	24.3	44.1	14.3	11.5
Ischemic heart disease	100.5	86.8	53.3	204.6	64.4	52.2	51.1	141.7	28.7	19.7	31.6	33.9	25.5	49.0	28.1	98.5	108.4	248.9	49.7
Cerebrovascular disease	81.9	126.5	63.5	62.9	65.3	39.4	28.0	56.6	27.1	30.3	32.8	94.3	24.2	34.0	44.7	43.4	82.9	74.9	37.3
Acute respiratory infections	25.5	29.9	40.6	19.7	42.3	20.0	19.7	40.3	17.6	74.0	25.4	20.5	62.9	21.9	37.5	30.4	33.7	23.4	30.4
Bronchitis, emphysema, and asthma	7.9	9.9	8.9	10.6	8.9	9.6	6.9	7.2	7.8	41.7	28.9	8.9	18.4	9.9	6.4	9.1	13.2	9.0	6.5
Cirrhosis and other liver diseases	13.7	7.1	9.4	11.3	31.4	3.3	6.3	6.1	14.1	7.3	9.6	5.1	22.9	4.6	3.3	24.6	14.2	13.4	8.1
Diseases of the urinary system	15.9	16.2	9.1	8.4	12.6	8.7	6.9	8.3	5.1	13.2	7.5	16.9	13.9	8.3	8.8	10.8	14.7	12.2	7.5
Congenital anomalies	11.8	7.8	9.5	7.2	11.8	6.3	15.1	8.3	7.1	7.0	4.3	4.5	9.6	10.5	5.0	6.2	6.7	6.7	11.7
Traffic accidents	16.2	10.5	16.7	25.7		15.8	15.6		8.3	25.4	17.7	1.7	24.1	17.8	8.5	16.1	17.9	25.0	35.3
Suicide	7.1	1.6	3.1	14.0		3.4	4.3		2.0	3.3	12.6	0.1	1.6	1.8	1.5	8.5	4.8	12.0	4.5
Homicide	3.6	4.8	10.9	2.3		40.2	4.7		3.9	6.5	51.7	1.2	17.8	2.2	5.5	14.8	3.3	10.2	10.6
All other causes	176.6	154.6	117.2	141.5	127.1	117.7	85.1	90.3	101.1	125.4	291.6	97.6	147.9	97.9	66.5	126.6	113.8	164.0	99.1

TABLE B.16. Estimated mortality rates per 100,000 population, adjusted for age, by cause, selected countries of the Americas, beginning of the 1980s.

Cause of death	ARG	BAR	BRA	CAN	CHI	COL	COR	CUB	DOR	ECU	ELS	JAM	MEX	PAN	PAR	PUR	TRT	USA	VEN
Intestinal infections	9.1	3.4	60.5	0.2	8.9	28.1	6.7	4.5	46.3	98.7	114.7	33.2	66.7	20.4	78.3	0.6	33.3	0.2	28.3
Diseases preventable by immunization	1.6	1.5	8.3	0.0	0.5	2.6	1.2	0.3	7.0	31.9	16.5	1.3	5.9	9.5	11.6	0.3	0.9	0.0	4.1
Septicemia	8.2	4.8	9.8	0.7	6.0	5.4	2.4	3.2	12.7	3.9	6.6	4.9	6.0	4.5	16.4	3.6	5.9	2.8	8.1
AIDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neoplasm of the stomach	11.7	14.9	20.0	7.2	31.2	26.6	35.6	7.0	5.7	29.1	13.0	21.8	8.9	13.9	10.8	9.2	12.0	4.4	22.2
Neoplasm of the colon, rectum, and anus	12.6	9.4	7.6	16.5	7.4	5.6	6.6	9.8	5.5	3.3	1.9	10.8	2.6	8.3	4.8	6.0	9.3	16.0	6.4
Neoplasm of the trachea, bronchus, and lung	24.0	8.1	14.1	30.8	13.9	12.1	12.5	25.5	7.2	5.6	4.4	14.6	8.8	13.2	5.3	10.1	7.3	34.5	14.0
Neoplasm of the breast (female)	11.1	15.0	7.9	12.1	7.5	5.0	6.2	7.4	3.7	3.2	1.8	12.7	3.4	5.2	4.8	4.8	9.3	12.2	5.9
Neoplasm of the uterus and placenta	6.5	12.7	8.7	3.2	10.3	10.7	8.3	6.9	8.2	13.9	6.4	15.0	9.5	9.9	12.6	3.3	10.3	3.6	13.3
Neoplasm of the prostate	5.5	7.6	5.6	6.0	5.1	6.3	6.4	7.3	8.7	4.6	3.1	10.3	3.3	7.0	4.6	6.0	9.4	6.3	5.7
Leukemia and other hematopoietic neoplasms	9.4	8.5	8.8	11.8	8.0	8.3	10.8	9.7	4.8	6.2	5.5	8.4	5.4	10.2	7.1	8.9	8.0	12.3	9.2
Diabetes mellitus	15.2	40.1	24.1	8.7	17.4	18.7	15.6	11.6	23.1	14.4	27.8	49.6	42.1	18.6	21.3	24.9	63.3	10.1	25.5
Nutritional deficiency	6.3	8.0	22.5	1.4	3.7	19.8	6.0	2.3	34.6	39.0	33.2	18.9	16.8	11.4	10.0	3.1	12.4	1.6	8.7
Hypertensive disease	14.4	18.6	29.3	4.2	11.5	30.4	9.3	7.6	30.1	12.2	3.1	49.1	8.9	11.2	10.8	23.1	60.4	9.0	23.7
Ischemic heart disease	91.2	67.1	122.9	147.7	80.8	112.9	95.3	135.5	71.8	38.0	88.7	49.2	45.5	98.5	62.5	91.5	149.9	154.7	103.3
Cerebrovascular disease	74.1	90.3	145.7	42.2	81.8	84.3	50.3	55.0	68.5	57.0	89.7	131.8	41.5	68.0	98.3	37.7	113.1	42.6	76.3
Acute respiratory infections	24.1	26.6	66.5	13.2	49.6	39.3	27.0	39.0	31.7	91.1	54.5	28.6	73.1	34.8	68.3	27.2	46.2	14.3	41.5
Bronchitis, emphysema, and asthma	7.2	8.6	19.7	7.8	11.0	19.7	12.1	7.3	16.7	46.9	50.5	13.6	26.3	16.2	12.2	8.5	17.5	6.1	11.5
Cirrhosis and other liver diseases	13.3	7.3	17.5	10.0	40.5	6.3	11.1	6.3	33.4	14.2	20.9	9.0	39.8	9.4	7.3	28.1	20.1	11.6	15.8
Diseases of the urinary system	14.5	12.2	18.4	5.7	15.5	16.7	11.8	8.4	10.6	21.6	19.0	23.5	22.5	15.2	18.6	10.2	19.6	7.6	13.3
Congenital anomalies	11.8	11.6	12.7	9.8	12.3	11.4	13.9	12.4	10.9	6.9	5.3	6.8	9.0	13.9	8.3	7.1	9.9	9.4	10.7
Traffic accidents	16.2	10.0	24.9	22.4		19.5	19.1		11.5	33.5	26.6	2.4	28.9	27.0	17.4	17.4	19.5	23.1	43.3
Suicide	7.0	1.7	4.6	12.1		3.8	5.1		3.0	3.6	14.9	0.2	1.9	2.8	2.9	9.4	5.1	10.6	6.0
Homicide	3.7	5.0	14.6	2.0		42.4	5.4		5.3	8.2	66.4	1.9	22.4	3.3	11.3	15.9	3.9	9.6	12.2
All other causes	166.1	129.6	215.9	111.0	155.7	208.2	137.9	91.8	193.3	193.4	534.2	146.7	209.8	172.0	137.0	128.8	146.8	119.0	158.4

TABLE B.17. Estimated mortality rates per 100,000 population, by cause, selected countries of the Americas, end of the 1990s.

Cause of death	ARG	BAR	BRA	CAN	CHI	COL	COR	CUB	DOR	ECU	ELS	JAM	MEX	PAN	PAR	PUR	TRT	USA	VEN
Intestinal infections	1.9	1.9	6.1	0.2	1.9	5.3	3.4	4.7	6.7	12.4	16.4	7.4	6.9	4.3	12.3	0.2	3.4	0.4	15.2
Diseases preventable by immunization	0.1	0.4	0.3	0.0	0.1	0.2	0.1	0.0	0.5	0.5	0.3	0.4	0.1	0.2	0.9	0.0	0.2	0.0	0.4
Septicemia	20.6	15.5	7.9	3.2	5.8	4.7	1.6	1.4	3.9	5.9	15.8	4.0	3.2	3.0	6.9	17.4	4.5	8.5	3.1
AIDS	5.4	34.3	8.8	4.5	2.5	4.1	3.6	1.0	11.3	1.2	6.5	0.0	4.3	15.2	0.7	27.3	18.8	7.8	4.2
Neoplasm of the stomach	9.0	14.0	7.6	6.9	20.2	11.2	19.0	6.2	2.8	14.8	9.7	12.8	5.0	8.0	3.8	8.3	6.6	4.9	7.6
Neoplasm of the colon, rectum, and anus	15.0	17.0	4.7	20.9	7.2	3.9	5.0	14.8	2.2	2.6	1.9	7.3	2.5	5.0	1.9	13.0	9.2	21.3	3.9
Neoplasm of the trachea, bronchus, and lung	24.1	9.9	9.4	52.3	12.7	7.3	6.3	31.5	4.4	4.3	2.8	11.3	6.6	7.1	3.5	16.2	7.5	57.7	8.6
Neoplasm of the breast (female)	14.1	17.2	5.3	17.0	6.7	3.6	4.8	9.5	2.1	2.5	1.8	7.7	3.5	4.1	2.9	9.3	10.2	16.0	4.2
Neoplasm of the uterus and placenta	6.8	13.0	4.4	3.6	6.6	5.6	5.5	8.5	3.6	6.8	7.9	9.3	5.4	5.6	6.1	3.5	8.6	4.1	6.7
Neoplasm of the prostate	9.1	32.9	4.9	12.4	8.2	4.4	5.8	15.8	6.3	4.4	3.6	9.4	3.8	7.6	2.2	15.4	17.5	12.4	5.4
Leukemia and other hematopoietic neoplasms	10.2	15.4	5.8	18.4	8.4	6.0	8.1	10.9	3.0	5.5	3.4	5.7	5.9	7.6	3.7	12.4	8.0	20.9	6.1
Diabetes mellitus	21.0	88.4	19.6	18.8	15.6	13.7	9.3	18.9	13.3	18.4	15.8	53.8	42.9	19.3	11.0	61.8	92.3	23.8	20.3
Nutritional deficiency	5.9	8.0	4.8	2.4	2.6	4.6	1.7	2.5	2.7	10.7	4.2	8.0	13.1	9.8	3.3	6.3	8.2	3.2	6.3
Hypertensive disease	13.1	20.7	14.4	4.7	12.1	14.7	10.4	9.9	13.7	25.4	3.0	32.5	9.8	6.7	6.0	27.0	29.9	16.2	15.5
Ischemic heart disease	61.2	77.7	53.6	148.9	58.5	58.3	60.0	161.4	35.4	17.4	44.6	30.4	45.4	50.8	33.5	109.6	134.3	176.2	65.5
Cerebrovascular disease	68.4	130.4	59.5	53.4	50.9	36.9	29.3	72.8	28.2	26.1	22.0	86.7	26.5	48.9	45.0	46.0	88.6	60.1	35.5
Acute respiratory infections	27.0	25.9	24.0	26.2	52.2	16.1	15.3	45.1	8.0	32.6	37.4	16.6	19.7	15.4	17.6	33.5	27.6	33.3	16.2
Bronchitis, emphysema, and asthma	4.2	7.2	6.6	6.6	6.4	4.7	6.3	7.3	3.6	7.6	7.7	7.1	8.3	5.8	3.0	12.7	10.8	9.8	4.1
Cirrhosis and other liver diseases	8.9	11.6	11.4	7.3	24.7	4.2	10.7	9.1	12.0	12.0	10.9	3.0	25.1	6.6	3.1	21.7	6.3	9.5	7.7
Diseases of the urinary system	17.2	21.3	8.6	11.8	11.8	7.2	8.5	6.0	3.9	13.6	22.9	17.5	11.6	9.5	6.2	24.9	16.3	17.2	7.3
Congenital anomalies	9.0	4.5	6.4	3.9	8.1	6.1	11.2	5.7	3.9	4.9	6.2	1.8	10.3	13.8	5.6	5.6	6.4	4.9	9.0
Traffic accidents	11.8	8.7	20.4	11.2		19.1	16.0		14.4	16.1	26.1	1.1	15.4	17.8	7.3	17.4	11.5	17.2	20.1
Suicide	6.3	5.8	4.1	12.9		3.3	5.4		1.8	4.7	9.1	0.1	3.4	4.8	2.1	8.5	14.0	11.5	4.8
Homicide	4.5	7.1	24.2	1.6		64.0	5.3		6.5	14.0	40.2	0.2	13.5	9.4	7.0	24.0	11.2	7.2	14.5
All other causes	201.1	161.5	138.4	200.0	126.0	101.0	98.8	136.8	68.7	99.3	118.8	75.6	111.7	95.5	58.8	208.7	143.9	218.3	97.6

TABLE B.18. Estimated mortality rates per 100,000 population, adjusted for age, by cause, selected countries of the Americas, end of the 1990s.

Cause of death	ARG	BAR	BRA	CAN	CHI	COL	COR	CUB	DOR	ECU	ELS	JAM	MEX	PAN	PAR	PUR	TRT	USA	VEN
Intestinal infections	2.1	1.3	11.7	0.1	1.9	10.0	4.2	3.4	18.6	17.6	28.7	11.5	9.8	5.1	30.9	0.2	4.1	0.3	19.3
Diseases preventable by immunization	0.1	0.2	0.4	0.0	0.1	0.3	0.2	0.0	1.0	0.7	0.5	0.5	0.2	0.3	2.0	0.0	0.2	0.0	0.5
Septicemia	15.2	9.8	13.2	1.8	5.7	7.8	2.1	1.7	9.4	9.2	24.9	5.7	4.6	3.7	16.4	10.0	4.8	4.4	4.1
AIDS	5.4	34.8	9.9	3.7	2.6	4.0	3.8	0.8	10.9	1.4	8.4	0.0	4.6	16.8	1.1	24.2	16.3	6.3	4.4
Neoplasm of the stomach	7.0	10.5	12.3	4.3	21.4	19.3	28.2	4.8	5.8	27.9	16.1	19.5	7.9	11.7	7.9	5.3	7.3	2.9	12.4
Neoplasm of the colon, rectum, and anus	11.1	13.5	7.6	12.9	7.4	6.5	7.3	10.6	4.7	4.7	3.1	11.1	3.9	7.1	4.1	8.8	10.0	12.2	6.3
Neoplasm of the trachea, bronchus, and lung	20.3	8.4	15.4	36.1	14.0	12.8	9.8	25.1	9.5	8.3	4.7	19.9	10.7	11.1	7.1	11.3	8.9	37.6	14.6
Neoplasm of the breast (female)	11.5	16.2	8.6	11.0	7.1	5.6	7.4	7.7	3.8	4.5	3.1	13.5	5.1	5.9	5.7	7.4	11.2	10.4	6.6
Neoplasm of the uterus and placenta	5.9	11.5	7.0	2.2	7.0	8.8	8.2	7.0	6.5	12.6	13.9	15.8	8.1	7.8	11.8	2.6	9.6	2.6	10.2
Neoplasm of the prostate	6.0	20.8	8.0	6.3	7.9	8.1	8.0	9.4	14.9	7.9	5.3	12.9	6.1	9.6	4.6	7.9	18.4	6.4	8.5
Leukemia and other hematopoietic neoplasms	8.4	15.2	8.5	12.2	9.1	8.5	11.0	9.3	5.2	8.5	5.2	9.1	7.5	10.0	7.4	9.0	8.9	12.9	8.4
Diabetes mellitus	15.5	66.8	32.4	10.4	16.2	23.8	14.3	14.5	28.5	35.9	26.9	83.6	69.0	27.8	23.7	40.7	108.2	13.7	33.8
Nutritional deficiency	4.6	6.0	8.3	1.1	2.5	8.1	2.1	1.9	6.6	15.8	6.7	11.4	19.0	11.4	7.7	3.5	8.2	1.4	8.0
Hypertensive disease	9.0	12.1	23.7	2.2	11.5	26.5	14.6	7.5	30.9	44.9	4.8	45.0	15.3	8.9	12.8	17.1	31.5	8.2	23.9
Ischemic heart disease	44.3	55.8	87.6	77.6	57.9	103.6	86.6	104.9	76.6	30.8	69.9	43.1	71.5	65.0	71.4	66.9	151.2	86.2	103.8
Cerebrovascular disease	48.4	81.0	97.1	24.2	50.7	64.7	40.3	48.1	62.2	45.3	34.0	120.5	41.5	60.7	96.3	25.4	94.9	26.9	54.5
Acute respiratory infections	18.5	15.9	39.7	11.0	49.8	29.1	19.1	26.7	18.8	48.9	59.4	21.7	28.7	18.0	41.9	18.4	28.6	14.6	21.2
Bronchitis, emphysema, and asthma	3.1	6.5	10.9	3.6	6.3	8.3	8.7	5.6	7.9	11.6	12.0	11.0	12.8	7.8	6.5	7.8	11.7	5.7	5.9
Cirrhosis and other liver diseases	8.0	13.0	16.3	5.6	28.1	7.1	16.4	7.6	24.5	22.6	17.3	5.2	37.0	9.8	6.2	18.0	7.3	7.1	12.6
Diseases of the urinary system	11.9	16.5	13.8	5.5	11.6	11.9	11.6	4.6	7.3	22.9	37.1	23.8	17.3	12.4	12.9	15.4	17.1	8.1	10.8
Congenital anomalies	11.5	6.7	13.3	6.2	10.4	12.3	12.1	8.2	11.9	6.7	11.7	3.4	14.5	18.0	13.5	7.1	12.5	6.2	10.9
Traffic accidents	11.5	8.2	24.4	11.2		21.8	19.2		15.5	21.0	36.4	1.4	17.0	20.3	13.0	15.3	11.0	15.8	22.9
Suicide	5.9	6.3	5.0	11.7		3.5	6.2		2.1	5.3	10.8	0.1	3.5	5.3	3.7	7.3	12.4	9.7	5.5
Homicide	4.5	6.8	25.9	1.6		61.6	5.8		5.4	16.2	49.2	0.3	14.2	9.7	12.0	21.7	9.7	7.2	14.6
All other causes	157.8	125.5	213.9	115.3	129.7	159.9	135.0	99.4	127.6	157.0	185.6	112.1	160.2	122.8	121.6	136.5	152.2	124.0	135.2



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## II. MACRODETERMINANTS OF HEALTH IN SUSTAINABLE HUMAN DEVELOPMENT

*...as sisters all, in the world of Columbus, we their delegates meet once again, venturing forth with firm and sure steps, sparked by the spirit that moves us, to uphold health, welfare, and development.*

Dr. Carlos Graf,  
Delegate of the Republic of Chile,  
Seventh Pan American Sanitary Conference, Havana, Cuba, 1924

### SUSTAINABLE HUMAN DEVELOPMENT AND HEALTH

#### Conceptual Framework

The process of increasing people's choices by expanding their essential human functionings and capabilities is a fundamental part of the concept of human development. The three essential capabilities for human development are for people to lead a long and healthy life, to acquire knowledge, and to have access to the resources needed for an acceptable standard of living (1). From a human development perspective, equity ranks as the chief concern, particularly in regard to basic capabilities and opportunities for all people, that is, equal access to education, health services, and political rights. The essence of sustainable human development strategies—and proof of their effectiveness—lies in guaranteeing a sustainable way of life for all. Such strategies are necessary for people-centered development, which promotes full exercise of their rights, as well as participation, gender equality, poverty reduction, and equitable, sustainable long-term growth.

Sustainability is a key aspect of human development, but strategies for achieving it must take into account the needs of both present and future generations without sacrificing one for the other,

which requires both intra- and intergenerational equity. Sustainable development suggests a new concept of economic growth that provides justice and opportunity for everyone equally, without continuing to destroy the world's finite natural resources or jeopardizing the survival of the planet. Sustainable development is a process based on economic, fiscal, trade, energy, agricultural, and industrial policies designed to achieve economically, socially, and ecologically viable improvement. The concept of human development is coessential with efforts to promote the capabilities of men and women through guaranteed access to health, education, food, housing, and information, so that families and societies can provide proper care, incentives, and opportunities to succeeding generations.

Efforts to improve health in sustainable human development must include policies conducive to sustained economic growth with more equitable income distribution. It is also important to link such policies to initiatives that will strengthen the essential capabilities of the poor, in areas such as health services, healthful environments, access to adequate water and sanitation services, proper nutrition, and educational opportunities. It is therefore an essential function of public health management to oversee and take steps to ensure a safe physical and social environment. Any development activity needs proper assessment of its environmental and social impact on the health of the population, especially for the most vulnerable and deprived groups.



### Health, Equity, and Human Development in the Region

A combined human development index (HDI) that includes and measures indicators for life expectancy, literacy among the population over 15 years of age, and gross domestic product (GDP) per capita, can promote a balanced perspective of the different spheres of social and economic life. In addition, it provides valuable evidence about the existing relationships between development and the health situation in the countries of the Region. Results from the use of this index have spurred the expansion and development of new composite indicators, such as the gender-related indices used to adjust the HDI.

Much like the specific case of health disparities, the Region of the Americas shows a strong polarity in terms of these indicators, although on a global level it compares more favorably to countries showing a medium HDI value. According to the *Human Development Report 2000* published by the United Nations Development Programme (UNDP), 8 countries in the Region rank among the 46 countries (17.4%) in the high human development category (with HDI values of 0.935 to 0.801), 23 are among the 92 countries (25.1%) in the medium human development category (HDI between 0.800 and 0.500), and 1 ranks among the 35 countries (2.9%) in the low human development category (HDI below 0.500) (2).

Figure 1 shows that the differences are quite pronounced in the Region as a whole, for both the HDI and the three indicators that make up the composite index (life expectancy, literacy, and GDP per capita). The life expectancy comparison between the highest (79.1 years) and lowest (54.0 years) indicators yields a difference of 25.1 years. The literacy rate also varies widely, from 99.0% in countries with the highest coverage to 47.8% in the lowest. These differences can also be seen in the relative wealth indicator for each country, measured by GDP per capita. The highest value in the Region (US\$ 29,600 per capita) is 21.4 times higher than that of the poorest country.

The different components of the index are not always internally consistent, thereby resulting in the mathematical phenomenon whereby one “drags” the others up or down. These differences can lead us to the problem of income distribution even when there is no discernible automatic correlation (except in extreme cases) between these discrepancies, the Gini coefficient (the most commonly used indicator for measuring income distribution), and the discrepancies observed.

When the HDI ranking of the countries of the Region is compared with their ranking according to infant mortality rate (using the infant mortality figure most recently estimated in the basic data of the Pan American Health Organization), it will be noted that some countries move up or down in relative position. Jamaica, for example, ranks 18 points higher according to infant mortality rate than on the HDI. This means that some countries have better or poorer health conditions than their HDI values alone indicate, compared to all countries of the Region (see Figure 2).

When the human development index is adjusted for gender-related measurements, the information is fairly consistent. Although there are no extreme disparities as in other regions of the world, it will be noted that, when comparing the HDI values with the ones differentiated by gender for 23 countries of the Americas with information, 7 retain the same ranking, 10 are ranked relatively lower (5 falling one position and 5 dropping more than one), and 6 improve their relative ranking (3 by one position and 3 by more than one).

A gender-based analysis of each indicator (according to data from the *Human Development Report 2000*) shows that for life expectancy there are extreme differences in absolute values, ranging from 81.9 years in Canada to 56.4 years in Haiti. Although life expectancy for women is greater in all countries, the difference is as high as seven years in the countries with a high HDI value, drops to an average of five years for those in the medium development category, and falls to less than four years in countries with a low HDI. Literacy among women over 15 years of age shows a similar pattern: once again, Canada and the United States have the highest values (99.0%) and Haiti ranks lowest (45.6%). An examination of literacy differences by gender shows 10 countries with a difference of 0 to less than 1 point, 3 countries in which the literacy rate is several points higher for women than for men (up to 9 points in one instance), 2 in which the men's rate is nearly 2 points higher, and 8 countries in which the rate is sharply lower, with extreme differences of up to 13 points. The lowest values can be found in the relatively less developed countries, indicating strong correlation between gender-based inequities and economic inequities. The differences in GDP per capita show similar behavior, although establishing this indicator is considerably more complex due to the lack of primary data on gender. The data must therefore be built on estimates, which makes it difficult to establish a baseline.

The HDI data, particularly for the largest countries, should be broken down by territory, population, and sociocultural characteristics, as the differences may be quite significant and could change the impression given by the national averages. The prevailing economic and social disparities in the Region—and the health disparities in particular—should be the major focus of intersectoral concern, and our societies must make concerted efforts to address such concerns through policies that have a national and regional impact. For technical and political reasons, however, it has not been easy to establish, on a macro level, clear causal relationships behind these disparities, particularly with regard to proper weighting of the degree and nature of the interactions between health and economic, political, and social development. This gap causes very specific repercussions for the development of policies aimed at reducing the profound health disparities in the Region.

There has been greater consensus about these interactions in recent years, one of the main consequences being an increase

in the number of studies aimed at measuring and defining the concept of equity in health (3). In the context of the globalization process, the coexistence of economic growth and greater inequity is a characteristic of recent development in the majority of countries in the Region, where health disparities that are unjust, preventable, or the result of lack of options for the affected parties are classified as inequities in health (4).

In large part, the study of inequities has revealed the marked differences hidden behind many average-indicators. Gender- and ethnicity-based perspectives have produced growing evidence to add to the studies on health and social capital, poverty, social class, and income differentials (5). Other perspectives, such as the study of social conditions in migrant populations, asymmetric urbanization phenomena (6), and income distribution by age group—significant in the context of an aging population (7)—provide new evidence for use in formulating equity-oriented policies. In many cases it can be shown that the benefits of technological development, economic growth, and globalization itself tend to be concentrated in certain societal groups, thus increasing the disparities and, in extreme forms, jeopardizing democratic governance.

The region of Latin America and the Caribbean shows the greatest disparities in income as well as in the other socioeconomic factors that determine health, and these disparities have been on the increase since 1980 (8). Even though general health in the countries of the Region has improved, the health situation of various socioeconomic groups has not seen similar gains. General health improvement appears to be slanted disproportionately toward those in the society who already enjoy greater social and economic advantage, while the health of disadvantaged groups is improving less systematically and at much more moderate rates (9).

### Health As a Determinant of Economic Growth

“The positive correlation between health and income per capita is one of the best-known relationships in international development” (10). Countries with higher income levels achieve greater control over many of the goods and services that contribute to the health of the population, including nutrition and access to drinking water and sanitation, high-quality health services, and appropriate information and education. The level of a population’s health, particularly in the long term, tends to be associated with the degree of economic growth and general availability of resources. This link can be seen very clearly when a health indicator such as infant mortality rate is correlated with income per capita, as shown in Figure 3 for the case of the Latin American and Caribbean countries. The characteristic correlation curve of income and health obtained by charting infant mortality rates according to GDP per capita shows that higher income levels correlate with lower infant mortality rates and, assumedly,

a higher level of health. It also shows a concave adjustment curve, indicating that the health gain per unit of increased income is proportionately greater in the countries and, by extension, lesser in the poorest societal groups. Figure 3, on the other hand, shows two curves depicting the average infant mortality rate by income in 1995 and 1999. The average infant mortality rate for a given level of income stated in constant values fell approximately 10% during the period in question, particularly at the extremes of low income. This means that on average, the countries of the Region achieved a considerable reduction of their infant mortality rates that probably cannot be attributed to changes in income, but rather to other determinants still to be examined. This indicates that, even without real economic growth, the health situation can improve measurably; this tendency seems to be distributed equally for all income levels.

Political contexts are also key determining factors of health. With few exceptions, the countries that have developed institutions of democratic governance and strong civil societies have established long-range social policies inclined toward broader distribution of income and social benefits. Countries that implemented social policies giving their populations better access to education, basic health services, nutrition, and basic sanitation have achieved low mortality rates in comparison with countries at equal or greater levels of economic development where large disparities of income and resources still remain (11).

There is abundant and growing evidence that investing in health not only increases productivity and creates human capital, thereby boosting the rate of economic growth, but it can also provide security when dealing with a crisis of consumption or income, especially for those with few resources. It can also prevent a deeper descent into poverty. Although other determining factors of health are perhaps more pertinent in terms of health production, proper access to health care—and particularly health care financing—is a basic human right as well as good social and economic policy, to the extent that it protects low- and even middle-income groups from catastrophic health care expenses and potential impoverishment (12). The following mechanisms have been identified as those that most directly tie the positive effects of investment in health into the process of economic growth:

#### **Improving conditions for women, maternal health, and child development in early infancy, and increased potential for their future productivity.**

One of the most important means of attaining these improvements is through the active role of women in human development. Investing in maternal health not only improves nutrition for infants but also enhances later educational achievement for children, thereby affecting future choices of occupation and productivity. There is also a growing body of evidence that chronic illnesses in the later years are largely the result of exposure to infectious diseases and other types of biomedical and socioeconomic stresses during childhood (13-16).

**Human capital formation, health, nutrition, and wages.**

Good health and proper nutrition improve worker productivity (17). Health has a direct influence on income, domestic wealth, labor productivity, participation in the labor force, savings and investment rates, demographic considerations, and other factors of human capital.

**Impact of specific diseases on economic outcomes.** There are many examples of the linkage between the control or reduction of specific diseases and its impact on labor productivity, increased income, or both. Of particular significance in that regard are HIV/AIDS and malaria (18).

**Impact of morbidity on wages.** In a joint effort to determine the relationship between morbidity and wages, the Inter-American Development Bank (IDB) and the Pan American Health Organization (PAHO) coordinated recent studies of Latin American household surveys (19). The findings indicated that the potential effects of health improvement on individual wages are significant, but they are especially profound among those with less human capital and, consequently, lower income.

**Demographic impact.** Health and demographic variables play an extremely important role in determining economic growth rates (20). It is estimated that a 1% increase in life expectancy results in an annual acceleration of per capita GDP of more than 3% during the following quarter-century, and the reduction of fertility rates by two children per woman appears to account for a 1% annual growth acceleration. In the case of Latin America, 33% of the differences seen in the fertility rates were associated with differences in health, as compared to 58% associated with differences in female secondary-school enrollment and 21% in female primary-school enrollment (21).

This causal determination whereby health leads to economic growth has been confirmed through PAHO-sponsored macroeconomic studies in the Region (22). The impact of health investment on economic growth and distribution, and the potential synergies with education and other components of human capital, were measured in Brazil and Mexico. The studies demonstrated that health is correlated with future growth, i.e., it produces economic growth in the long term. An examination of the impact of mortality according to age group and gender reveals that this causality is related to maternity and the most economically active groups. The 15- to 20-year lags between health and growth could be the result of sustained improvements in health and the intergenerational nature of human capital formation in education and health. The combination of conclusions on the performance of Latin America appear to confirm the findings in those countries, which may be sufficient indication that investment in health over long periods produces economic growth in the observed cases by 0.8% to 1.5% annually.

**THE DIMENSIONS OF GLOBALIZATION AND ITS IMPACT ON HEALTH**

In order to analyze the health profile at the beginning of the new millennium, it is necessary to take into account the complex set of largely contradictory phenomena known today as globalization. The concept of globalization refers to the gradual internationalization of economic activity. It implies, among other things, coordination of rules of the marketplace, reduction of trade barriers, formation of an international capital market through gradual elimination of the controls on foreign exchange and capital, direct investment and an increase in the number of businesses operating in many countries, increasingly rapid dissemination of technology and knowledge, and availability of efficient, low-cost communications (23).

Globalization is also associated with the gradual appearance of facilitating organizations and networks that make it possible to increase contacts, share experiences, and strengthen the learning process, while also expanding the ability of governments to benefit from the experience of other countries for developing and implementing their own policies. Some have described this process as border elimination and world unification, driven by multinational corporations that are creating global production and financing their activities in a global capital market (24).

Several impacts of globalization can be cited, among them the delinking of the economy from the traditional factors of production such as financial capital, natural resources, and labor, to a base of knowledge and technological change. The structure of business, the basic economic unit, has changed. The traditional methods of organization and management based on a centrally controlled administrative structure are now being replaced with more flexible, decentralized models. New linkages between knowledge, technology, information, advertising, communications, marketing, and finance have appeared, along with growing specialization and fragmentation of the labor force into many specialized groups. In addition, globalization and the technological revolution create a combined set of factors that reduce job opportunities in many countries, especially for manual laborers. This situation further exacerbates social inequality and, consequently, widens health disparities between countries and between distinct societal groups within each country.

Globalization also presents risks and opportunities for health that transcend national borders. Trade liberalization and the technological revolution have spread technological advances in health, such as effective contraceptive methods, ways to obtain safe drinking water, low-cost refrigeration, and new therapeutic agents for effective treatment of leprosy, schistosomiasis, trachoma, onchocerciasis, and other diseases (25). Modern information and communication technologies offer many potential benefits, to the extent that they become accessible for the countries of the Americas. Their application could extend to the areas

of telemedicine, interactive health networks, communication services among health workers, human resource development, continuing education, and distance learning (26).

### **Globalization, Communication, Science, and Health**

The process of globalization is accelerated through the development of new technologies for communication, transportation, and management that produce major reductions in the time and costs of communication, data transfer, and relocation. "Globalization, facilitated by a scientific revolution in biological and information technology, is creating a global 'connectivity,' a striking compression of time and distance throughout the world" (27). This idea of a smaller, accessible and interconnected world has prompted the identification of what are now referred to as "common goods" or "global public goods." The globalization phenomenon has been cited by several authors as a factor that profoundly affects all fundamental aspects of human life, including health (28).

The explosive surge of the Internet in the late 1990s and the accompanying drop in the cost of communication created accessibility and multiplied connections to an extent unimaginable only a few years earlier. The impact of the Internet extends to services, social and interpersonal relations, and scientific and technological development. There is sizable geographic and social distribution including activities related to individual and public health. Of an estimated 513 million users in 2001, 35.2% lived in the United States, 30.1% in Europe, 28% in Asia, and about 5% in Latin America (see Table 1).

An average of 4.7% of the population in Latin America has Internet access, but averages by country range from over 10% in Argentina, Chile, and Uruguay to less than 0.3% in the Dominican Republic, Guyana, and Haiti (Table 2). In the United States and Canada, on the other hand, 57.9% of the population uses the Internet. Although connectivity in the Region is low compared to other countries with more advanced information technology, the Region's 50% annual rate of increase is the highest in the world, even higher than rates in the United States, Europe, and Asia. It is estimated that in 2003 the number of online users in Latin America will reach 40 million, or 7% of the total population (29).

Most computer networks in Latin America and the Caribbean were set up during the past eight years. Brazil and Mexico (1989) were the first countries to connect to full interactive Internet services. Since early 2000, several Latin American and Caribbean countries have had over 1,000 servers connected to the Internet (Table 3). As mentioned above, the Internet connection growth rate in Latin America is the highest in the world. To cite a few examples, the number of servers in Argentina, Brazil, Colombia, Costa Rica, and Trinidad and Tobago doubled in 1999 and rose 90% in Guatemala and Peru during the same period, while Mexico experienced a 259% increase.

This high rate of growth in regional connectivity has important repercussions for the future dissemination of scientific and technological information on health in the countries of the Region. Despite the fact that access to new technologies is limited to a relatively small segment of the population, thereby increasing the existing inequities, it is clear that the secular trend will be towards greater availability of these means of communication. In all likelihood the same trends observed in the United States and Canada—where estimates indicate that 54% of Internet users are accessing health-related information or services—will occur in Latin America and the Caribbean (30). Most physicians in the United States connect to the Internet on a daily basis, and over 55% use electronic mail to communicate with colleagues and co-workers (31). If we project these trends to the rest of the American continent, by the middle of the first decade of the twenty-first century over 150 million people (125 million in the United States and Canada and 25 million in Latin America and the Caribbean) will be using cybermedia regularly to obtain services and information essential to health improvement. This will have a decisive impact on health conditions and health disparities in the Region.

In the specific case of investment in science and technology, a comparison between selected countries of the Region reveals significant differences in the absolute value of aggregate resources and the priority level given to investment in this factor, which can act as a very significant component for growth and adjustment of each country's development model (see Table 4). The predictive nature of investment in science and technology allows for certain speculations about the value assigned to long-term considerations in a sustainable development framework.

### **Globalization, Governance, and Health**

The stability of the Region's democratic regimes is without question one of the major achievements of the past two decades. Significant doubts remain, however, about the development of civic involvement, improvement of institutional credibility, and the battle against corruption. Globalization puts a strain on the foundations of governance. Supranational and multinational powers intervene in national affairs and push for the creation of universal laws, creating pressure that erodes sovereignty and undermines the nature and identity of the State. The knowledge, attitudes, and skills required by political leaders and civil servants have to be redefined in such a context. In other words, globalization imposes the need to reinvent leadership and civil society and to undertake State reform (32).

Globalization and the accompanying technological revolution also pose many challenges to the democratic process in Latin America. Although the number of political players has increased, equal representation among the various sectors in Latin America and the Caribbean is still not a reality. Another secondary effect

is the potential for a significant rise in the income of a small minority, while the great majority of the population fights to maintain a stable income and many others see a considerable decline, thus creating great insecurity. There are also risks for an increase in structural poverty, growing marginalization of large population segments, and fragmentation of the labor force (33).

Social exclusion is unquestionably the greatest risk of globalization. After losing a job, many people also lose their political and social involvement in the community. Declining civic involvement in community activities and loss of confidence among community members create a serious impact on social capital. Unlike physical or human capital, social capital is a public good created as a by-product of social relations; it refers to “the characteristics of social structures such as trust, standards, and networks, that can improve a society’s efficiency by promoting coordinated action” (34). There is evidence that depletion of social capital is closely tied to poverty and health. Dislocation and lack of participation in group activities is a key factor in predicting certain diseases. Empirical data demonstrate a strong relationship between loss of trust on the part of groups or communities and higher overall mortality rates due to an increase in heart disease, malignancies, cerebrovascular disease, and infant mortality (35). The data also show a large gap between rich and poor that is inversely proportional to the level of investment in social capital. In other words, declining investment in social capital is one way that growing inequities in income level affect the mortality rate (36).

In short, a country’s level of governance depends on the quality of its institutions, its social capital, and political culture, as well as on capable representation of organizations and movements involved in policy development and implementation. For this reason, efforts to strengthen governance and forge a democratic process should first be aimed at bringing about reform that institutionalizes public action. The quality of public intervention depends not only on the ability of institutions to develop and implement policy, but also on the incentives and limitations of their operating environment. Improving the quality of institutional staff and structures is important, but this alone is not sufficient. The purpose of State reform should not be to make public institutions “effective and efficient, but rather to make them function in a way that induces market efficiency and social justice” (37).

The health sector is called upon to perform a set of essential functions to promote and protect the health of the population, given the fact that citizens, as participants in society, have an inalienable right to such guarantees and services. For the State to perform these functions effectively within the spheres of central and local government, an appropriate, modern legal and regulatory framework must be developed and supported. Such a framework enables the public and private sectors to work effectively together and with civil society to protect public health, especially in the most vulnerable and unprotected segments of society.

Transparent, responsible management in the health sector is linked to several factors, including democratization of government

in general, but it also extends to civil society and the private sector. National institutions of government, in turn, have a responsibility to exercise leadership in the reform process and to develop health policies. New individual and institutional capabilities are needed, including proper management of multicultural environments, the ability to create and manage information and consultation networks, the development of strategic vision and management skills, and the ability to come to agreement with other players within or outside the sector, to set up interdisciplinary teams, to manage conflict, and, more important still, to maintain the necessary credibility to supervise experimentation and training processes (38).

In many countries of the Region, the ministers of health still lack the resources and suitable institutions required for such leadership. One symptom of the increasing difficulty that governments face in managing the health sector is the gradual decrease in the average time served over the past 10 years by ministers of health in Latin America and the Caribbean. Over a 15-year period (1983–1997), the average stay in office for health ministers in nine countries was scarcely one year; in another 11 countries the average was two years, or less than half a presidential term; in only 10 countries did health ministers remain in office for more than three years (Table 5).

### **Globalization, Public Goods, Trade, and Health**

As discussed above, globalization creates complex health repercussions with a variety of manifestations. Benefit or harm can result in varying degrees depending on the prevailing economic determinants, ecological and social factors, and new technological advances. It is partly for this reason that there is concern with identifying a set of common resources that take on the nature of public goods. The socioeconomic development of many towns and communities relies on the management of these resources. A number of countries, jurisdictions, and international agencies (39) have taken notice of this phenomenon and its health considerations. The globalization of commerce and transportation also poses risks and opportunities for public health. One of the main risks is the spread of infectious disease between countries, which is certainly not a new phenomenon. The new element added in the last decade of the twentieth century has been the volume and speed of travel, which magnifies the risk and promotes the “globalization” of infectious agents.

In a recent study on global public goods, the UNDP identified a wide-ranging set of factors associated with globalization and tested possible related repercussions for the health sector (28). These factors are outlined below.

- At the macroeconomic level, structural adjustment policies and chronic unemployment lead to deprivation, social exclusion, and persistent poverty. The situation is aggravated by the lack of adequate social protection systems, resulting in an increase in the rates of preventable morbidity and mortality.

- Increased commerce in the form of traffic in tobacco, alcohol, and psychoactive drugs, and the flooding of the market with unsafe or ineffective drugs present health hazards. As an example, tobacco consumption has risen substantially throughout the world, owing to tobacco conglomerates' aggressive advertising aimed principally at women, adolescents, and developing countries. If the trend continues, by the year 2020 over 8 million people will die of diseases related to tobacco consumption, compared with only 3 million at the start of the 1990s (40). Similarly, there is risk of the spread of food-borne diseases and poisoning from contaminated food across borders.
- Trade liberalization has made it easier for multinational companies to produce, process, and distribute food. Although this tends to reduce the price of consumer products, it also increases health hazards. The growth of global commerce in food places continuing pressure on production, while food aid continues to decline. Expanding demand for food in rapidly growing economies is accompanied by structural deficiencies and lower availability of food aid in the poorest countries, thus creating a negative effect on food security. Food shortages in impoverished areas increase migration and lead to social and civil conflict.
- The increasing mobility of individuals through both forced and voluntary migration, including tourism, is demonstrated by the fact that over 1 million people per day cross borders throughout the world. Such movement increases the risk of transmission and broad dissemination of infectious diseases and risky behaviors. An increase in the number of refugees and rapid population growth in some countries are contributing factors in ethnic and civil conflict and environmental deterioration.
- Environmental degradation and persistent patterns of unsustainable consumption result in depleted resources, especially affecting access to drinking water and air and water pollution, all of which have an impact on health. The depletion of the ozone layer, increased ultraviolet radiation, accumulated greenhouse gases, and the resultant global warming will have a number of effects, including: introduction of toxins into the human food chain; increased respiratory disorders; an increase in diseases related to immunosuppression, skin cancer, and cataracts; major changes in the pattern of infectious diseases and vector distribution; heat waves; and climatic changes that will adversely affect food production.
- Strict implementation of trade agreements regarding international patent and intellectual property will have the effect of preventing low-income sectors and nations from accessing new technologies on the global market.

Trade liberalization and deregulation of the health sector have had an adverse effect on drug prices in some Latin American

countries. Lack of controls on international transactions involving these products, the low price elasticity of many such products, and their low cost when trade barriers were eliminated largely explain the systematic increase in their relative price in recent years. These factors produce an appreciable impact "on public access to these goods and on the revenue/expense balance of the medical and social security entities responsible for funding and providing health services" (41).

International trade and communicable disease have long exhibited a reciprocal effect, which has given rise to a complex set of preventive measures. Health agreements for ports and borders were implemented in the late nineteenth century, and the Pan American Sanitary Bureau was created in the early twentieth century. In the early 1990s, strong tensions arose between health and trade when a cholera epidemic struck the Region (42). Other considerations, such as the delivery of health services, have apparently been more local or national; there has been sporadic activity in the purchase of medical services abroad, but the impact on the consumer nations has been insignificant. Today, however, certain factors influence the way we access biotechnology, information technology, drugs, health services, health insurance plans, and job opportunities. These phenomena, evidenced by the flow of patients to the industrialized countries in recent decades, have increased as the technology gap widens. The communications media including the Internet are shaping a sustained expansion of direct and indirect marketing of such practices. Various countries of the Region appear to be adding to the trend (43).

According to the United States Commerce Department, the country's exports of surgical and dental instruments and supplies nearly doubled between 1991 and 1997, and exports to Latin America accounted for 20% (nearly US\$ 2.7 billion) of the total. Innovations such as telemedicine present both problems and opportunities for developing countries (44). With the establishment of cross-border markets for equipment and materials, trade growth in border areas, and increasing migration of health professionals, it is important to establish innovative scenarios for examining financing and new ways to assess the consequences for health.

The new guidelines currently being established for relations among States in the Region of the Americas acknowledge the impact of globalization and international trade. These changes first became evident in the past decade with the redrafting of traditional integration models such as the old Andean Pact and the Central American Integration System (SICA), the creation of new trade areas such as the Southern Common Market (MERCOSUR) and the North American Free Trade Agreement (NAFTA), and negotiations to expand the regional integration system by constructing a Free Trade Area of the Americas (FTAA), which are ex-

<sup>1</sup>The World Trade Organization (WTO) agreements that impact on health are: the General Agreement on Tariffs and Trade (GATT); the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIP); the Agreement on the Application of Sanitary and Phytosanitary Measures (SPSM); and the Agreement on Technical Barriers to Trade (TBT).

pected to be concluded in 2004. The Association of Caribbean States (ACS) also affirms the importance of globalization by naming economic integration, including trade liberalization, as an objective of its creation. The establishment of the World Trade Organization (WTO) is the final step in constructing a platform for increasingly free, sustained trade, and the agreements emerging therefrom create a reciprocal obligation among States to adjust their regulatory and trade policies.<sup>1</sup> The connection between integration and health lies in recognizing that health is an important sector of the economy, and that policies and regulations are needed that promote trade while also ensuring the quality of health goods and products and broadening the basis for coverage and access. Equal access as an individual asset goes hand in hand with the development-related principle of each country's ability to compete on an equal footing in international markets. On any given scale, the health sector becomes an essential player in developing general policies and creating supranational strategies for oversight, accreditation, certification, and approval of quality standards while ensuring greater competitiveness.

Under this scenario, work must be done with the integration authorities to develop a plan to coordinate the various supranational entities—variously composed of councils, economic and social commissions, programs, sector agreements, secretariats, and parliaments—so that decisions and policies will coincide. The plan must also clearly identify and put into practice the new functions of the international technical-cooperation agencies. At the center of the debate is the need to recognize that the health sector must exert greater influence on the negotiation processes that, until very recently, were dominated by the ministries of industry, trade, and foreign affairs. In order for this to happen, certain conditions must be met, one of the most important of these being recognition that health is a benefit rather than a barrier to the process.

Political leaders in general, and the ministers of health in particular, must be committed to ensuring that technical experts continue to be involved in the negotiating process and receive ongoing training in order to carry out their new technical and negotiating responsibilities. It is essential to have clear quality standards for trade, based on uniform criteria determined with input from all sectors. A coordinated program is key for preventing duplication among the different groups, which would be counterproductive for the approval of policies and regulations. It is important to accept the existence of a supranational agency as a new subregional collective. And lastly, mechanisms for interagency coordination must be designed so that decisions can be made on joint undertakings for each subject area and cooperating agency (45).

A common approach beginning in the initial phases of the negotiating process will ensure that health issues receive proper treatment in a context of vigorous trade. These issues cannot be sufficiently examined from the perspective of the sector-oriented international organizations. A multidisciplinary, multisectoral approach to health problems is needed. In the new scenario created

by globalization and integration, the health sector will have to reconcile its ultimate objective—protecting the health of the population—with the demands of production and commerce in health goods and services on a national and international scale, while attempting to optimize the benefits throughout the process (46).

## POVERTY, INCOME, AND HEALTH

### Conceptual Considerations

Few topics have received as much attention as the relationship between poverty and health. The start of the twenty-first century is an opportune moment for reassessing that relationship in light of recent considerations such as studies conducted on the heterogeneity of poverty, structural poverty, poverty according to income, and the reciprocal relationships that confirm the effect of poverty on health and vice-versa. Poverty is fundamentally deprivation or reduced capability (47). Deprivations such as poor health, undernutrition, or illiteracy hold intrinsic importance, while others such as low income play a decisive role. The health status of an individual or an entire population is at once an essential feature and a decisive factor in human development. Poor health in itself is a cause of poverty. The less fortunate members of society are systematically deprived from an intrinsic component needed for optimum capability, while at the same time suffering higher rates of morbidity and mortality. Developing countries that have invested in giving their citizens universal access to basic health services, food security, nutrition, drinking water, sanitation services, and sufficient educational opportunities might have comparatively lower-income populations yet enjoy more capability and better health status than wealthier countries with more unequal distribution of opportunities and capabilities.

When examining the many forms of poverty, it is important to look at the chronic structural processes that affect families and place future generations at risk through the intergenerational transmission of poverty. Multiple deficiencies during growth and development have a lasting impact on maturation and learning and on the development of capabilities needed to become a full, productive member of society. The situation becomes especially dramatic when considering the combined impact of reduced individual potential and the sharp trend in the labor market toward jobs that are increasingly skilled or more demanding in terms of training, specialization, and expertise. In order to achieve sustainable human development, it is vital to overcome the mechanisms of poverty transmission so that the potential of future generations is not lost. Joint strategies for interventions in health, education, nutrition, and other basic needs must be implemented, with combined input from all sectors.

Structural poverty usually emerges as insufficient social resources for families. Census data can be used to identify factors such as substandard housing or homelessness, overcrowding, lack of sanitation services, illiteracy due to structural reasons or

from disuse, and large families. This information yields detailed maps of structural poverty, although the information is too static to keep track of changing conditions. Functional or income poverty is a more dynamic yardstick for a fast-changing situation that can produce differences upward or downward with respect to structural poverty measurements. As an example, some very needy families might have new or occasional income, while others with relatively good social resources might endure periods of low income. One classic and widely used approach is to classify at poverty level anyone whose average income falls below 2 dollars per day (48). More accurate ways of defining poverty that adjust for the purchasing power of each currency are used in income threshold studies conducted in each country based on the value of a basic food basket. Families that spend over 50% of their income on the basic food basket are classified at poverty level, while those using all of their income are classified as indigent inasmuch as their ability to sustain themselves is in jeopardy.

### Extent of Poverty

A large percentage of families in Latin America and the Caribbean—an estimated 150 million people—are affected by poverty. Applying the income threshold of less than 2 dollars per day, the poverty figures in absolute numbers have continued to rise since 1985. Using more refined indicators, it would not be an exaggeration to say that in one form or another, half the population of the Americas is affected by poverty (49). Of particular note have been trends closely associated with economic crisis, such as the emergence of the new poor in countries that have seen sudden impoverishment of their middle class. This phenomenon is often accompanied by fragmentation or breakdown of family and community structures and a risk of adverse impact on the long-term accumulation of human and social capital. Changes in child care conditions and infant survival resulting from the impoverishment of the nuclear family, and changes observed in groups subjected to chronic poverty conditions, are detrimental to early childhood development and affect other determining factors more directly related to child health and development. These changes effectively feed and sustain the vicious cycle that leads to persistent poverty and its repercussions.

Analysis of the characteristics associated with poverty indicates that out of every 10 poor urban households, 7 are in poverty because of low wage income, 2 as a result of unemployment, and 1 because of family size, i.e., number of children (50). The relative importance of these characteristics did not vary, as shown in Table 6.

For rural poverty, however, the pattern is different for the countries on which data are available, in every case registering a 5 to 20 point increase with respect to urban poverty (Table 7). Nearly half

the households in poverty can be classified as indigent. Income is a useful socioeconomic category, as it tends to be linked to several other determinants, for either sociocultural or economic reasons, depending on the given population and social context examined. A few country studies at the regional and local level have addressed disparities in health outcomes and access to care among populations with different incomes. Several studies in recent years have confirmed the significance of the income distribution factor,<sup>2</sup> because of the absolute impact of income as well as its relative weight in each society. The breakdown of different social indicators by income level reveals sharp inequalities hidden beneath the indicators when considered on a global or national level.

### Poverty, Education, and Health

Access to education and health is the basic instrument for accumulating human capital. A deficiency in both of these components of human development is the principal immediate determinant of transgenerational transmission of poverty. More people have had access to formal education since 1985, but the increase is lower than in other regions of the world. In 1995, only two-thirds of the school-age population of Latin America and the Caribbean completed the fourth grade. Southeast Asia, which had similar formal education levels in 1985, has now surpassed our Region in percentage of population enrolled in primary and secondary school (51). In some countries, up to 10% of children from households in the poorest quartile do not enter primary school at the appropriate time, compared to only 1% of children from wealthier families; and 20%—and in Brazil as many as 44%—of the poorest children fall behind in the first two years, compared to 3% of children from wealthier families (Table 8). Between one-third and two-thirds of the poorest children in some countries do not complete primary school. That fact directly impacts on poverty transmission and on the health and development conditions of the population as a whole. This result can be an obstacle to health improvement, given the proven correlation between family health and level of formal education for men and women. In response to the low level of formal education and its effect on opportunity and well-being, the *Social Development Report*, published recently by the IDB, emphasized the importance of increasing poor children's access to formal education, regarded as the principal intervention for reducing poverty and inequality in the Region (52).

A number of specific studies have focused on this subject. A 1996 national study in Brazil revealed that the rates of low weight-for-age in children under 5 years old show a strong correlation with the family's level of formal education. The rates vary from 19.3% when the head of the family has no formal education, to only 3.4% when the head of the family has 11 or more years of education, or nearly a six-fold increase. The same pattern applies for the intermediate levels of formal education, with a 13.7% incidence of low weight-for-age when there have been 1 to 3 years

<sup>2</sup>This variable, usually measured by income quintile or decile, assesses the degree of equity in income distribution and can be calculated via indicators such as the Gini coefficient, the Lorenz curve, or the 20/20 ratio, which compares countries or regions with one another or internally over time.



of formal instruction, 8.0% for 4 to 7 years, and 6.3% for 8 to 10 years. The results show that any continuation of formal education can have a salutary effect on health. Analysis of the mother's formal education level yields similar patterns, for both low weight-for-age (ranging from 19.9% for 0 to 3 years of formal education to 3.3% for 11 or more years) and low weight-for-height (from 24% for mothers with 0 to 3 years of schooling to 7% for those with 6 or more years) (53).

Studies conducted in Chile found a relationship between the formal education level of mothers and the health of their children. The neonatal mortality rates disaggregated by mothers' formal education level for 1990–1995 vary from 13.5 per 1,000 live births for mothers with no formal education, to 6 per 1,000 for those who completed 13 or more years of schooling. The post-neonatal mortality rates fell from 24.5 per 1,000 live births to 2.6 for those same categories. The rate was 10 times higher for an illiterate mother than for a mother with 13 or more years of schooling. One of the most notable examples of the need to disaggregate national health statistics by socioeconomic group to show this beneficial relationship can be illustrated by the increase in life expectancy for Chilean women from the mid-1980s to the mid-1990s. Life expectancy for Chilean women at 20 years of age increased by nearly two years during that period. Women who had 13 or more years of formal education enjoyed nearly all of the benefit, however, gaining almost 10 years in one decade while the gain for groups with lower education levels was insignificant (54).

### Poverty, Income, and Household Drinking-Water Coverage

The example below shows how the national averages for an indicator that impacts greatly on population health—drinking-water connection coverage—correlate with income level in the selected countries. Coverage tends to be greater at higher levels of GDP per capita, which largely explains the differences between the countries (see Table 9 and Figure 4) (55) according to GDP per capita in 11 selected countries of Latin America and the Caribbean.

Table 10 shows the results of comparative studies for these same countries and indicates internal differences by decile and by urban and rural population. The coverage also differs according to income level within each country. In Bolivia, for example, coverage for the urban population in the lowest income decile is 82.1%, while the top decile has 98.1% coverage and the decile gradation shows a high correlation. The lower-income countries such as Ecuador, El Salvador, Nicaragua, Paraguay, and Peru, and those with greater inequities such as Brazil and Panama, all follow the same pattern. In countries such as Chile, Colombia, and Jamaica, the urban population shows very few differences by decile, while the differences for the rural population are much greater. Since urban coverage in the lowest income decile starts at above 90%, the differences are more evident in the rural context.

The correlation between availability of drinking water and income level is much stronger in the urban population, where overall coverage is also greater than in the rural population. In some countries, the rural population exhibits differences according to ease of access. These differences are very important in determining child health. As an example, the probability of occurrence of diarrheal episodes in children under five—a major cause of late-infancy mortality and undernutrition—is inversely proportional to the availability of drinking water in the home. This is one of the greatest protection factors, exceeded only by the mother's education level, which could well be a colinear variable with drinking-water availability (56).

### Poverty, Income, Nutrition, and Access to Reproductive and Child Health Services

A very strong correlation exists between undernutrition and income level. As shown in Table 11, the rate of undernutrition among children in the highest income quintile for the selected countries is 3.5 to 10 times lower than for the lowest quintile. In addition, the level of undernutrition for all selected countries correlates with income level all along the scale, in a proportion resembling a rate-response relationship.

The same correlations and disparities by income level have been observed in regard to access to basic medical care for children, such as treatment and prevention of acute respiratory infections. The poorest children are only one-third to one-half as likely to receive timely, effective treatment for such illnesses, according to information obtained in the selected countries shown in Table 12.

Not even a service as basic and widespread as immunization escapes this pattern in the Region, as Table 13 demonstrates. It should be noted, however, that in some countries the highest income quintile, which usually receives care in the private subsector, exhibits lower coverage than the fourth and sometimes the third quintile. Such facts should be taken into account in strategies for eliminating vaccine-preventable diseases in the Region. The ratio of vaccination coverage from the lowest-income to the highest-income groups in the selected countries ranges from 0.38 in Paraguay to .97 in Guatemala.

It is not surprising, then, that the infant mortality rate also exhibits differences by income quintile for the selected countries of the Region. As shown in Table 14, the ratio of infant mortality in the poorest countries ranges from 1.3 in Haiti to more than 4 in Bolivia and Peru.

Nine countries of the Americas show a very similar relationship between income level and the percentage of pregnant women receiving prenatal and delivery care from professional or institutionally trained personnel (Table 15). Among the selected countries, the Dominican Republic has fairly equitable and nearly universal coverage of all economic groups. Other countries, however, register truly alarming differences, with less than 20% of low-income women receiving professional delivery

care, and one-third to one-half of poor women receiving no prenatal care during pregnancy. This situation undoubtedly has very serious consequences for development during the prenatal period and early infancy of the poorest children, as well as repercussions that impact on subsequent psychosocial, cognitive, and physical development.

The use of modern contraceptive methods, another important aspect of reproductive health, also shows a distribution in which the differences are correlated with income quintile. This factor, added to those discussed above, increases the risk of maternal and neonatal mortality in low-income groups (Table 16).

### Poverty, Income, and Physical and Financial Access to Health Services

A series of case studies coordinated by PAHO examined inequalities in the health systems of Brazil, Ecuador, Guatemala, Jamaica, Mexico, and Peru, which covered more than two-thirds of the population, GDP, and overall national expenditure on health for the 45 countries and territories of Latin America and the Caribbean. The studies explored the adequacy of different methods of organization, service delivery, and financing of the national health care systems and examined their inequalities and differing responses to the needs of the poor (57).

The differences in per capita income in these countries, as expressed in United States dollars adjusted for parity of purchasing power (PPP), range from nearly US\$ 4,000 in Guatemala to about US\$ 6,300 in Brazil and US\$ 7,600 in Mexico. Brazil and Guatemala have the highest inequality of income. The Gini coefficient for these two countries is about 0.60, while the ratio of income distribution between the highest and lowest quintiles is 47 in Brazil and 32 in Guatemala. Jamaica has the lowest level of income inequality, with a Gini coefficient of 0.41 and a ratio of income distribution from the highest to the lowest quintile measuring only 8. The percentage of people who live below the poverty line based on consumption—i.e., with income lower than the cost of the basic food basket, which provides a minimum intake of calories and protein—varies from more than 50% in Ecuador, Peru, and Guatemala, to 34% in Jamaica, 17% in Brazil, and 10% in Mexico. In Jamaica, the incomes of 34% of the population fall below the poverty line.

The national health systems of these countries vary from predominantly public as in Jamaica and Mexico, to a wide diversity of mixed models such as those used in Brazil, Ecuador, and Peru. In every country, private expenditures, including direct cash payments, voluntary contributions paid in advance to privately managed health plans, and health insurance plans, are the largest component of the national health care expenditure, fluctuating from 66% in Brazil to nearly 50% in Ecuador, Jamaica, and Peru. For the developed countries, not including the United States, the public/private mix is approximately 70/30. The biggest variations occur in direct cash expenditure. In Brazil that figure is 40%, while in Ecuador and Peru, where only 20% of the population is

covered by national health insurance, direct cash sources are the main financial component of national health spending. This obviously discriminatory situation represents a great inequity that enormously affects the potential of the Region's poor and underprivileged to obtain the health care they need.

The study concluded that despite the diversity of socioeconomic conditions and organizational, financial, and service delivery systems, a few general patterns exist, especially in regard to the distribution of the benefits of public spending, which does little to remedy the inequalities resulting from private spending on health or income disparity. Table 17 examines the distribution of public spending on health goods and services by income quintile for Ecuador, Guatemala, Jamaica, and Peru.

Of these four countries, only in Jamaica are the benefits of public spending distributed with preference to the lower-income groups; in this case, 25.3% of public spending goes to the poorest 20% of the population and only 15.2% to the wealthiest quintile. In the other three countries the distribution is neutral, as is the case in Peru, or even skewed towards the higher-income groups, as occurs in Guatemala and Ecuador. Over 30% of public spending in the latter two countries goes to the wealthiest quintile of the population. Bearing in mind the large inequalities in Ecuador, Guatemala, and Peru in regard to distribution of income and satisfaction of basic needs, this is an obvious inequity.

Concerns do understandably arise, then, about increasing the quality and improving the coverage of services, and about the need for services to reach those who most need them in a way that can effect even partial compensation for the disadvantages of low income and social exclusion. Poverty is an intergenerationally transmitted, multidimensional phenomenon that has shown absolute growth in the Region in the past decade, despite the sustained, moderate economic growth that most of the countries experienced during the 1990s. The allocation of resources and distribution of goods and services, both public and private, still tend to be concentrated at the middle socioeconomic levels, thus reinforcing deprivation and social exclusion.

In that context, it is important to acknowledge the close interrelationship between poverty and health and the fact that the health sector can do much to change the situation. The idea is to implement active policies that selectively protect the population by compensating for other inequities, thereby enabling the health systems to remove the mechanisms of exclusion or inequitable resource allocation. Inequalities of income distribution are closely linked to disparities in access to health and other social services crucial to population health and morbidity/mortality rates. The systematic relationship between mortality, economic situation, and inequity has, however, begun to awaken the interest of a new generation of researchers. Findings have shown that income disparity adds risk factors for health and premature death and exerts an even greater impact than absolute income. This realization reinforces the assessment that social capital is an effective tool for health protection (58).

## ETHNICITY AND HEALTH

At the core of the development policy agenda is the idea that poverty can be reduced only by increasing equity. The disparities among population groups cannot, however, be overcome by introducing global economic policies. Selective policies are essential to correct the asymmetries that have built up over the years as a result of cultural, political, religious, and other factors.

For historical reasons, certain ethnic population groups have been excluded from the benefits of development, resulting in unequal access to educational and health services, political representation, and opportunities for social and cultural participation. Lack of access to the benefits of social policies has placed these groups at a disadvantage in the job market, restricted their access to credit, and limited their potential for upward social mobility. Ethnic origin can therefore be counted as a factor in the structural exclusion of certain population groups. It is a factor that was not previously considered in the design of overall development policy, including health policies.<sup>3</sup> The international agencies<sup>4</sup> have played a major role in this process through information-gathering, conceptualization, and advocacy.

It may be useful to adopt an “ethnicity/race” variable<sup>5</sup> to examine the differences in social groups. On that basis, programs and policies aimed at fighting poverty may be able to achieve more striking results and refine earlier strategies that did not consider cultural origin in the definition of poverty but attempted to alleviate poverty through sustained economic growth. Such a strategy has already revealed its limitations in the fact that, even in periods of economic growth, the region of Latin America and the Caribbean has paradoxically shown the greatest disparities in income and other determinants of the quality of life, including health and access to services.

### Conceptual Issues

Certain clarifications are in order regarding the concepts of ethnicity and race. Their use in the anthropological, sociological,<sup>6</sup> and biomedical literature has revealed a certain amount of confusion in the past. Recently, however, there appears to be some agreement that there is no genetic or biological basis for establishing different human groups. Variations in phenotype (skin color, eye shape, hair type, height, and other characteristics) are ultimately not intrinsically different from the variations seen among humans in general.

<sup>3</sup>The analysis of inequities linked to ethnic origin is already standard in the United States in particular, where demographic information systems have recorded these categories for several decades, but only recently has it been considered in Latin America and the Caribbean.

<sup>4</sup>See the documents from the World Bank-sponsored meeting in 2000 on “Race and Poverty,” from the June 2001 PAHO meeting on “Equity in Health: From an Ethnic Perspective,” and from the IDB in June 2001: “Towards a Shared Vision of Development: High-Level Dialogue on Race, Ethnicity and Inclusion in Latin America and the Caribbean.”

“The concept of *race* is a social construct that is frequently used for political purposes. The vast majority of opinion shows that, from a scientific and anthropological perspective, the notion that people can be categorized and classified into different races is a myth. There is a single *race*: the human race” (59). The concept of ethnicity refers to a group of humans with shared values and beliefs and a common history, all of which create a sociocultural sense of group belonging (60). In some countries, however, researchers, statisticians, and social activists prefer to reserve the term “ethnicity” to refer to the descendants of indigenous peoples and “race” to refer to African descendants.

In a health context, the use of these two terms should be strictly governed so that they are not used as synonyms. Based on the existing scientific information, there is no evidence that phenotypal variations are sufficient cause for major differences among humans in terms of health and access to services. There is presently some debate over the greater incidence of diseases such as sickle cell anemia and diabetes among African descendants, but this may be due to living conditions, type of food, or adaptations to their environments of origin.

In short, racial discrimination is a social factor that plays a role in the creation of health differentials among individuals. Discrimination in health operates in various ways: either in the form of barriers in access to services, poor quality of available services, or inadequate information for decision-making; or through indirect mechanisms such as lifestyle, place of residence, type of occupation, income level, or status of the individual or family. The real historical process in the Region subordinated the human groups descended from indigenous peoples and from Africans in the Americas and the Caribbean, and therefore slowed the building of identity among these groups. As a consequence, they are condemned as “the other” and sometimes identified by their skin color or prominent cultural traits such as language or clothing. This process of segregation and social exclusion in itself generates disease by placing greater stress on individuals, harsh living conditions, and barriers in access to health services (61).

The concepts of race and ethnicity still command very little space on the agenda for research on inequality and health in Latin America. The reasons for this omission include the tendency not to consider race/ethnicity as an important variable for building models on inequality—a reflection of certain national ideologies and the myth of racial democracy—and constant reference to the problems involved in implementing these concepts (62).

On the national and sector levels, public policies and programs to combat poverty are aimed at achieving a positive redistribution

<sup>5</sup>Depending on the method used by the different countries, the ethnic origin of individuals may be defined through language, place of birth, skin color, or community affiliation.

<sup>6</sup>Some countries, Brazil for example, use phenotypal traits such as skin color for collecting and analyzing vital statistics, and five categories are established: white, black, mulatto, yellow, and indigenous. For the same purposes, Guatemala combines cultural aspects such as dress or use of a vernacular language.

that will benefit disadvantaged groups. Several countries are implementing successful strategies focused on vulnerable groups, within the context of efficient use of available resources. The goal is to open a window of opportunity so that the descendents of indigenous and African peoples may benefit from programs that seek to reverse the impact of centuries of discrimination.

### A Demographic Perspective

The Region of the Americas has one of the most complex demographics from the standpoint of ethnic composition, as a result of its history of conquest, colonialism, and immigration. Despite the limitations involved in quantifying the different ethnic groups in the countries of the Region and within each country, existing estimates enable us to assess the size of ethnic groups of African and indigenous origin. Table 18 reconstructs statistics from several sources to offer a brief overview of ethnic groups in the Region.

The total indigenous population of Latin America and the Caribbean is estimated at 45 to 50 million, of which 90% are concentrated in Central America and the Andean Subregion. As a comparison, the indigenous population of the United States is estimated at 1.6 million, and estimates for Canada come to less than half a million.

The countries with the highest indigenous population are Bolivia, Ecuador, Guatemala, and Peru, where they constitute from 40% to 70% of the total population. In another nine countries (Belize, Chile, El Salvador, Guyana, Honduras, Mexico, Nicaragua, Panama, and Suriname), the proportions range from 5% to 20%. In the remaining countries, indigenous peoples account for less than 4% of the total population, though among these countries, Brazil, Canada, Colombia, and the United States have sizeable contingents in absolute numbers.

Attempts to quantify African-American populations reveal similar, if not greater, complexities. The problems of under-recording and differences in criteria from one country to another are reflected in the demographic estimates, which indicate that these groups account for approximately one quarter of the Region's total population, or 200 million (Table 19).

The Latin American countries with the largest population of African descendents (over 45%) are Brazil, Colombia, the Dominican Republic, the English-speaking Caribbean countries, Haiti, and Venezuela. Brazil has the Region's largest African-American population (nearly 75 million according to official estimates). The United States, despite its relatively low percentage (12.9%), ranks second in relative size, with 36 million African-Americans.

In the context of this analysis, and on the basis of the data in Table 19, it is important to consider the political, social, and cultural conditions of the African-descendent populations, as this will be a key component in public policymaking. Following are descriptions of different conditions existing for African-descendent populations in this Region:

- They constitute the majority of the population in the English-speaking Caribbean and Haiti, where they enjoy a high level of self-determination, autonomy, territorial control, and broad political representation, without exclusion due to racial discrimination.
- They are the largest minority, though in some cases they may nearly constitute a demographic majority; this does not necessarily result in proportional political influence (as in Brazil and Colombia).
- They are minorities in the strict sense, but with very clear-cut identity and self-determination. This occurs in two types of situations: 1) communities with a specific geographic settlement, such as the Garifunas of Belize and Honduras, the black Creoles of Guatemala and the Ecuadorian province of Esmeraldas, the Yungas of Bolivia, or the Camba Cuá community of Paraguay; and 2) communities with strong organizing capacity located in urban districts (e.g., in Caracas, Guayaquil, Lima, Montevideo, Puerto Limón (Costa Rica), Rio de Janeiro, or São Paulo).
- They form part of national societies where mixture of races occurs to a high degree and where African ancestry does not constitute an identity (as in Cuba, the Dominican Republic, and Venezuela).
- They are recognized as the largest ethnic/racial minority (e.g., in the United States) and benefit from a growing number of affirmative policies in the areas of health, labor, and education.

### Poverty and Ethnicity

There is a strong correlation between statistical indicators such as the poverty indexes broken down by race and ethnic group, and other human development indicators such as access to health, education, or job opportunities. According to World Bank data, in 1994 the indigenous population was among the most poverty-prone in Latin America, with poverty defined as income below 2 dollars per day (Table 20). In Peru, 80% of the indigenous population was poor, compared to 50% of the non-indigenous population (63).

As in studies of social exclusion due to race or ethnicity, Table 20 shows that for the selected countries, the indigenous population is affected by poverty in significantly higher proportions than the average of the general population.

Income differentials between African descendents and the rest of the population are also striking, as reflected by the information from Brazil regarding the distribution of ethnic groups by income quintile, presented in Table 21.

Income differentials by ethnic group are not exclusive to developing countries. Rather, they are also observed in the industrialized countries of the Region, as in the case of the United States (Table 22).

A recent study (64) shows how poverty levels are linked to social exclusion phenomena. This can be observed in very specific factors such as schooling (Table 23). This study also speculates on GDP increases in the selected countries if they could neutralize two inequities. In the first case, income corrections could result in changes ranging from 1.76% to 17.12%; in the second case, corrections in the educational situation would reap potential benefits ranging from 2.45% to 19.56%.

Another study on Brazil presents information on differentials in access to drinking water according to ethnic origin of the population, which confirms that ethnic origin is central to the social exclusion process (see Table 24).

### Health Differentials in African-Descendent Communities

Research results presented below confirm the great disparities in health between African descendents and the majority groups in some countries of the Region of the Americas. A similar situation holds true for the descendents of indigenous peoples, which is addressed in Chapter IV.

Studies in the United States point out health disparities between different human groups according to ethnic/racial origin and cite African-American mortality rates that are higher “from nearly every cause except suicide and obstructive pulmonary disease. In 1992, the gap in life expectancy was 6.9 years” (65). In a similar vein, according to the 1996 National Household Sample Survey in Brazil, the likelihood of one or more deaths of infants (under one year) in the family is significantly higher among the indigenous population (33%), blacks (19.9%), and mulatto or brown-skinned groups (20.5%) than for whites (12.5%) or Asians (11.2%).

In a study on inequalities in Brazil (66), 1990 data show that mortality rates for infants of illiterate mothers were almost 120 per 1,000 among blacks, 110 per 1,000 for mulatto and dark-skinned groups, and 95 per 1,000 for whites. When the mother had eight or more years of formal education, the infant mortality rates were lower: 82, 70, and 57 per 1,000 live births, respectively. The disparities associated with race, however, were even greater than for formal education (Figure 5). Black women needed four to seven years of formal education to achieve the infant mortality rates of illiterate white women.

Higher mortality rates are not the only observable difference. Studies also reveal that this population segment has a more vulnerable health situation, as shown by examples presented below.

- In Ecuador’s Esmeraldas province, onchocerciasis is prevalent in over 90% of the members of the Telembi-Santa María community, with a population of 81% African descendents (67).
- Sickle cell anemia, the result of a mutation in the hemoglobin molecule that gives it a half-moon shape, emerged in

Africa (particularly in Senegal, Benin, Cameroon, and Banto regions) in areas endemic to malaria and reached the Americas through slave traffic. The prevalence of HbS (heterozygotes) among African descendents and whites in different cities of Brazil is as follows: in Salvador, blacks 4.9%–8.5%, whites 3.4%–7.7%; in Campinas, 5.6%–9.8% and 2.4%–3.1%, respectively; and in São Paulo, 5.9%–7.1% and 1.2%–2.8%, respectively (68).

- According to 1995 data for the United States, African descendents over 18 years of age have a disproportionate number of persons with type 2 diabetes, making them the minority with the highest prevalence: 20.2% as compared to only 4.8% of Mexican descendents in the U.S., for example. Even though type 2 diabetes is easily preventable through diet and exercise, the black population has the highest mortality rate: 28.8 per 100,000, compared to 18.8 per 100,000 among Hispanics.
- Uterine myomas, which are tumors common among females, affect 20% of Afro-Brazilian women of reproductive age.
- Glucose-6-phosphate dehydrogenase deficiency is an enzyme problem that can cause episodes of acute hemolysis or hemolytic anemia. It is an X chromosome-linked genetic disease with an incidence in the black population of 12%–15%; in Brazil the incidence is 2% in whites and 10% in blacks (69).
- The highest rates of malaria are found in Chocó, Colombia, with 692.0 cases from *Plasmodium falciparum* per 100,000 population, and 725.2 per 100,000 from *P. vivax*. The incidence in Esmeraldas, Ecuador, is nearly 25%, totaling 84,689 cases (70).
- There are also differences with respect to external causes. Data from São Paulo, Brazil, indicate that the mortality rates from violence-related factors are higher for both men and women (133.2 per 100,000 for white men and 193.80 per 100,000 for black men, compared to 23.58 and 25.62 per 100,000, respectively, for women) (71). The mortality rate from homicide is 41.5 per 100,000 in Esmeraldas (Ecuador), compared to only 13.4 per 100,000 for the entire country. Mortality from suicide in the same province is 8.8 compared to 4.8 per 100,000 for the country as a whole (70).
- In Brazil, 8.6% of white women and 11% of black women give birth to low birth-weight children.
- According to United States figures, the HIV/AIDS epidemic disproportionately affects ethnic minorities. African descendents, who make up 12.9% of the population, account for 54% of those with HIV/AIDS (72).

The combination of disease, barriers in access to services, and lack of information for choosing healthy lifestyles is reflected in:

- Higher infant mortality rates: infant mortality in Chocó, Colombia—a state with a majority Afro-Colombian popu-

lation—is the highest in the country: 99.16 per 1,000 live births in males and 82.09 per 1,000 in females, more than three times higher than the rates in Bogota (31.77 and 23.13 per 1,000, respectively) and Antioquia (26.39 and 19.44 per 1,000). In Brazil, infant mortality by race of the mother in 1993 was 37 per 1,000 for the white population and 62 per 1,000 for the black population (69).

- Higher maternal mortality rates: in Chocó, Colombia, in 1996 (70), the maternal mortality rate was 30.55 per 100,000 live births (national average of 45.45). In the United States, the maternal mortality rate for black women in 1994 was 684 per 100,000 live births. The relative risk was 4.3 in Paraná, Brazil, in 1993, and the rate for black mothers was 65.7, for whites 48.0, and for Asians 358.5.
- Lower life expectancy: the life expectancy for males in Chocó, Colombia, is 62.76 years, while in Bogotá the figure is 68.52. In Esmeraldas (Ecuador), one of the poorest provinces, along with Los Ríos, life expectancy at birth is 64.5 years, 6 years lower than in Pichincha (71.70), for example.

### Final Reflections

Sustainable human development offers a useful framework for conducting a general analysis of development, inasmuch as it provides food for thought about inequities and also helps in assessing the contribution of ethnic groups to the Region. Agenda 21, section 3, of the United Nations Conference on Environment and Development, points out that indigenous populations “over many generations have accrued traditional holistic and scientific knowledge of their lands, their natural resources, and the environment.” The same chapter, however, also warns of the threat of irrational development of natural resources for survival by many indigenous nations, even in their historical settlements. The recommendation given is that we “recognize, encourage and strengthen the role of the indigenous populations” and make room for them in the development process.

The lowering of health differences can go far towards improving health and living conditions. It can be instrumental in reversing the historical process of deprivation and in laying the groundwork for a change of conduct. In addition, it can support the underappreciated ethnicity of these groups and enhance their potential to exert a positive influence in the active development of a multicultural civil society in the Region.

In the past decade, progress in regard to ethnicity and public policy has occurred. Examples in this regard are outlined below.

1. Indigenous and African-American organizations became increasingly mobilized in the 1990s. As a result of ethnic mobilization, the governments of Latin America and the Caribbean have generally become more aware of the need to recognize the vulnerability of the people in these com-

munities. The many networks coordinated by organizations of indigenous peoples as well as African descendents have gained strength as they prepare for the United Nations-sponsored World Conference Against Racism, Racial Discrimination, Xenophobia, and Related Intolerance. Civil society is beginning to see the need to embrace the mechanisms of negotiation with agencies of government.

2. Governments are constrained by limited financial resources for implementing new programs, and personnel often lack proper training or awareness of these problem areas. Dialogue on this topic with representatives of organized civic groups is not always adequate or effective. Mechanisms for mutual accountability are also lacking (73).
3. The topics found most frequently on the agendas of the nongovernmental organizations representing these groups are land entitlement, bilingual education, cultural recognition, and implementation of constructive policies at the middle and higher education levels and in the job market. There has been progress in designing programs targeted to indigenous groups, in the adoption of constitutional protections (in Argentina, Bolivia, Colombia, Ecuador, Guatemala, Mexico, Nicaragua, and Paraguay), and in the ratification of Convention 169 of the International Labour Organization (ILO) (Bolivia, Costa Rica, Colombia, Ecuador, Honduras, Mexico, Paraguay, and Peru), which recognizes the multiethnic nature of the populations (74).
4. Despite these achievements, there is still ground to cover in meeting these policy objectives.

### HEALTH AND GENDER EQUITY

Gender differences, alone and interacting with other socioeconomic factors, are expressed in inequalities in the epidemiological profile as well as in patterns of production and consumption of health services. Gender differences include sex differences relating to the biological distinction between women and men, though they transcend that distinction. The concept of gender refers to the set of culturally specific characteristics that determine the social behavior of women and men and govern relations between the sexes. The object of interest in a gender-based approach is not women and men per se, but rather the unequal social relationships between the sexes and the effects of such inequality on people's lives. Both explanatory considerations—the biological aspect of sex and the social aspect of gender—are essential to a proper understanding of health processes and for designing effective, equitable initiatives.

Gender-based factors are of crucial importance for identifying individual health risks and behaviors and also for determining how social life is organized. Gender, along with class and ethnicity, plays a key role in resource allocation and distribution of benefits in hierarchical societies.

An analysis of gender in health, therefore, goes beyond a description of sex differentials in health. It also examines how the division of roles and power between women and men affects health/disease processes and patterns of health care delivery. This type of analysis runs into two major obstacles, however: first, health information is very seldom disaggregated by sex; and second, data from secondary sources are generally not gathered or processed for purposes of comparing sex differentials in health with sex differentials in important socioeconomic variables. With these limitations in mind, the information presented here will basically be aimed at identifying sex differentials in health and access to appropriate care, and at shedding light on how gender relations are associated with these differentials.

### Gender, Equity, and Health Situation

There are considerable differences between the health/disease patterns of women and men. The differences stem from inherent biological traits, unequal risks, and above all from the unequal opportunity created by the societal division of male and female roles. Gender equity in health does not assume that mortality, or even morbidity or disability, would be equally distributed between the sexes; rather, it means that women and men can enjoy the opportunities and conditions that will enable them to lead a healthy life, without suffering from preventable disease, injury, or disability. In other words, the distribution of social resources must be attuned to the specific needs of both sexes in any socioeconomic environment. Therefore, any analysis of gender equity in health calls for examination of sex differentials not only in regard to length and quality of life, but also in regard to the preventability of injury and premature death.

### Length and Quality of Life

In most countries of the world, especially the more industrialized countries, women have a longer life expectancy than men, with lower relative mortality rates in nearly every age group. Life expectancy at birth for males in the Region of the Americas is between 51.8 and 76.3 years, while the range for females is 56.8 to 82.1 years (70). This gap is partly associated with genetic factors, mainly due to higher male mortality rates at life stages in which the differentiating effect of reproductive risks and of gender-based societal roles is minimal, i.e., the perinatal period and early infancy. Although the relative importance of biology in the survival gap remains debatable, there is no question that gender-based social factors have a significant effect on the size of the gap. Depending on the socioeconomic environment, gender-based factors affect women and men differently, to the benefit or detriment of their health, thus widening or narrowing the gap in life expectancy.

Greater longevity among females is not an empirical constant. History suggests that a hostile socioeconomic environment may have narrowed or even negated the presumed biological difference in favor of women. Until the late nineteenth century in the

industrialized countries (75), and even today in some developing countries, women have a lower life expectancy at birth, a fact which is usually associated with high maternal mortality rates. It should be emphasized, however, that the gap did not widen simply because women began to live longer, but rather, it may also reflect proportionately greater increases in male mortality, as was the case in Russia during the 1990s (76). Consequently, any change in the sex differential in life expectancy at birth should consider both sides of the equation, i.e., gain or loss of longevity for both men and women.

The interaction between gender and socioeconomic inequality can be observed in figures 6a and 6b, which illustrate the risk of premature death among 15- to 59-year-olds in 13 countries of the Region, by sex and poverty level.<sup>7</sup> These figures show that for those above the poverty line, the risk of male mortality was two to four times greater than the risk for females (Figure 6a). Among those below the poverty line, however (Figure 6b), there was a considerable increase in the risk of premature death among both men and women and, except in Jamaica, the increase was proportionately greater for women.

The risk of death for those above and below the poverty line according to sex, as estimated by WHO in 1999, demonstrates the unequal impact of poverty on the survivability of women and men (Figure 7). This indicator suggests that, in poverty conditions, the risk of premature death is 2 to 4 times higher for men and 4 to 12 times higher for women, thus reducing the mortality gap between the sexes. Explanations for the greater and more varying impact of poverty on women's survivability can be found not only in biologically driven differences in vulnerability of the sexes, but also in gender-based social factors. These social factors are linked to sexual inequality in access and control over resources, and an unequal distribution of social resources that does not adequately take into account the special needs of women.

In step with the declining mortality rates and increased life expectancy at birth, the notion of quality of life has gained importance, and concepts and instruments of analysis have been developed to measure it. One such instrument can be found in estimates of healthy life expectancy, expressed in years of life without disability. The use of this type of indicator is as yet very limited, especially for cross-country comparative analysis, because the health surveys on which they are based are often not comparable.

Bearing in mind these limitations, the following findings are notable: 1) sex differentials in life expectancy at birth tend to be reduced when the quality-of-life component is added; 2) women have more years of disability than men (77, pp. 180–187, 202–207); and 3) the number of years lost due to disability is greater among the poor. When life expectancy at birth was adjusted for disability, the female advantage in years of life fell

<sup>7</sup>Poverty was defined as per capita income equal to or less than one international dollar per day. The estimates for probability of death were taken from *World Population Prospects: The 1998 Revision*, New York, United Nations, 1999.

30% in Canada and 38% in Haiti. The percentage of years with disability was 9.6 for women and 8.1 for men in Canada, while in Haiti the percentages rose to 17.8 and 16.2, respectively (77, p. 29).

These estimates are consistent with the widely documented fact that women, despite living longer, experience a higher incidence of morbidity and disability than men throughout the life cycle. This is true for all adult age groups and is more pronounced for acute, short-term afflictions and disability during the reproductive years, and chronic afflictions and disability in the elder years. In contrast, men have a lower incidence of morbidity and disability, but when health problems occur, they tend to be life-threatening (78).

The interaction of sex-related biological factors and gender-based social factors makes older women one of society's most vulnerable groups, disproportionately affected by loneliness, disease, poverty, and lack of social services. Their greater longevity is linked to a higher incidence of widowhood; their lower level of participation in the paid workforce and lower remuneration levels for work during adulthood, as compared to men, cause women to become disadvantaged in the elder years, not only through lower income but also from lack of entitlement to health and social security benefits. In other words, having cared for the family throughout their adult life, most women must face old age without either a partner or formal health care services.

#### *Nature of Problems Differentially Affecting the Sexes*

Conditions or problems had to meet one or more selection criteria for analysis. They had to: 1) be exclusive to either sex; 2) show greater prevalence for one sex; 3) indicate different risks or consequences for women and men but in any case, be consistent with principles of equity; and 4) be largely preventable. The selected problems were grouped in the following categories: sexual and reproductive health, malignant tumors, accidents and violence, and "others," for which priority was given to conditions with clear sex differentials, such as diseases of the circulatory system, nutrition problems, diabetes, cirrhosis of the liver, and mental disorders. The information on causes of mortality came from the PAHO database<sup>8</sup> (79), while the remainder was obtained from both PAHO and outside sources.

**Sexuality and reproductive health.** The broad concept of reproductive health adopted at the International Conference in Cairo included: the ability to lead a satisfactory, enriching, risk-free sexual life; freedom to make one's own reproductive decisions; and access to the information, means, and services needed for risk-free pregnancy and delivery.

Sexual activity determines the greatest qualitative difference between the sexes with respect to the type of health risks, since

women are affected not only by the biological consequences of pregnancy, delivery, and breast-feeding, but also by the culturally assigned responsibility of child care. In addition, women assume most of the responsibility for contraception, are more vulnerable to infections of the reproductive system and sexually transmitted infections, and suffer more serious complications from such infection. Another important gender-based determinant is unequal distribution of power between the sexes, which often limits women's control over their sexuality and their ability to protect themselves from unwanted pregnancy or sexually transmitted infection. Adolescent girls are especially vulnerable.

*Control of fertility.* One of the most profound and irrevocable social changes occurring in the Region during the 20th century was the massive influx of women in the job market. Combined with women's increasing access to formal education, this phenomenon has had a critical impact on the nature of relations between the sexes and women's ability to make life decisions. As a corollary to these changes, women have gained increasing control over their own reproductive decisions. As a result of this ability, along with access to new contraceptive technologies, starting in the 1960s, Latin America and the Caribbean have experienced the world's greatest decline in fertility rates. The number of children per woman—nearly 6 in the period 1955–1959—fell to 2.7 (80, p. 72) in the year 2000, approximately a 50% reduction in fertility over a 40-year period.

The changes in the rate and age structure of fertility have exerted a positive impact on the health of women and their children, as witnessed by decreased risk of maternal and infant morbidity/mortality resulting from multiple births, closely spaced pregnancies, and pregnancy at the extremes of the life cycle. Beyond these effects, it is important to emphasize, as did the United Nations in 1985 (81), that the fact that women can control their fertility constitutes the basis for exercising their other rights.

Persistent and profound inequality in fertility levels, both between and within countries, nevertheless serves to dim the positive outlook. The disparities are related to the continuing socioeconomic disadvantage of some population segments and, within them, certain groups of women. As an example, with the exception of Cuba, which has lower per-capita income, the number of children per woman was two in countries such as Aruba, Bahamas, Barbados, Bermuda, Canada, and Cuba, and four or more in countries with fewer resources such as Bolivia, Guatemala, Honduras, Nicaragua, and Paraguay (70). There were significant differences within countries as well. Guatemala, for example, posted a 1998–1999 difference of 4.2 children between women with no education (6.8) and women with secondary or higher education (2.6) (82).

*Pregnancy during adolescence.* Pregnancy among adolescents is increasingly gaining quantitative and qualitative importance. Four of the six countries that have consecutive Demographic and Health

<sup>8</sup>Chapter I of this publication discusses the quality of the information in detail. See also: PAHO, *Health Statistics from the Americas*, 1998 edition, Washington, D.C., 1998 (Annex, Tables H, I, J).



Surveys (DHS)<sup>9</sup> posted an increase in fertility rates in the 15- to 19-year age group, in contrast with reduced rates in the other age groups. Those countries were Brazil, Colombia, the Dominican Republic, and Peru. This situation has serious implications for maternal and child health, as well as fundamental repercussions in the form of the restrictions that such early maternity places on educational and social development and job opportunities.

**Maternal health.** Despite the generalized underrecording of maternal mortality—averaging as high as 50% in the Region (83, p. 6)—complications of maternity still constituted one of the key causes of mortality among women of reproductive age. In the late 1990s, maternal complications remained the primary cause of death among women 20 to 34 years of age in Latin America and the Caribbean. This is a dramatic contrast with the situation in the industrialized countries, where death from maternal complications occurs infrequently. In 1995, for example, a woman's risk of dying from maternal causes was 1 in 160 in Latin America and the Caribbean, while in North America the figure was 1 in 3,500 (83, p. 2). The situation reflects the low priority given by society to a problem that affects only women, particularly poor women; it is especially notable considering that such deaths are mainly preventable, and the technology and know-how for preventing them have existed for many years. An additional difficulty in determining the actual number of maternal deaths is the generally low priority given to resource allocation for that endeavor.

The maternal mortality rate (or more appropriately, maternal mortality ratio) is a more sensitive social development indicator for measuring inequalities, since the disparities between wealthy and poor countries are conspicuously greater for maternal mortality than for infant mortality. Figure 8 shows the maternal and infant mortality differentials compared among countries of the Region, with reference to Costa Rica, which has the lowest mortality.<sup>10</sup> Haiti, for example, registered infant and maternal mortality rates that were respectively 7 and 30 times higher than the rates in Costa Rica.

Abortion is the primary cause of maternal mortality in Latin America, accounting for approximately half of such deaths (80, p. 13). The illegality of abortion in almost all countries of the Region makes it impossible to determine the real incidence of mortality from this cause and hinders the search for solutions. The problem is evident in hospital statistics. In Ecuador, for example, abortion was the second greatest cause of hospitalization among women in 1997, with 20,350 cases (5% of hospitalizations and a rate of 34 per 100,000 women).

Because of its preventability and injustice, maternal mortality has been characterized as the clearest illustration of social in-

equity, and the most eloquent expression of the disadvantage faced by major segments of the Region's female population in exercising their basic rights (84).

**Sexually transmitted infections.** For biological as well as cultural reasons, women are more vulnerable to sexually transmitted infections. The anatomical differences between the sexes facilitate male-to-female transmission; the absence of symptoms hinders diagnosis; and of particular note, unequal power distribution between the sexes hampers women's ability to negotiate safe sexual relations. In addition, women suffer more serious consequences: infertility, complications of pregnancy, postpartum infections, and cervical cancer. Estimates of years of life lost through premature death or disability due to sexually transmitted disease—except HIV/AIDS—indicated that in Latin America and the Caribbean, the loss was 2.6 times higher for women than for men. The corresponding figures were 255,000 for men and 668,000 for women (85). In Canada, the incidence of reported chlamydial infection in women was three times that of the rate for men. The most affected age groups were 10- to 14-year-olds, with a rate 20 times higher in females than males, and 15- to 19-year-olds, for which the incidence in females was 6 times greater. The highest incidence of gonorrhea occurred in females aged 15 to 19, with a rate 2.6 times higher than that of males (86).

In contrast, HIV/AIDS is considerably more prevalent among men. Estimates of years of life lost through death and disability (in thousands) for the year 2000 were 3,367 in men and 895 in women, a ratio of nearly 4 to 1 (85). It is important to note, however, that the rate of new infections is rising faster among women. Since 1996, there has been a sharp drop in the male to female ratio of AIDS incidence in the Southern Cone countries, Mexico, the Latin and non-Latin Caribbean, and North America (87).<sup>11</sup>

**Malignant neoplasms.** Malignant tumors appear to be the most frequent cause of male mortality in the relatively more advanced countries (e.g., Argentina, Bahamas, Barbados, Canada, Costa Rica, Cuba, and the United States). Poor or less developed countries have a higher incidence of female than male mortality from such causes. This situation is due to a different distribution of more lethal or less lethal cancer types, as well as differences in access to detection and treatment technologies for cancers specific to women.

**Breast and uterine cancer.** These two cancers in combination represent the predominant cause of death in the 35- to 64-year age group in 25 countries studied. Cervical cancer is more common in developing countries and at lower socioeconomic levels. In contrast, there is a higher incidence of breast cancer in wealthier countries and at higher income levels (Figure 9). The English-speaking Caribbean displayed a unique coexistence of high mortality rates from both breast and uterine cancer.<sup>12</sup>

<sup>9</sup>Demographic and Health Surveys (DHS) are the result of an international program that has provided technical and financial assistance to governmental and private institutions in developing countries to conduct national surveys. The quality and reliability of the information generated by this program are internationally recognized.

<sup>10</sup>To facilitate comparison, the rates for each country were divided by the rate for Costa Rica, which yielded the multiplier for each country. Costa Rica was used as a reference because it was considered reasonable to assume that the other countries of the Region could reduce their rates to that level.

<sup>11</sup>See more detailed information in chapter VI.

<sup>12</sup>See more detailed information in chapter VI.

The significance of cervical cancer as a cause of death in Latin America and the Caribbean is a subject of great concern, not only due to its high rates and emergence at early ages, but also because it is preventable. In contrast to the situation with breast cancer, a simple, efficient, low-cost technology for detecting cervical cancer at stages when the likelihood of a cure is nearly 100% has existed for over 40 years. There are also simple, cost-effective technologies for treating this disease in early pre-invasive stages. For these reasons, the persistently high mortality rates from cervical cancer raise an alarm about the value that society places on a problem that exclusively affects women, especially poor women. The example of the United States illustrates the preventability of breast cancer. Although white women in that country have a higher incidence of this disease than non-whites, it results in higher mortality rates among the latter group.<sup>13</sup>

**Prostate cancer.** Although this type of cancer is a significant cause of death among males, the years of life lost amount to less than half the corresponding figure for breast or uterine cancer because of the advanced age at which most deaths from prostate cancer occur. Estimates for the year 2000 indicate the following numbers of years lost (in thousands) due to death and disability from these cancers in Latin America and the Caribbean: 197 from prostate cancer, 586 from uterine cancer, 552 from breast cancer, and 113 from ovarian cancer.

**Lung cancer.** Mortality rates from lung cancer were three to five times higher for men than for women in all countries of the Region. In Argentina (1996), for example, the mortality rate for the 35- to 64-year age group was 59.1 in men and 10.3 in women; in Paraguay (1997), the figure was 13.2 in men and 3.3 in women. These differences are linked to traditionally higher tobacco consumption among males, for many years encouraged among men and criticized in women. The gap has been narrowing in response to social changes about definitions of femininity and the fact that consumer goods are more available financially to women. It is noteworthy that lung cancer has surpassed breast cancer as a cause of death among women in Canada and the United States and has begun to be a prominent cause of female deaths in Cuba, El Salvador, and Puerto Rico (Figure 9).

**External causes.** The greatest quantitative sex differentials in mortality fall into the "external causes" category, which includes accidents, suicide, homicide, legal intervention, and operations of war. Death from these causes for the Americas as a whole is 3.7 times higher in men than in women. In the Andean Region, the ratio climbed to 4.6, while North America and the non-Latin Caribbean registered 2.8 (70). Although there was considerable variation between countries, the higher male mortality rate from external causes was a constant, becoming evident in childhood, increasing with age, and reaching its highest level in young adulthood. This phenomenon demonstrates the importance of social determinants of risk behavior, including gender-based division

of social roles and responsibilities. The higher male mortality from accidents, homicide, suicide, and armed conflict is linked to stereotypically male risk behaviors, which are looked upon and encouraged as manly through gender socialization and social dictums. These behaviors are related to men's cultural obligation to act as a "provider" and "protector," regardless of danger, and society's expectation for them to publicly and privately display traits consistent with the role of "hero," "risk-taker," "winner," and "powerholder."

**Accidents.** The early impact of gender socialization is clearly displayed in the mortality rates for the 1- to 4-year age group. In the group of 20 countries studied (circa 1997), male mortality in this age group from accidents already exceeded female mortality by proportions ranging from 25% to 130%. In the 20- to 34-year age group, and to a lesser extent among those aged 35 to 49, accidents, particularly in motor vehicles, were one of the primary causes of fatalities among males.<sup>14</sup> Accident fatality rates among those aged 20 to 34 resulted in a male/female ratio of approximately 3:1 in the United States (1998), and 7:1 in Mexico (1997).

**Homicide.** Sex differentials in homicide fatalities were even greater than for accidents. In Colombia, for example, in the 20- to 34-year age group, male homicide rates were 16 times higher than for females in 1996. The corresponding proportions were 13 times higher in Mexico, 12 in Brazil, 4.5 in the United States, and 4 in Cuba. Figure 10 clearly shows the difference in homicide fatalities by gender and cultural environment, presenting the rates for women and men in geographically adjacent populations on both sides of the Mexican-United States border.

**Suicide.** Suicide is the only external cause of death for which men did not always rank higher. "Actual" suicide rates in the past tended to be higher in males, in contrast with suicide attempts, which were more prevalent in females. Recent data, however, indicate that the suicide rates among female adolescents have surpassed those for male adolescents in Ecuador (1996), El Salvador (1996), and Nicaragua (1996), and attained similar levels in Cuba (1997).

**Violence against women.** Violence experienced by men and women differs not only quantitatively but also qualitatively, i.e., in its nature, causes, and consequences. Men tend to be victims of attack from strangers or casual acquaintances, while women suffer greater risk of attack within their own home, from men with whom they are closely involved. Violence against men tends to be acute in nature and aims at total defeat, it appears to be routinely documented in public records, and it is punished by law. Violence against women tends to be chronic and prolonged in nature; it has the purpose of control rather than total defeat; it is frequently associated with sexual abuse; it is reported and recorded much less frequently and quite often it is tolerated by law and custom.

Given the varying extent to which violence against women is recognized, condemned, and reported, it is difficult to make cross-country comparisons. The following figures are presented only as approximations for countries at different levels of development.

<sup>13</sup>See more detailed information in chapter VI.

<sup>14</sup>See more detailed information in chapters I and VI.

According to 1993 statistics for Canada, half of Canadian women over 16 years of age were victims of physical or sexual assault as defined by the Criminal Code, and their partners were the most likely assailants (88). Demographic and Health Surveys in Colombia in 1995 showed that approximately one of every five women 15 to 49 years of age had been assaulted by their partners. In Nicaragua, according to 1998 data, 21% of women in the same age group were at some time the victims of serious assault by their partners. Other population studies of women aged 15 to 49 in Santiago, Chile (1997), and Metropolitan Lima (middle and low income, 1997) found that 23% and 31% of women, respectively, had been assaulted by their partners in the past 12 months (89).

It bears repeating that, even with divergent manifestations according to sex, the unequal balance of power between men and women and the social demands associated with the exercise of power (within and across genders) have clearly negative impacts on the survival as well as the physical, psychological, and social welfare of both women and men.

**Other problems.** Cardiovascular diseases, generally regarded as “masculine,” constitute a primary cause of death throughout the Region among women as well, especially after the age of 50. Although ischemic heart disease tends to be more frequent among men, this is not the case for hypertensive heart disease or stroke. These two groups of causes result in higher rates of female than male mortality in some age groups (especially after age 80) and in some countries of the Region. In Mexico (1997), for example, female fatalities from hypertensive disease surpassed the rates for males starting at age 35. Canada (1997), Colombia (1996), and Costa Rica (1995) registered more female than male fatalities from stroke in the 35- to 49-year age group, which also held true for the 20- to 34-year age group in the first two countries. Even though heart disease is the principal cause of death among women in most countries of the Americas, the attention remains focused on men and the risk to women is underestimated. This bias is reflected in substantial sex-related differences in the quality of care provided for these causes (90) and, in turn, the differences are associated with the likelihood of surviving an acute episode.

Malnutrition is the most widespread and debilitating health problem among women in developing countries. Even though it affects both sexes, biological factors put women more at risk for nutritional deficiency, particularly for iron. Women need more iron than men because of menstruation, pregnancy, and breast-feeding. This greater biological need translates into deficiency not only because of circumstances of poverty that prevent them from obtaining appropriate food, but also because of inequitable food distribution in the home, which often favors the male “provider” (91). The incidence of anemia among pregnant women in Latin America and the Caribbean ranges from 13% in Chile to 53% in Peru (92).

Diabetes is one of the 10 greatest causes of death in all countries of the Region, tending to affect women more frequently, especially

after the age of 50. The differential is especially high in Cuba (1997), where female mortality from diabetes is nearly double that of men after 65 years of age.

There is a clear male predominance in mortality from cirrhosis of the liver, especially in the 20- to 34-year and 35- to 49-year age groups. Alcohol consumption is a risk behavior associated with this disease and, as in the case of tobacco, has traditionally occurred more frequently among men than women. Mexican males registered a mortality rate from cirrhosis (1997) 6.3 times higher than females in the 35- to 49-year age group. The corresponding multipliers in Brazil and Argentina were 5.0 and 5.8. The United States and Cuba displayed a narrower gap between the sexes, posting male rates that were respectively 2.5 and 3.2 times those of females.

Mental health problems also affect women and men differentially. Women are two to three times more likely than men to experience depression, for example. The number of years lost (in thousands) from depression-related death and disability in Latin America and the Caribbean (2000) was estimated at 1,815 in men and 3,423 in women. Men, on the other hand, exhibited a higher incidence of dependency on substances such as alcohol and drugs. The figure for years lost due to alcohol consumption was 11 times higher for men than for women (4,321 compared to 389); male loss of years due to drug consumption was nearly double that of females (881 compared to 472) (85).

### **Gender, Equity, and Access to Adequate Care: Needs-Based Health Care**

Although socioeconomic factors are recognized as the principal determinants of inequity in health, ready access to services based on need is central to the elimination of barriers to health protection, disease prevention, and improved quality of life for those who are already ill. Access to proper health care is especially crucial for women, largely due to their reproductive function, which calls for systematic care throughout the reproductive cycle. Gender equity in access to health care does not mean that men and women receive an equal share of resources and services; rather, it means that resources are differentially allocated and tailored to the special needs of each sex and each socioeconomic group.

Women generally utilize health services more frequently than men. This tendency stems not only from women's acquired and more favorable attitude towards seeking care, but also, and more fundamentally, their greater need for health services, especially preventive care.

#### *Use of Services for Illness or Injury*

The extent and trend of sex differences in the use of health services varies according to socioeconomic level, age, and type of service. An examination of socioeconomic level in connection with services provided for declared illness or injury, for example, shows that in some countries and in low-income groups, use has

generally appeared to be lower for men than for women, in both the public and private sectors (Figure 11). When age is considered, the largest sex difference in the use of services occurs during the reproductive years and skews in favor of females, in contrast with the figures for childhood, when the ratio is inverted in favor of males (93). An analysis of types of service indicates that women tend to use preventive services more, while men more often rely on emergency services, and differences by sex vary for hospital services. Information on the utilization of health services tailored to the special needs of each sex suffers from limited access and poor organization. The only available data pertain to reproductive health services for women and cover family planning, prenatal check-ups, and delivery care.

### *Use of Services for Reproductive Health*

**Control of fertility.** By the late 20th century, the right to control one's fertility through modern contraceptive methods was being exercised by 57% of women in Latin America and the Caribbean and 68% of women in the United States. These averages, however, mask profound inequalities between and within countries in terms of access to such technologies. The prevalence of contraceptives ranges from 74% to 13% from one country to another. Canada, Brazil, and Cuba rank at the high end, with 74%, 71%, and 68%, respectively, while Bolivia and Haiti occupy the low end, with 17% and 13%, respectively (80, p. 69). At the sub-national level, contraceptive use showed a positive correlation with women's socioeconomic status. In Guatemala (1998), for example, among women with high school and higher education levels, 54% live with a partner and use modern contraceptive methods; that figure falls to 16% among women with no education. According to the 1995 Demographic and Health Survey in Guatemala, the corresponding figures for mestizo and indigenous women were 41.3% and 8.4%; and for urban versus rural residents, 43% and 21%, respectively.

In light of the fact that not every woman of reproductive age needs or wants to use contraceptives, there has been increasing use of the index of unmet need for family planning, which adjusts for non-use in that regard. Analysis of this indicator in nine countries of the Region revealed that the percentage of women with unmet family planning needs varied from a low of 7.3% in Brazil (1996) to a high of 44.5% in Haiti (1999), and countries such as Guatemala and Bolivia registered around 25%. As for internal differences, less-educated females (Figure 12) and adolescents living in rural areas exhibited the highest levels of unmet demand. The situation of adolescents should be emphasized, as women in this group experience greater cultural restriction of their reproductive rights.

The population's access to services can be traced by using an indicator of professional delivery care. The socioeconomic differentials associated with this indicator were addressed earlier in this chapter, so it will suffice here to emphasize that even in the

year 2000, one out of every five births in Latin America and the Caribbean was not attended by trained personnel. This figure conceals extreme deficiencies in health care services, as exemplified by Haiti and Guatemala, where 8 out of 10 and 6.5 out of 10 females, respectively, were unable to exercise their right to safe delivery care (80, p. 72).

### **Gender, Equity, and Health Care Financing: Payment According to Means**

Equity in health care financing will require that both women and men contribute according to their financial means rather than their needs. This would imply in particular that reproductive costs be distributed across the society as a whole rather than fall exclusively on women.

In the case of women, the principle of equity is doubly complicated when there is no system of shared financing. In view of the special needs imposed by their reproductive function, women spend more on health services. In the United States, women of reproductive age pay 68% more out-of-pocket than men (94); in Chile, a private health insurance premium during the reproductive years is 2.5 times higher for women than for men (95); in Brazil, the Dominican Republic, Paraguay, and Peru, household survey data indicated that out-of-pocket expenditures on health are 16% to 40% higher for women than for men (Figure 13). This inequity becomes proportionally more acute if we consider the lower financial means of women as a group.

Women are disproportionately represented among the poor. This situation is rooted in the division of labor according to gender, with the following implications:

- Less access to paid employment: because of the domestic responsibilities that society assigns to women, over 50% of women in Latin America and the Caribbean (96, pp. 231–234) are still excluded from the paid job market. They work without pay in the home, which makes them financially dependent in terms of both income and insurance plans.
- Higher unemployment: except in El Salvador, Honduras, Mexico, and Nicaragua, unemployment is higher among women than among men. In the Dominican Republic, for example, the rate of urban unemployment is 10.9% for men and 26.0% for women (96, pp. 265–268).
- Lower remuneration: women are less well remunerated than men, not only because they are paid less for the same work, but also because they are concentrated in lower-paying jobs. Women's job income as a percentage of men's income ranges from 57% in Mexico (1998) to 79% in Colombia (1997) (96, pp. 249–250). On average, women's earnings are 71% of men's earnings for the Region as a whole (97).
- Fewer short-term social benefits: in an attempt to coordinate domestic and job responsibilities, more women than

men work part-time or in the informal sector. Neither of these types of work is covered by social security or health insurance plans. The percentage of women who worked part-time was twice that of men. Examples of the percentages for men and women include: in Argentina, 20 and 44; in Venezuela, 12 and 33; and in Bolivia, 17 and 41 (98). Women's participation in low-productivity sectors ranked higher in all 18 countries examined (96, pp. 255–258). In Bolivia (1997), where the informal sector accounts for a high proportion of jobs (65.5%), men had 38.0% of the jobs, while women held nearly double that figure, or 75.2%.

- Fewer long-term social benefits: due to pregnancy and child-rearing, and also because they are culturally designated as the primary caregivers for the elderly and the chronically ill, women experience greater job discontinuity, a fact that limits their access to insurance and health care in the long term.

Given the way in which work and power over resources are distributed socially according to sex, employment-related public and private insurance plans put women at a systematic disadvantage for accessing health care in their own right, as citizens rather than dependents.

The information presented in this section reveals preventable inequalities between women and men which are attributable less to biological differences of sex than to risks and opportunities associated with social constructs of gender. It is also worth noting that women's greater longevity or more extensive use of health services cannot be taken as an indication of better health or privileged access to health care. There is a need for proper analysis of gender differences in needs, access, and control over the appropriate resources to meet those needs. Such analysis is a prerequisite for understanding the health situation and achieving universal equity.

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TABLE 1. Internet users, by region of the world, 2001.

Region	Internet users	Users per 1,000 population	Percentage of total world users
United States and Canada	180,680,000	57.9	35.2
Europe	154,630,000	32.6	30.1
Asia/Pacific	143,990,000	4.5	28.1
Latin America and the Caribbean	24,817,000	4.7	4.8
Middle East	4,650,000	1.6	0.9
Africa	4,150,000	0.6	0.8
Total	512,917,200		100.0

Source: *Internet trends and statistics*. [Web site.] NUA Internet Surveys. Available at: <http://www.nua.com/surveys>. Accessed August 2001.

TABLE 2. Internet users, Latin America and the Caribbean, circa 2000.

Country or territory	Internet users	Percentage of population
Chile	1,750,000	11.4
Uruguay	370,000	11.0
Argentina	3,880,000	10.3
Virgin Islands	12,000	9.8
Antigua and Barbuda	5,000	7.5
Brazil	11,940,000	6.9
Belize	15,000	6.1
Costa Rica	250,000	6.1
Puerto Rico	200,000	5.1
Saint Kitts and Nevis	2,000	5.1
Grenada	4,100	4.6
Bahamas	13,100	4.2
Venezuela	950,000	3.9
Aruba	4,000	3.8
Mexico	3,420,000	3.4
Trinidad and Tobago	42,800	3.3
Saint Vincent and the Grenadines	3,500	3.0
Dominica	2,000	2.8
Suriname	11,700	2.8
Jamaica	60,000	2.3
Barbados	6,000	2.2
Colombia	878,000	2.0
Saint Lucia	3,000	1.9
Panama	45,000	1.6
Peru	400,000	1.5
Ecuador	180,000	1.4
Martinique	5,000	1.3
French Guiana	2,000	1.1
Bolivia	78,000	0.9
Netherlands Antilles	2,000	0.9
Guadeloupe	4,000	0.9
El Salvador	40,000	0.6
Honduras	40,000	0.6
Guatemala	65,000	0.6
Cuba	60,000	0.5
Nicaragua	20,000	0.4
Paraguay	20,000	0.4
Guyana	3,000	0.3
Dominican Republic	25,000	0.3
Haiti	6,000	0.1

Source: *Internet trends and statistics*. [Web site.] NUA Internet Surveys. Available at: <http://www.nua.com/surveys>. Accessed August 2001.

TABLE 3. Internet servers, selected countries of Latin America and the Caribbean, 2001.

Country	Total number of Internet servers (top-level domains)	Number of servers per 1,000 population
Uruguay	25,385	7.7
Mexico	404,873	4.3
Argentina	142,470	4.0
Trinidad and Tobago	4,852	3.7
Brazil	446,444	2.7
Chile	40,190	2.6
Costa Rica	7,471	2.2
Colombia	40,565	1.0
Dominican Republic	6,754	0.8
Venezuela	14,281	0.6
Panama	1,235	0.4
Peru	9,230	0.4
Paraguay	1,660	0.3
Ecuador	1,922	0.2
Guatemala	1,772	0.2
Nicaragua	1,028	0.2

Source: Hahn S. *Case studies on development of the Internet in Latin America and the Caribbean*. Washington, DC: Organization of American States; 2001.

TABLE 4. Science and technology investment, in absolute values, selected countries of the Region, 1997.

Country	Investment as a percentage of GDP	Investment in millions of US\$
United States	2.55	196,540
Canada	1.59	11,059
Cuba	1.33	193
Brazil	1.24	9,187
Panama	0.92	80
Peru	0.67	424
Colombia	0.65	604
Argentina	0.50	1,466
Mexico	0.42	1,690
Uruguay	0.42	50
El Salvador	0.30	34

Source: Red de Indicadores de Ciencia y Tecnología Iberoamericana/Interamericana (RICYT). [Web site.] Available at: <http://www.rieyt.edu.ar>. Accessed in 2001.



TABLE 5. Turnover of ministers of health, selected countries of the Region, 1983–1997.

Rate of turnover	Countries	Average length in office
High	Argentina, Bolivia, Brazil, Colombia, Grenada, Haiti, Peru, Suriname, Venezuela	1 year and 3 months
Medium	Bahamas, Barbados, Belize, Canada, Dominican Republic, Ecuador, Guatemala, Guyana, Honduras, Nicaragua, Panama, Saint Vincent and the Grenadines, Trinidad and Tobago, Uruguay	2 years
Low	Antigua and Barbuda, Costa Rica, Cuba, Dominica, El Salvador, Jamaica, Mexico, Paraguay, Saint Lucia, United States of America	3 and a half years

Source: Pan American Health Organization. Database of the Program on Public Policy and Health, 2000.

TABLE 6. Percentage distribution of poor urban families by leading cause of poverty, circa 1997.

Country and poverty index in percentage	Poverty from low income (%)	Poverty from unemployment (%)	Poverty from family size (%)	Poverty from other causes (%)
Argentina (Buenos Aires) 13%	42	33	21	4
Bolivia 47%	72	8	11	9
Brazil 25%	69	16	7	8
Chile 19%	58	18	11	13
Colombia (Bogotá) 30%	68	15	10	7
Ecuador 35%	70	12	10	9
Honduras 67%	74	9	11	6
Mexico 38%	83	7	8	2
Panama 25%	57	25	13	6
Paraguay (Asunción) 34%	71	10	10	9
Uruguay 6%	67	20	9	4
Venezuela 42%	68	17	10	6

Source: Comisión Económica para América Latina y el Caribe. *La brecha de la equidad: una segunda evaluación*. Santiago: CEPAL; 2000.

TABLE 7. Percentage of indigent and poor rural population, selected countries of Latin America, circa 1997.

Country/year	Percentage of rural indigence	Percentage of rural poverty/non-indigence	Total poverty plus indigence
Brazil, 1996	22.9	22.7	45.6
Chile, 1996	6.9	15.8	22.7
Colombia, 1997	29.3	24.7	54.0
Costa Rica, 1997	9.1	13.8	22.9
Honduras, 1997	58.6	21.3	79.9
Mexico, 1996	24.7	28.1	52.8
Panama, 1997	14.1	19.4	33.5
Venezuela, 1994	22.9	24.8	47.7

Source: Comisión Económica para América Latina y el Caribe. *La brecha de la equidad: una segunda evaluación*. Santiago: CEPAL; 2000.

TABLE 8. Inequalities in primary schooling, by income level, in urban areas of selected countries of Latin America, 2000.

Country	Income quartile	School-age children enrolled late in primary school (%)	Children who repeat two of the first grades (%)	School-age children who interrupt or fall behind in the first four grades (%)	Children who interrupt or fall behind in primary school (%)
Brazil	First	8	44	48	67
	Fourth	1	5	5	13
Chile	First	2	14	8	14
	Fourth	0	4	2	2
Colombia	First	8	21	23	35
	Fourth	2	7	4	12
Costa Rica	First	3	30	17	23
	Fourth	0	3	3	4
El Salvador	First	9	19	25	29
	Fourth	1	5	2	3
Honduras	First	10	19	18	33
	Fourth	4	3	10	9
Mexico	First	4			16
	Fourth	0	...	...	0
Nicaragua	First	9	22	24	35
	Fourth	0	6	12	18
Panama	First	1	12	8	12
	Fourth	0	1	2	2
Paraguay	First	7	17	19	23
	Fourth	0	3	4	10
Uruguay	First	2	15	8	13
	Fourth	0	0	0	0
Venezuela	First	5	16	15	25
	Fourth	1	2	2	8

Source: Comisión Económica para América Latina y el Caribe. *La brecha de la equidad: una segunda evaluación*. Santiago: CEPAL; 2000.

TABLE 9. Percentage of homes with drinking-water connection and per capita income, selected countries of Latin America and the Caribbean, 1996–1999.

Country	Year	Income per capita (US\$)	Percentage of population with drinking water
Nicaragua	1998	442	61
Bolivia	1999	1,094	65
Ecuador	1998	1,620	56
Paraguay	1997	1,889	44
El Salvador	1998	1,967	53
Colombia	1997	2,404	85
Peru	1997	2,675	72
Jamaica	1998	2,744	67
Panama	1997	3,169	86
Chile	1998	4,900	90
Brazil	1996	4,912	76

Source: Organización Panamericana de la Salud, Programa de Políticas Públicas y Salud, Programa de Saneamiento Básico. *Desigualdades en el acceso, uso y gasto con el agua potable en América Latina y el Caribe*. Washington, DC: OPS; 2001. (Serie de Informes Técnicos 1-11).

TABLE 10. Percentage of homes with water connection according to first and tenth income decile and geographic area of settlement, selected countries of Latin America and the Caribbean, circa 1999.

Country	Area	Percentage of homes with household water connection, for the lowest and highest income decile and for total population		
		First decile (lowest income)	Tenth decile (highest income)	Total
Bolivia	Urban	82.1	98.1	90.6
	Rural	14.3	41.5	23.0
Brazil	Urban	53.5	97.3	89.6
	Rural	2.6	32.3	19.3
Chile	Urban	96.8	99.7	98.8
	Rural	27.7	43.1	36.0
Colombia	Urban	91.1	99.2	97.4
	Rural	71.4	91.8	78.2
	Rural <sup>a</sup>	29.6	41.0	31.2
Ecuador	Urban	56.2	90.8	75.3
	Rural	42.3	49.4	46.3
	Rural <sup>a</sup>	11.2	26.3	18.5
El Salvador	Urban	39.3	88.8	70.5
	Rural	16.2	39.6	25.5
Jamaica	Kingston	95.7	100.0	97.4
	Urban	62.7	89.5	79.4
	Rural	23.2	54.8	38.8
Nicaragua	Urban	58.3	96.4	83.9
	Rural	7.3	53.3	30.5
Panama	Urban	84.0	100.0	95.4
	Rural	55.8	92.8	79.9
	Rural <sup>b</sup>	16.7	45.5	24.4
	Indigenous	39.0	34.4	37.1
Paraguay	Urban	35.0	87.7	66.9
	Rural	1.8	30.6	13.3
Peru	Urban	57.7	97.0	85.0
	Rural	35.0	34.4	41.9

<sup>a</sup>Rural.

<sup>a</sup>Scattered rural.

<sup>b</sup>Hard-to-access rural areas.

Source: Organización Panamericana de la Salud, Programa de Políticas Públicas y Salud, Programa de Saneamiento Básico. *Desigualdades en el acceso, uso y gasto con el agua potable en América Latina y el Caribe*. Washington, DC: OPS; 2001. (Serie de Informes Técnicos 1–11).

TABLE 11. Malnutrition rate in children, selected countries of Latin America and the Caribbean, by income quintile, circa 1999.

Country	Poorest quintile	Second quintile	Middle quintile	Fourth quintile	Wealthiest quintile	Ratio of poorest to wealthiest quintile
Bolivia	39.2	29.0	22.3	11.1	6.0	6.53
Brazil	23.2	8.7	5.0	3.9	2.3	10.09
Colombia	23.7	16.7	13.4	7.7	5.9	4.02
Dominican Republic	21.5	10.3	7.8	5.6	2.5	8.60
Guatemala	64.6	61.6	53.5	33.5	12.1	5.34
Haiti	45.5	33.0	32.3	25.2	12.8	3.56
Nicaragua	38.1	29.1	22.7	13.0	8.3	4.59
Paraguay	22.5	19.0	12.5	6.3	3.0	7.5
Peru	45.6	30.8	18.8	9.9	5.2	8.77

Source: Gwatkin DR, et al. *Socio-economic differences in health, nutrition, and population in selected countries*. Washington, DC: World Bank, HNP/Poverty Thematic Group; May 2000.

TABLE 12. Percentage of children treated for respiratory infections, by income quintile, selected countries of Latin America and the Caribbean, circa 1999.

Country	Poorest quintile	Second quintile	Middle quintile	Fourth quintile	Wealthiest quintile	Ratio of poorest to wealthiest quintile
Bolivia	27.6	37.3	41.1	58.4	69.5	0.397
Brazil	33.4	47.4	47.6	52.6	65.1	0.513
Colombia	34.3	50.5	49.4	53.7	68.0	0.504
Dominican Republic	38.8	49.2	52.6	46.9	60.2	0.645
Guatemala	27.6	29.7	46.3	47.4	73.3	0.377
Haiti	8.5	14.4	13.7	22.7	36.3	0.234
Nicaragua	45.2	56.2	62.6	67.1	73.9	0.612
Peru	35.8	44.6	51.5	56.2	56.4	0.635

Source: Gwatkin DR, et al. *Socio-economic differences in health, nutrition, and population in selected countries*. Washington, DC: World Bank, HNP/Poverty Thematic Group; May 2000.

TABLE 13. Percentage of complete vaccination coverage, by income quintile, in nine selected countries of Latin America and the Caribbean, circa 1999.

Country	Poorest quintile	Second quintile	Middle quintile	Fourth quintile	Wealthiest quintile	Ratio of poorest to wealthiest quintile
Bolivia	21.8	24.9	21.0	33.4	30.6	0.712
Brazil	56.6	74.0	84.9	83.1	73.8	0.767
Colombia	53.8	66.9	68.1	70.6	74.1	0.726
Dominican Republic	28.0	30.2	46.9	42.6	51.7	0.542
Guatemala	41.2	43.0	47.1	38.3	42.5	0.969
Haiti	18.8	20.1	35.3	37.9	44.1	0.426
Nicaragua	61.0	74.6	75.3	85.7	73.1	0.834
Paraguay	20.2	30.8	36.4	40.7	53.0	0.381
Peru	55.3	63.8	63.5	71.7	66.0	0.838

Source: Gwatkin DR, et al. *Socio-economic differences in health, nutrition, and population in selected countries*. Washington, DC: World Bank, HNP/Poverty Thematic Group; May 2000.

TABLE 14. Infant mortality rate by income quintile, selected countries of Latin America and the Caribbean, circa 1999.

Country	Poorest quintile	Second quintile	Middle quintile	Fourth quintile	Wealthiest quintile	Ratio of poorest to wealthiest quintile
Bolivia	106.5	85.0	75.5	38.6	25.5	4.176
Brazil	83.2	46.7	32.9	24.7	28.6	2.909
Colombia	40.8	31.4	27.0	31.5	16.2	2.519
Dominican Republic	66.7	54.5	52.3	33.5	23.4	2.850
Guatemala	56.9	79.7	55.7	46.7	35.0	1.626
Haiti	93.7	93.6	85.6	81.7	74.3	1.261
Nicaragua	50.7	53.7	45.7	40.2	25.8	1.965
Paraguay	42.9	36.5	46.1	33.5	15.7	2.732
Peru	78.3	53.6	34.4	36.0	19.5	4.015

Source: Gwatkin DR, et al. *Socio-economic differences in health, nutrition, and population in selected countries*. Washington, DC: World Bank, HNP/Poverty Thematic Group; May 2000.

TABLE 15. Percentage of pregnant women receiving prenatal and delivery care from institutional personnel, by income quintile, selected countries of Latin America, circa 1999.

Country	Income quintile					Average for total population	Ratio of poorest to wealthiest
	Poorest	Second	Middle	Fourth	Wealthiest		
Bolivia							
Prenatal care	38.8	57.8	70.4	88.6	95.3	65.1	0.407
Professional delivery care	19.8	44.8	67.7	87.9	97.9	56.7	0.202
Brazil							
Prenatal care	67.5	87.7	93.4	96.9	98.1	85.6	0.688
Professional delivery care	71.6	88.7	95.7	97.7	98.6	87.7	0.726
Colombia							
Prenatal care	67.5	87.7	93.4	96.9	98.1	85.6	0.688
Professional delivery care	60.6	85.2	92.8	98.9	98.1	84.5	0.618
Dominican Republic							
Prenatal care	96.1	98.2	99.0	99.2	99.9	98.3	0.962
Professional delivery care	88.6	96.9	97.3	98.4	97.8	95.3	0.906
Guatemala							
Prenatal care	34.6	41.1	49.3	72.2	90.0	52.5	0.384
Professional delivery care	9.3	16.1	31.1	62.8	91.5	34.8	0.102
Haiti							
Prenatal care	44.3	60.0	72.3	83.7	91.0	67.7	0.487
Professional delivery care	24.0	37.3	47.4	60.7	78.2	46.3	0.307
Nicaragua							
Prenatal care	67.0	80.9	86.9	89.0	96.0	81.5	0.698
Professional delivery care	32.9	58.8	79.8	86.0	92.3	64.6	0.356
Paraguay							
Prenatal care	69.5	79.5	85.6	94.8	98.5	83.9	0.706
Professional delivery care	41.2	49.9	69.0	87.9	98.1	66.0	0.420
Peru							
Prenatal care	37.3	64.8	79.1	87.7	96.0	67.3	0.389
Professional delivery care	13.7	48.0	75.1	90.3	96.6	56.4	0.142

Source: Gwatkin DR, et al. *Socio-economic differences in health, nutrition, and population in selected countries*. Washington, DC: World Bank, HNP/Poverty Thematic Group; May 2000.

TABLE 16. Percentage of women of reproductive age who use modern contraceptive methods, by income quintile, selected countries of Latin America and the Caribbean, circa 1999.

Country	Poorest quintile	Second quintile	Middle quintile	Fourth quintile	Wealthiest quintile	Ratio of poorest to wealthiest quintile
Brazil	55.8	68.9	73.6	73.8	76.8	0.727
Bolivia	7.1	17.2	22.2	32.2	45.6	0.156
Colombia	42.2	59.6	62.7	64.2	65.7	0.642
Dominican Republic	51.2	61.7	58.2	61.5	63.7	0.804
Guatemala	5.4	10.1	21.4	37.4	57.1	0.095
Haiti	4.9	7.4	12.7	20.4	20.9	0.234
Nicaragua	40.2	55.5	60.3	65.4	64.2	0.626
Paraguay	20.6	25.3	34.4	44.3	46.1	0.447
Peru	24.0	37.5	45.2	48.9	50.3	0.477

Source: Gwatkin DR, et al. *Socio-economic differences in health, nutrition, and population in selected countries*. Washington, DC: World Bank, HNP/Poverty Thematic Group; May 2000.

TABLE 17. Distribution of the benefits (percentage) of public expenditure on health in Ecuador, Guatemala, Jamaica, and Peru.

Country	Poorest quintile	Second quintile	Middle quintile	Fourth quintile	Wealthiest quintile
Ecuador	12.5	15.0	19.4	22.5	30.5
Guatemala	12.8	12.7	16.9	26.3	31.3
Jamaica	25.3	23.9	19.4	16.2	15.2
Peru	20.1	20.7	21.0	20.7	17.5

Source: Suárez-Berenguela RM. "Health systems inequalities and inequities in Latin America and the Caribbean: findings and policy implications." In: Pan American Health Organization. *Investment in health: social and economic returns*. Washington, DC: PAHO; 2001:135. (Scientific and Technical Publication 582).

TABLE 18. Estimated indigenous population of the Americas.

Countries according to percentage of indigenous population		Indigenous population	
		Thousands	Percentage of total population
Group 1 Over 40%	Bolivia	5,652	71
	Guatemala	7,129	66
	Peru	11,655	47
	Ecuador	5,235	43
Group 2 5%–20%	Belize	44	19
	Honduras	922	15
	Mexico	13,416	14
	Chile	1,186	8
	El Salvador	422	7
	Guyana	51	6
	Panama	132	6
	Suriname	25	6
	Nicaragua	240	5
Group 3 1%–4%	French Guiana	4	4
	Paraguay	157	3
	Colombia	816	2
	Venezuela	465	2
	Jamaica	51	2
	Puerto Rico	72	2
	Trinidad and Tobago	26	2
	Dominican Republic	54	2
	Canada <sup>a</sup>	35	1
	Costa Rica	38	1
	Guadeloupe	3	1
	Barbados	3	1
	Bahamas	3	1
	Martinique	1	1
Argentina	361	1	
Group 4 Less than 1%	United States <sup>b</sup>	2,475	0.9
	Uruguay	1	0.016
	Brazil	332	0.20

<sup>a</sup>Pan American Health Organization. *Health in the Americas*. 1998 edition. Washington, DC: PAHO; 1998. (Scientific Publication 569).

<sup>b</sup>United States Census Bureau [Web site].

Source: Meentzen A. *Estrategias de desarrollo culturalmente adecuadas para mujeres indígenas*. Washington, DC: Banco Interamericano de Desarrollo; 2000. (Documento 11/00, IND, S).

TABLE 19. Estimates of black and mestizo populations, by country, Region of the Americas, 1970–2000.

Country	Year	Black (%)	Mestizo (%)	Population	Black plus mestizo population
Antigua and Barbuda	1970	81.4	8.6	67,000	60,300
Argentina				36,125,000	<sup>a</sup>
Bahamas				300,000	
Barbados	1980	91.9	2.6	268,000	253,260
Belize	1991	6.6	43.7	230,000	115,690
Bolivia				7,957,000	<sup>a</sup>
Brazil	1995	4.9	40.1	166,296,000	74,833,200
Canada	1996	1.5 <sup>b</sup>		28,528,125	442,605 <sup>b</sup>
Chile				14,822,000	<sup>a</sup>
Colombia	1991	5.0	71.0	40,804,000	31,011,040
Costa Rica				3,840,000	<sup>a</sup>
Cuba	1981	12.0	21.8	11,116,000	3,757,208
Dominica	1981	91.2	6.0	71,000	69,012
Dominican Republic	1991	11.0	73.0	8,232,000	6,914,880
Ecuador				12,175,000	<sup>a</sup>
El Salvador				6,031,000	<sup>a</sup>
Grenada	1980	82.2	13.3	93,000	88,815
Guadeloupe				443,000	
Guatemala				10,802,000	<sup>a</sup>
Guyana	1980	30.5	11.0	856,000	355,240
Haiti	1999	95.0		8,056,000	7,653,200
Honduras				6,148,000	<sup>a</sup>
Jamaica	1970	90.9	5.8	2,539,000	2,455,213
Mexico				95,830,000	<sup>a</sup>
Netherlands Antilles				213,000	
Nicaragua				4,807,000	<sup>a</sup>
Panama				2,767,000	<sup>a</sup>
Paraguay				5,223,000	<sup>a</sup>
Peru				24,801,000	<sup>a</sup>
Saint Kitts and Nevis	1980	94.3	3.3	41,000	40,016
Saint Lucia	1980	86.8	9.3	148,000	142,228
Saint Vincent and the Grenadines	1980	82.0	13.9	115,000	110,285
Suriname		15.0		416,000	62,400
Trinidad and Tobago	1980	40.8	16.3	1,284,000	733,164
United States	2000	12.9 <sup>c</sup>		281,400,000	36,300,000
Uruguay			3 <sup>d</sup>	3,289,000	96,000 <sup>d</sup>
Venezuela	1991	10.0	65.0	23,242,000	17,431,500
Total				812,664,125	200,260,756

<sup>a</sup>Census does not collect information on racial origin (African).

<sup>b</sup>Data are from the 1996 Canadian census. African-descendent and Caribbean origin populations were grouped together.

<sup>c</sup>The United States percentage refers to African descendents and includes black and mestizo.

<sup>d</sup>The estimates for Uruguay are from the Organization of Afro-Americans, and the percentage includes all African descendents.

Source: Hopenhayn M, Bello A. *Discriminación étnico-racial y xenofobia en América Latina y el Caribe*. Santiago: Comisión Económica para América Latina y el Caribe; 2001.



TABLE 20. Percentage of general and indigenous populations living below the poverty line.

Country	General population (%)	Indigenous population (%)
Bolivia <sup>a</sup>	52.5	64.3
Guatemala	65.6	86.6
Mexico	22.6	80.6
Peru	53.0	79.0
Paraguay <sup>b</sup>	20.5	36.8

<sup>a</sup>Urban population only.

<sup>b</sup>The non-bilingual Guaraní-speaking population was considered indigenous.

Sources: For Mexico and Peru: Quezada Ch. *Invisible citizens*. Washington, DC: Inter-American Development Bank; 2001. For other countries: Hopenhayn M, Bello A. *Discriminación étnico-racial y xenofobia en América Latina y el Caribe*. Santiago: Comisión Económica para América Latina y el Caribe; 2001.

TABLE 21. Distribution (percentage) of ethnic groups by income quintile, Brazil, 1996.

Ethnic group	Quintile				
	1 poorest	2	3	4	5 wealthiest
Indigenous	27.88	34.63	12.78	16.88	7.82
Black	22.97	23.91	22.35	19.22	11.54
Mulatto	29.53	25.05	19.41	16.08	9.95
White	13.37	17.34	18.35	23.18	27.77
Asian	8.10	8.38	10.72	14.92	57.88

Source: Torres C. *Una mirada desde la perspectiva de la etnicidad*. Washington, DC: Organización Panamericana de la Salud; 2001. Based on data from the National Household Sample Survey (Pesquisa Nacional por Amostra de Domicílios—PNAD), 1996.

TABLE 22. Per capita income by ethnic group, United States, 1999.

Ethnic group	Per capita income in US\$
African-American	14,397
Hispanic	11,621
Asian and Pacific Islander	21,134
Indigenous and native Alaskan	Not available
White	24,109

Source: US Department of Health and Human Services. *Mental health: culture, race, and ethnicity*. Washington, DC: USDHHS; 2001.

TABLE 23. Schooling, wages, and potential educational benefit to the indigenous population and the population of African-descent, selected Latin American countries.

Country	Indigenous or of African-descent population (%)	Difference in years of schooling, compared to rest of population	Average wage ratio of African descendents and indigenous populations to rest of population	Benefits if current education level were utilized (%)	Benefits in GDP if attain same education level as rest of population (%)
Bolivia	49.32	-4.4 years	0.49	17.12	19.56
Brazil	43.94	-2.1 years	0.50	4.85	7.98
Guatemala	44.70	-2.8 years	0.53	4.59	9.04
Peru	17.82	-3.3 years	0.58	1.76	2.45

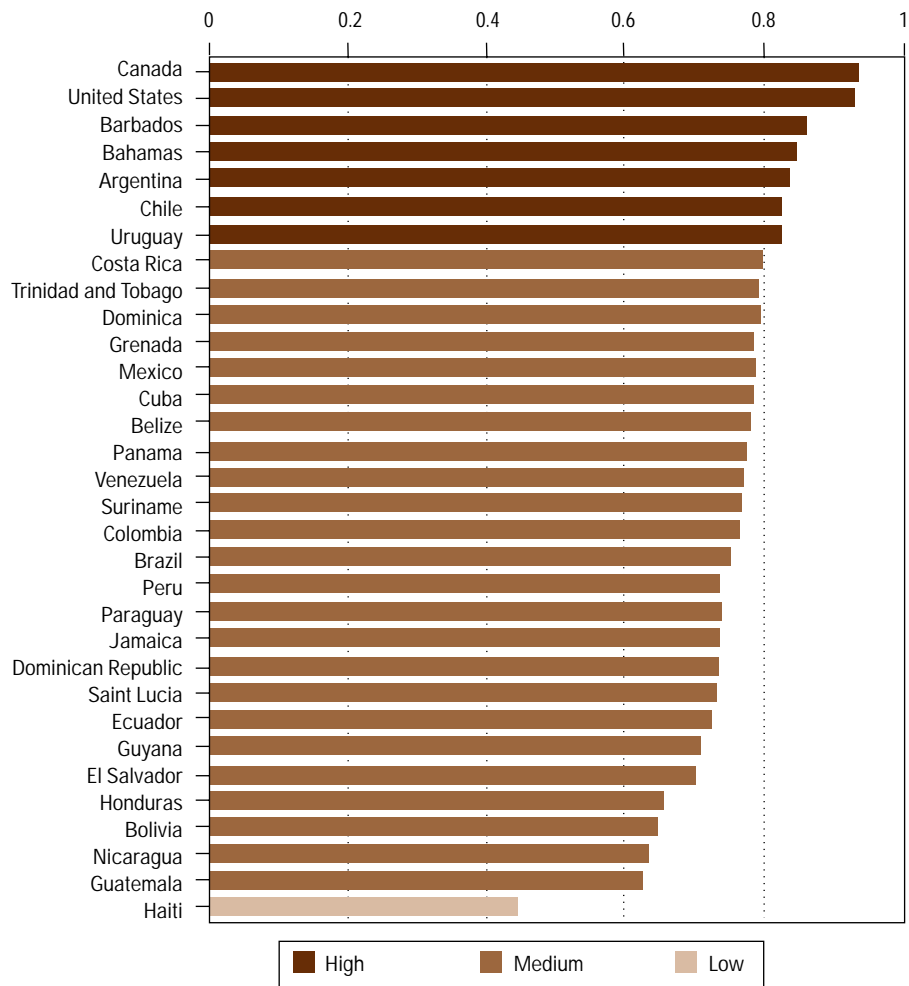
Source: Zoninsein J. *El caso económico para combatir la exclusión racial y étnica en América Latina y el Caribe*. Washington, DC: Banco Interamericano de Desarrollo; 2002.

TABLE 24. Distribution (percentage) of sources of drinking water by ethnicity, Brazil, 1996.

Population	No household connection			With household connection		
	Other sources	Well or spring	General system	Other sources	Well or spring	General system
Indigenous	15.64	42.02	1.88	0.00	6.56	33.80
Black	5.99	8.31	5.85	0.13	6.28	73.29
Mulatto	10.99	13.19	7.26	0.09	7.66	60.61
White	2.47	4.46	1.88	0.12	11.01	79.92

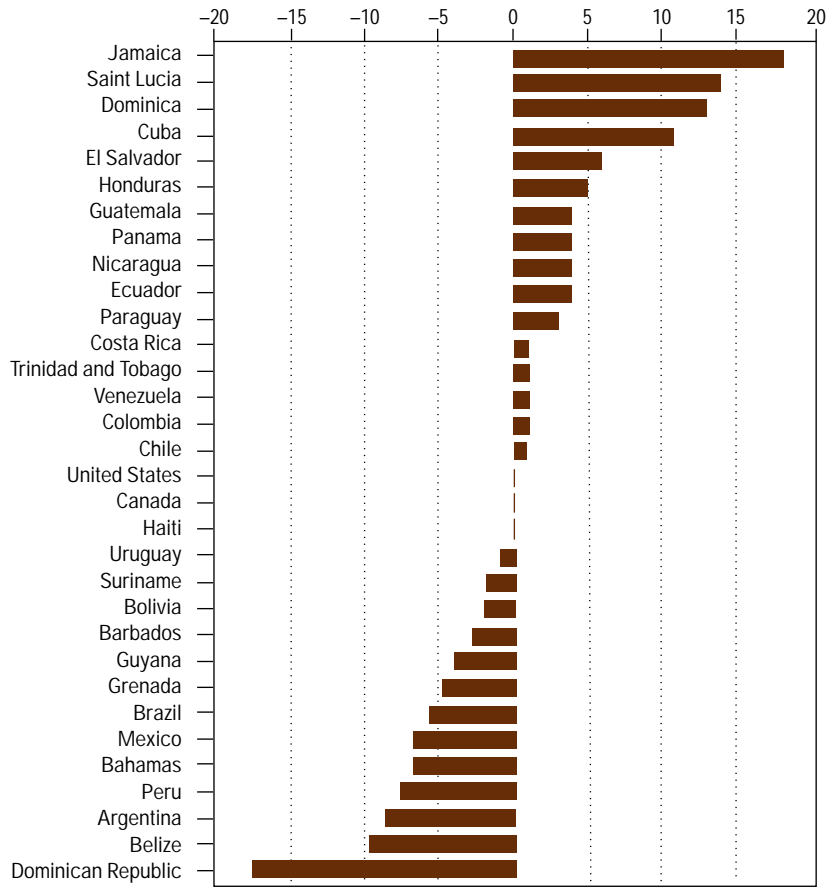
Source: Torres C. *Una mirada desde la perspectiva de la etnicidad*. Washington, DC: Organización Panamericana de la Salud; 2001. Based on data from the National Household Sample Survey (Pesquisa Nacional por Amostra de Domicílios—PNAD), 1996.

FIGURE 1. Human development index, selected countries of the Americas, 2000.



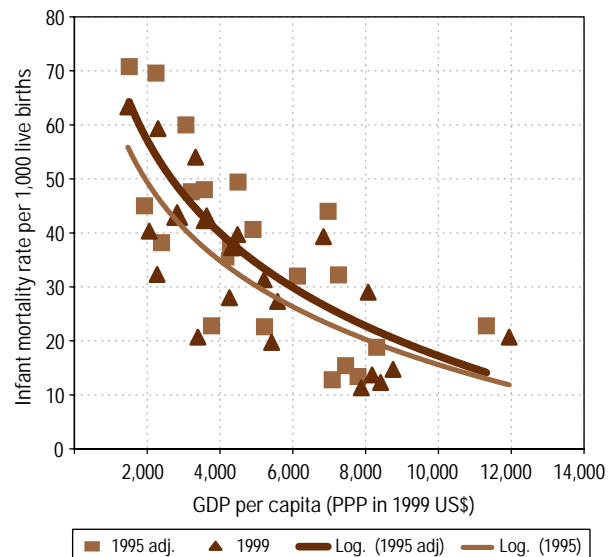
Source: United Nations Development Programme, *Human Development Report 2000*. New York: Oxford University Press; 2000.

FIGURE 2. Difference in variation of the human development index and the infant mortality rate, selected countries of the Americas, 2000.



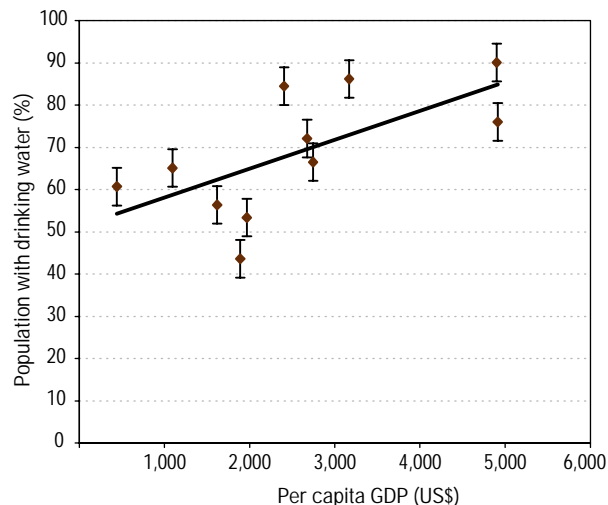
Source: United Nations Development Programme, *Human Development Report 2000*. New York: Oxford University Press; 2000.

FIGURE 3. Infant mortality rate and GDP per capita (PPP in 1999 US\$), 22 countries of Latin America and the Caribbean, 1995 and 1999.



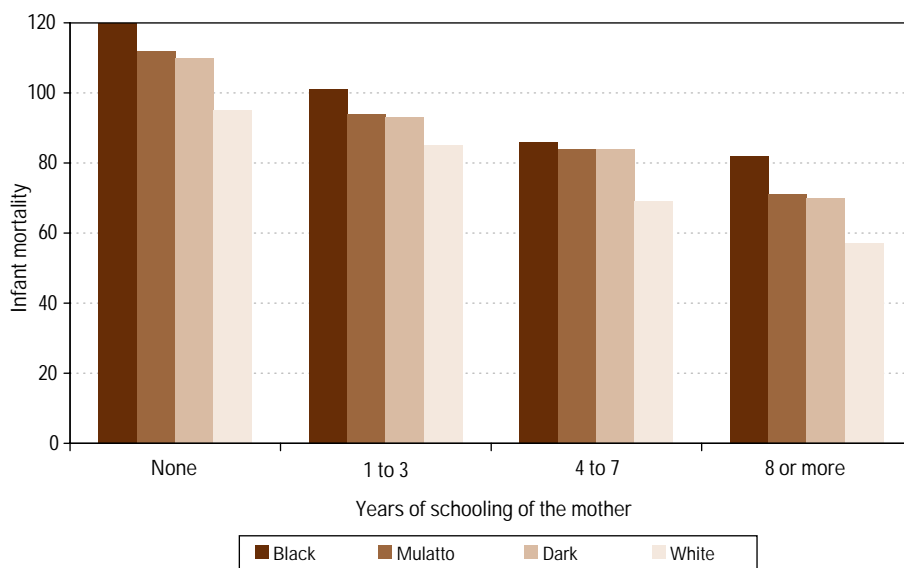
Source: Organización Panamericana de la Salud, Programa Especial de Análisis de Salud. *Iniciativa de datos básicos de salud*. Washington, DC: OPS; 2001.

FIGURE 4. Percentage of the population with drinking-water service, by per capita GDP, 11 countries of Latin America and the Caribbean, circa 1999.



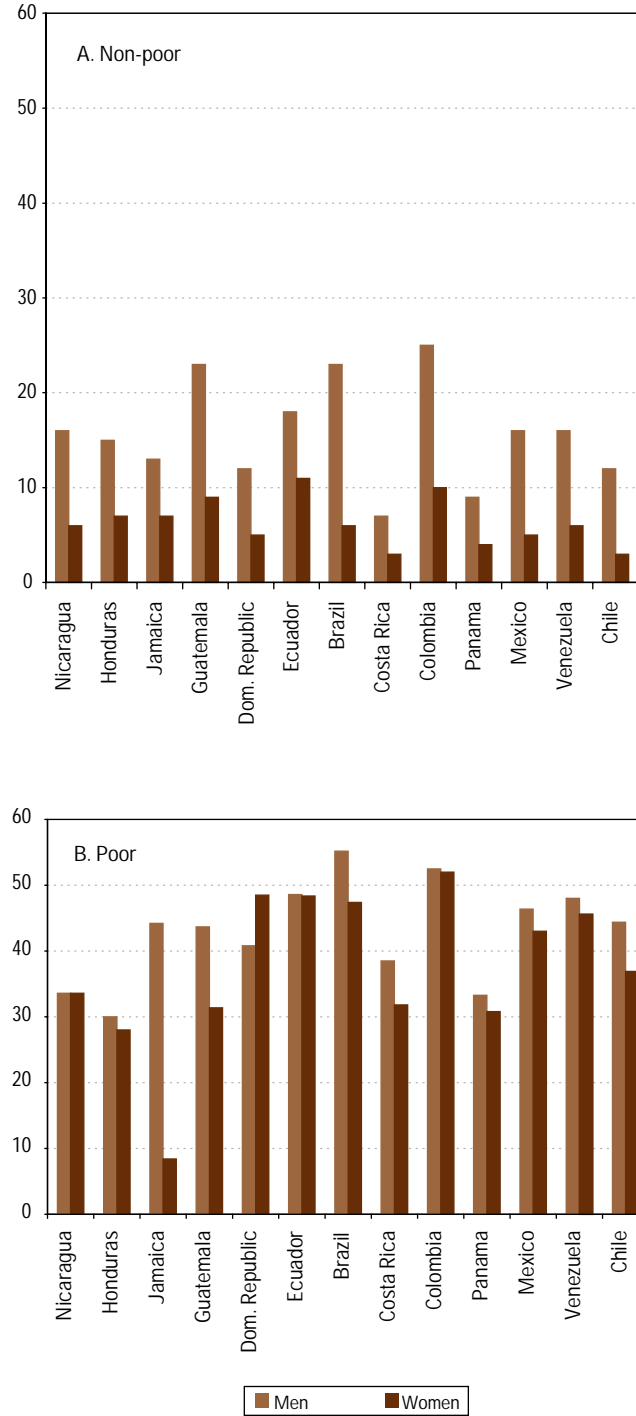
Source: Organización Panamericana de la Salud, Programa de Políticas Públicas y Salud, Programa de Saneamiento Básico. *Desigualdades en el acceso, uso y gasto con el agua potable en América Latina y el Caribe*. Washington, DC: OPS; 2001. (Serie de Informes Técnicos 1-11).

FIGURE 5. Infant mortality by years of schooling of the mother and by race, Brazil, 1990.



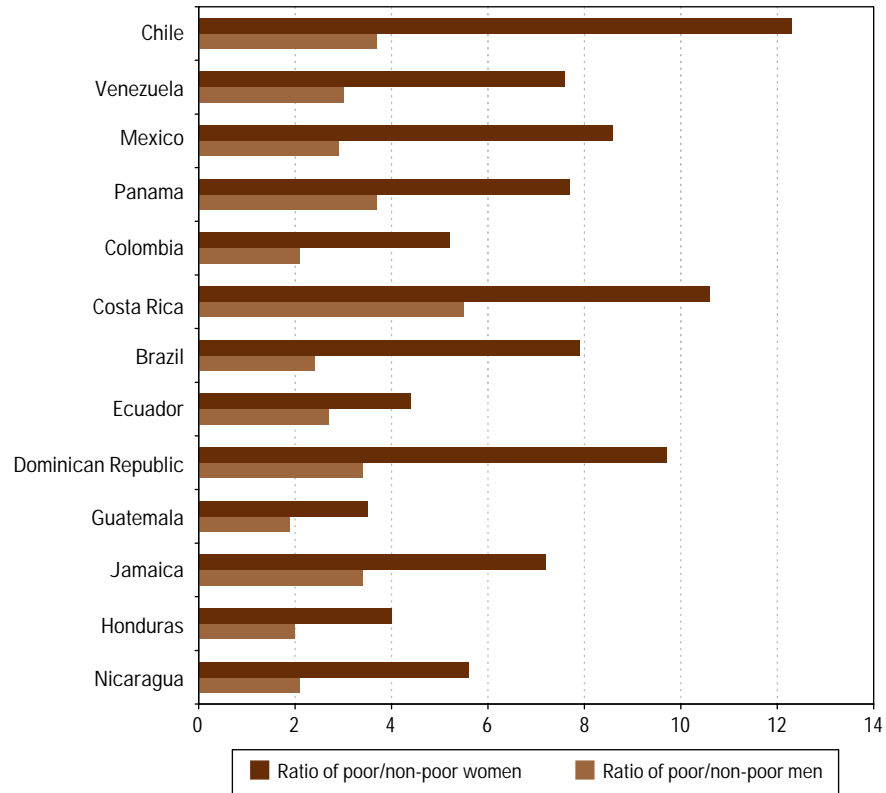
Source: Casas JA. *Disparidades de salud en América Latina y el Caribe: el rol de los factores determinantes sociales y económicos*. Washington, DC: Organización Panamericana de la Salud; 2000.

FIGURE 6. Risk of dying (per 1,000) between ages 15 and 59, by sex, country, and socioeconomic level (circa 1996).



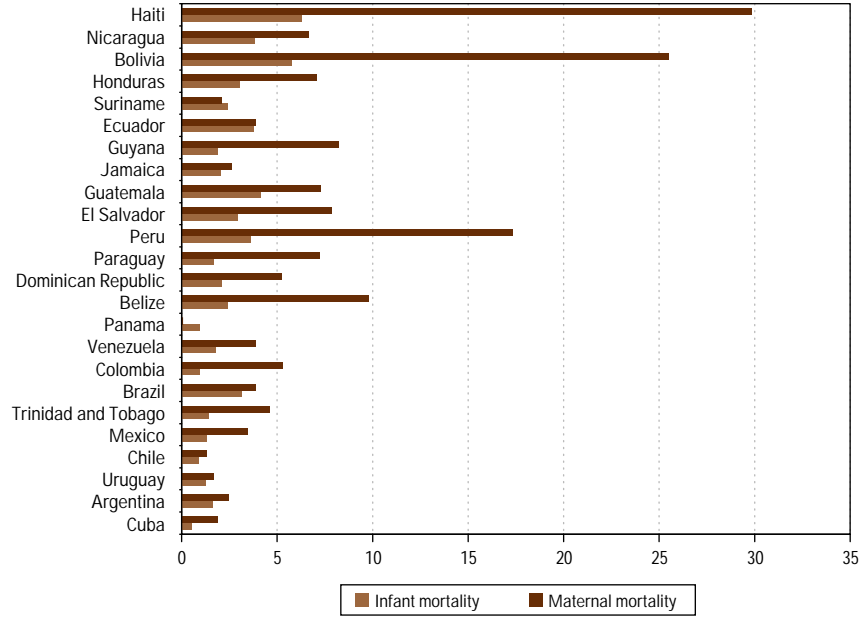
Source: World Health Organization. *The world health report 1999: making a difference*. Geneva: WHO; 1999.

FIGURE 7. Ratio of poor/non-poor for risk of dying for men and women (per 1,000) between ages 15 and 59 years.



Source: World Health Organization. *The world health report 1999: making a difference*. Geneva: WHO; 1999. Statistical annex, table 7.

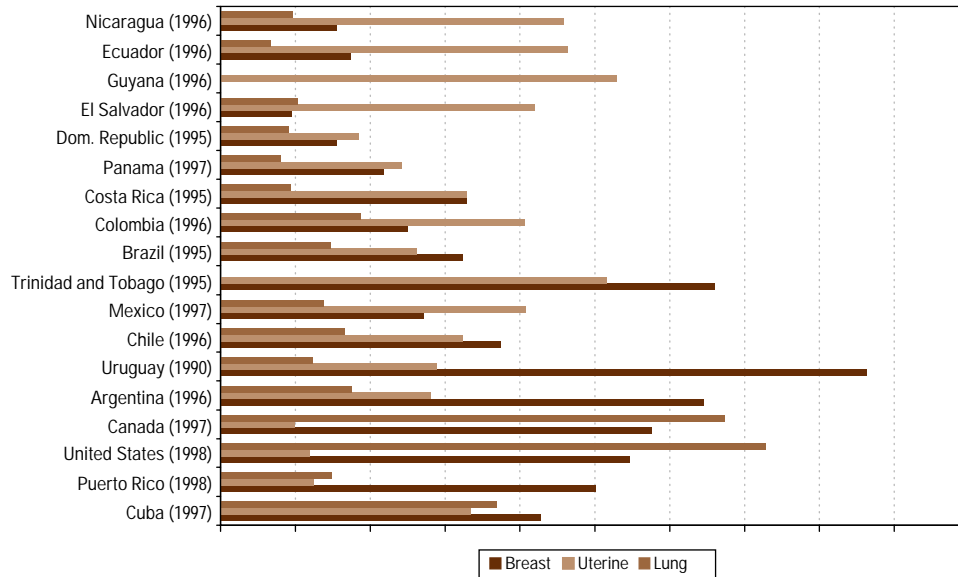
FIGURE 8. Ratio between maternal mortality and infant mortality rates in selected countries of the Americas and maternal mortality and infant mortality rates in Costa Rica.<sup>a</sup>



<sup>a</sup>Countries in ascending order of per capita GNP, adjusted for parity of purchasing power (PPP), in 1998. No data available for Cuba's GNP.

Source: Based on rates reported in: Organización Panamericana de la Salud, Special Program for Health Analysis. *Basic Indicators 2000*. Washington, DC: PAHO; 2000.

FIGURE 9. Registered mortality rates for women aged 50 to 64 (per 100,000) from breast, uterine, and lung cancer, selected countries of the Americas, circa 1997 (countries in ascending order of per capita GNP, PPP, in 1998).<sup>a</sup>

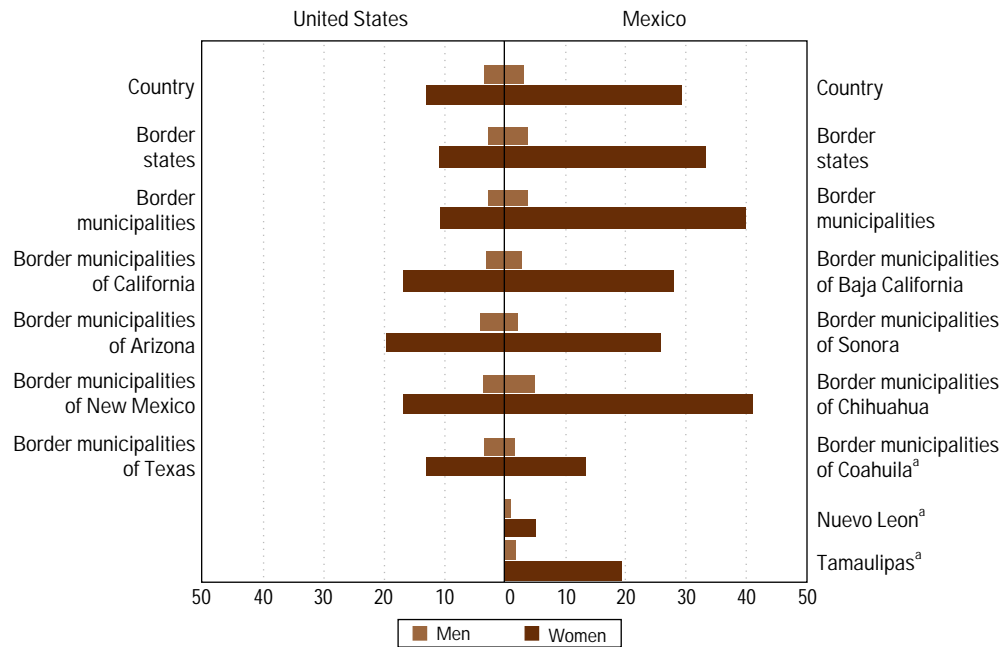


<sup>a</sup>No GNP data available for Cuba.

Source: Pan American Health Organization, Technical Information System. *Mortality database*. (Rates for fewer than 10 deaths are not included.)



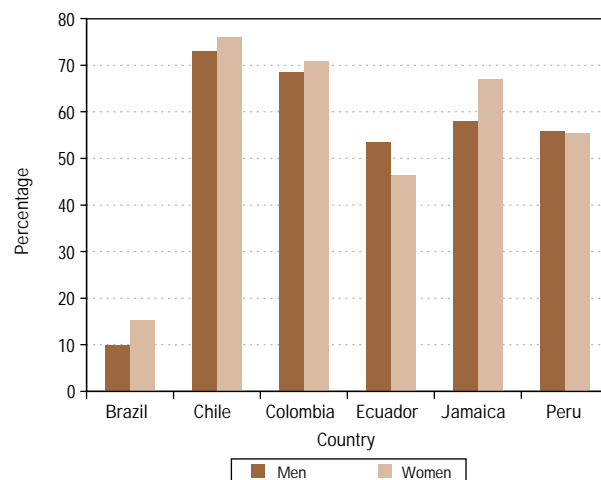
FIGURE 10. Age-standardized rates for homicide, legal intervention, and operations of war for women and men in Mexico, the United States, and border municipalities, 1995–1997.



<sup>a</sup>Rate per 100,000 population.

Source: Pan American Health Organization, Special Program for Health Analysis. *Perfiles de mortalidad de las comunidades hermanas fronteras, México-Estados Unidos*. Washington, DC: PAHO; 2000.

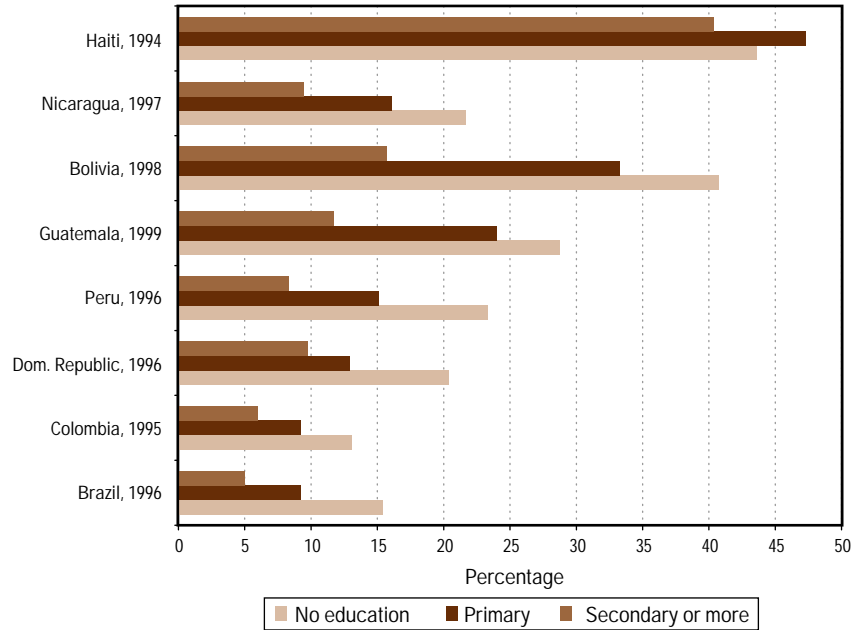
FIGURE 11. Use of health services for illness or accident, by sex, six countries of Latin America and the Caribbean (1997–2000).<sup>a</sup>



<sup>a</sup>Differences between the sexes are comparable among countries, but differences in use of services are not, because surveys did not use the same question nor the same period of reference, which varies from 15 days in Brazil; one month in Colombia, Ecuador, Jamaica, and Peru; and three months in Chile.

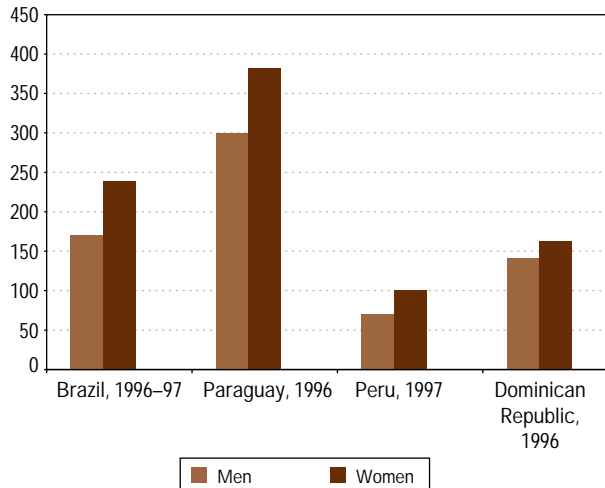
Source: Data from household surveys processed by the Pan American Health Organization in "Hoja resumen sobre desigualdad en salud" for Chile (2000), Colombia (2001), Jamaica (2001), Peru (2002), Ecuador (2002). Washington, DC: PAHO: 2000 and 2001; Travassos C, *et al. Utilização dos serviços de saúde no Brasil: gênero, características familiares e condição social*. Washington, DC: Pan American Health Organization; 2001.

FIGURE 12. Percentage of unmet family planning needs, by education level of the woman, selected countries in the Americas, 1994–1999.<sup>a</sup>



<sup>a</sup>Countries in ascending order of GNP per capita (PPP) in 1998.  
 Source: Demographic and Health Surveys, available at [www.measuredhs.com](http://www.measuredhs.com).

FIGURE 13. Out-of-pocket health expenditures for men and women, selected countries of Latin America and the Caribbean (in US\$).



Source: Living Standard Measurement Surveys for Brazil, Paraguay, and Peru; Demographic and Health Surveys for the Dominican Republic.

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# III. HEALTH SYSTEM REFORMS

*The challenge of achieving the goal of health for all will require the unflagging commitment of governments, the allocation of required resources, and the reform and restructuring of health systems in order to obtain maximum equity, efficiency, and effectiveness.*

Dr. Héctor Acuña,  
*Health Conditions in the Americas, 1977–1980*

## CONTEXT

The demographic context in which health systems in the Americas are operating at the start of the 21st century is characterized by a steady rise in life expectancy, a decline in mortality and birth rates, and major migratory movements. Latin American and Caribbean countries are undergoing an epidemiological transition in which diseases characteristic of developed countries exist side by side with others that are typical of underdeveloped countries and in which emerging diseases, such as AIDS, and reemerging ones, such as tuberculosis, are gaining ground. Violence, too, is a daily occurrence in this scenario, as are accidents and morbidity and mortality due to mental disorders and addictions (drugs, alcohol, tobacco). In spite of the gains that have been made, the Region continues to experience major shortcomings in drinking water supply and basic sanitation systems.

The Region's economic context is characterized by positive trends in macroeconomic variables that exist alongside worsening conditions for the least well-off population groups. On the one hand, the gross domestic product is rising in the Region, and a price stabilization that was unknown just a decade ago is in evidence; trade is being liberalized and subregional associations are being formed; tax and financial reform processes are accelerating; state-run enterprises are being privatized; and labor and social security reforms are being carried out. On the other hand, the number of poor people is on the rise, as is the urbanization of poverty, and there is an increasing concentration of wealth, with rising unemployment rates and an increase in informal employment.

These negative trends pose new challenges for public policies, particularly those that seek to extend social protection for health.

On the political front, societies are being democratized, at least in formal respects. With one exception, every government in the Region can be said to have been democratically elected. This democratization has occurred within the framework of State reform and transformation. The view that the State can do everything and own everything is being set aside and, to a greater or lesser extent, almost every country is witnessing the privatization of state-run enterprises. At the same time, the State is trying to discharge its untransferable functions as the guarantor of citizen rights, promoter of social cohesiveness, and coordinator of collective solidarity. To this end, the State is seeking to strengthen its regulatory powers, which means it must undergo an intensive modernization process that demands a change of culture.

In keeping with the above, public administration also is being reassessed. A more democratic approach to public policy making provides opportunities for the involvement of civil society in defining and furthering public interests. Public administration is no longer seen as exclusive to the State bureaucracy, but as belonging to all of society, even if public authorities continue to govern and regulate.

In the health sector, public administration not only means the direct provision of services. Above all, it entails guaranteeing the resolution of the population's health problems, by its own means or in ways that ensure the broad-based right to health. In discussions about health systems, more than the public establishments and networks are included; increasingly, all health care providers,

regardless of their legal or economic status, are becoming part of the debate.

Technological change is another key element in the context analysis, and one of the most notable changes has been the explosion of information technologies. Rapid access to these technologies and the opportunity that they afford for anticipating problems and developing innovative solutions lend them great potential. By and large, the speed and global nature of overall and sector-specific changes are forcing the health systems to find new ways to relate to their environment and to search for alternative modes of organization and management so they can respond satisfactorily to the population's demands.

### **The Regional Initiative for Following-up and Assessing Reforms**

By the early 1990s, almost all Latin American and Caribbean countries had begun or were considering starting to reform their health sectors (1). What exactly is "health sector reform" has been and continues to be debated (2, 3). According to the mandate issued by the First Summit of the Americas, PAHO, along with the Region's governments and other international bodies and agencies, is charged with following up and assessing health sector reforms. In 1995, an international meeting convened for this purpose (4) developed a definition of reform that has been widely used since then (5).<sup>1</sup> In 1997, the United States Agency for International Development (USAID) and PAHO launched the "Health Sector Reform Initiative." By mid-2001, the initiative had raised US\$ 10.2 million to support sector reform, with a view towards promoting equitable access to quality health services in 13 of the Region's countries. The follow-up and assessment of health sector reforms pose conceptual and methodological problems that are far from being resolved (6). In 1998, PAHO's Health Systems and Services Development Division disseminated the methodological guidelines for preparing profiles of health service systems in the Region's countries (7). These guidelines were designed to facilitate their use by national and subnational groups, as well as to be able to make comparisons between countries. The guidelines help fill out the three analytical categories: the political, economic, and social context; general organization, resources, and functions; and the follow-up and assessment of reforms.

The following is an analysis of the status of and trends in reforms at the end of the 1990s. It was based, among other sources, on information contained in the third section of the 25 profiles completed between August 1998 and November 2000. With regard to the countries of Latin America and the Caribbean, the follow-

ing analysis has been validated by two external review institutions and presented at two subregional forums of health ministers.

### **Reforms in Canada and the United States**

In Canada, reforms have aimed at striking a balance between actions that influence health determinants outside of the sector and actions that target the health system itself. With regard to the health system, the general objective has been to streamline functions and responsibilities: the federal government sets overall policy, establishes rules, and conducts audits; provincial governments carry out oversight; and local governments provide infrastructure and deliver services. Canada has emphasized approaches that focus less on hospital care and physicians; rather, they promote noninstitutional care, a broader diversity of multidisciplinary health service providers, and greater dependence on other forms of community care, including health promotion and disease prevention. Although it has been acknowledged that resources must be reassigned to community care, institutional inertia and fiscal pressures are hampering this change.

The United States has not carried out a reform of its health sector, despite proposals submitted in this regard. Two key issues that have prompted discussions of health sector reform are the high number of uninsured persons and the mounting costs of health care; in other words, the country faces the same problems it faced in 1992. The increase in spending has slowed somewhat, but the United States still spends more on health care per capita than any other industrialized nation, and its population does not enjoy better health. In the 1990s high-level discussions were held on financing and service delivery. In 1993, the Clinton administration submitted to Congress a proposal to reform the health care system—called the "Health Security Act"—which was never passed. Congress has, however, passed several laws concerning insurance and health budgets; they are described in the section on legislation and reforms.

### **Reforms in Latin America and the Caribbean**

In most Latin American and Caribbean countries, health sector reforms have been and continue to be part of overall State reform, or reforms of the Political Constitution, or of State modernization processes. At times, they bear their own names, such as "New Federalism" in Mexico or "Process of State Refinement" in Cuba. There are cases, such as Brazil's, in which the reform was not part of a State transformation, but instead emerged from a prior, more comprehensive debate about reworking the health care system (8). In several countries the reform was isolated within a national health plan, or else was a silent reform, or was not called reform because it consisted solely of pilot initiatives. Comprehensive reform commissions or specific units for reform have often been created under the Office of President of the Republic, or a preexisting national health council, or a commission

<sup>1</sup>Health sector reform has been defined as "a process for introducing substantive changes in the health sector's entities and functions, in order to obtain more equitable benefits, more efficient management, and more effective actions, and to satisfy the health needs of the population. It is an intense transformation of the health systems, conducted over a given period of time and based on situations that warrant reform and make it viable."

for State modernization, or an executive committee for reform of public administration, or an interministerial committee on administrative reform.

In many cases, ministries of health have been in charge of the initial design of the reform. In others, experienced international consultants have been sought; in still others, unions or medical associations were involved, or a wide-ranging consultation with society was held, or all three. In some countries, international technical and financial aid agencies played a major role in this phase. In particular, the Inter-American Development Bank<sup>2</sup> (9) and the World Bank (10) have been actively involved in financing health sector reforms since the late 1980s, and all indications are that they continue to do so.

In several countries, congressional bodies have been the preferred forums for negotiating reform. In others, that role has been or is being discharged by national commissions or a wide range of groups that support reform. In almost all cases, a phase of negotiations within the government and another phase of negotiations between the government and the various political and social actors can be identified. At the start of or during this phase, national authorities publish documents spelling out problems, objectives, strategies, and all or some of the suggested reforms. At this point the public debate broadens.

Often, governments have tried, with varying success, to develop a consensus on reform objectives, strategies, and pacing with the various political and social actors. Some countries have institutionalized national councils, advisory commissions, or periodic national forums as venues for the discussion of priority problems and strategic options. On occasion, even if there has been no specific forum for discussion, the consultations have been part of the consensus-building process. The idea of a "social pact for health" with the active participation of civil society has been championed, with little effect, by academic (11) and political (12) circles in several countries. The population has had little involvement in this phase and has been taken into account mainly for the organization of specific activities. As a rule, management of the activities financed by financial aid agencies is assigned to specific technical executive units, whose coordination with ministries of health is not always smooth.

The implementation of reforms has tended to be slow. By late 2000, most Latin American and Caribbean countries were somewhere between the design and the initial implementation of reforms; implementation was far along in a growing minority of them, and a few had begun to talk about a second (or even third) generation of health sector reforms. By and large, these processes take several years and must often be overseen by governments of differing political persuasions.

In some countries, reforms have been comprehensive, entailing sweeping changes in or the replacement of basic health legislation.

These reforms have had major intersectoral consequences, have affected most of the sector's functions, have substantially altered relations between public and private actors, and have created opportunities for the emergence of new actors. In others, reforms have been more limited in application, such as changes in health care services for individuals in several of a given country's public subsystems, in the implementation strategy chosen, or in the sector function (for example, it has affected only the delivery of services, with a new management model in some centers under ministries of health or social security institutions). Debate about these changes in the countries tends to be wide-ranging, and there is an awareness that such experiences can have different repercussions. The declared objectives, however, are always to improve the efficiency and quality of health care, to promote equity among regions and social groups, to extend coverage, and to shift resource allocation. In most countries, reforms include a large decentralization component as a means of achieving these objectives.

Assessments of the progress of health sector reforms have been uneven, often impeded by the fact that assessment criteria were not developed at the onset. Nevertheless, some countries are conducting assessments or have already done so, and have recommended changes and adaptations and, on occasion, a modification of the processes. Others have established mechanisms for conducting regular, specific, or initial assessments. Lastly, in some countries the reforms have not been in place long, and thus it is too early to assess results. Some countries have used the assessment as a major input in redesigning the substance of reforms and the strategies for implementing them.

### Substance of the Reforms

The great majority of Latin American and Caribbean countries have made major changes in their legal frameworks, a few have reformed their constitutions to accommodate the changes that reform entails, and many have promulgated new basic health laws or significantly amended existing ones. A few countries have neither substantially modified their legal frameworks nor do they plan to do so. A minority say that they have included some definition of equity in new legislation. A minority of countries report that the legal changes promote coordination among sectors, and a few report the opposite.

Most countries expressly guarantee, many in their constitutions, their inhabitants' right to health care, usually in a general way and without express limitations. However, only half of them offer information which would suggest that the population is sufficiently aware of this right or that action is taken to see that it is.

Most countries are undertaking programs to expand coverage. Almost half of these programs are based on expanding the supply of basic primary care services to populations with the least access, combined at times with strengthening specific top-down programs. Many countries have introduced some kind of basic benefit package for the entire population, or at least for specific groups.

<sup>2</sup>In 1998 alone IDB approved US\$ 119 million in loans for health sector reform projects in the Dominican Republic, Jamaica, and Paraguay.

Health ministries tend to play a leading role in this regard, and mother and child benefits are the ones most commonly included.

Reforms seek to bolster the steering role of health ministries. In most cases, this has meant changes in the organization of the ministry, although only a minority of countries have reported creating new regulatory agencies or institutions under the ministries. The enhancement of information systems for decision-making is a key item on the agenda of most countries.

In most countries, functions within the public subsector have been or are being divided up. Health ministries retain steering-role functions that fall to the State in this area. The division of functions has had widely varied effects on the sector, but a great many countries have apparently tended to separate the provision of services from other functions. Accountability mechanisms are not being bolstered sufficiently, however, or else this is being done exclusively in connection with financial and accounting audits.

In terms of decentralization, the intermediate level seems to be favored (regions, provinces, departments, or states), followed by the local level, and the health care establishments themselves. Several countries have combined two or more levels. Decentralization begins with the transfer of some managerial control over establishments and programs, and the last thing to be transferred is the management of human resources, whose hiring is still centralized in almost all countries. Some countries have decentralized functions to varying degrees inside each public institution.

One of the objectives of reform in most countries is to spur social participation and control, and the intermediate and local levels of government are the most common spheres of participation, followed by the national level, and health care establishments. The degree to which participatory bodies have been formalized varies greatly from country to country.

Most countries are making an effort to strengthen their systems of information about health care financing and spending. Often, however, the systems do not yet allow information from various sources to be included, which means that special studies must be conducted in order to determine spending on health care, private spending in particular. The preparation of national health care accounts has spread, as has PAHO's WinSIG system, as a means of enhancing efficiency in resource allocation and management. Many countries have made changes in their financing blend, and others are discussing them. More than half of the countries are making changes in the distribution of public spending on health, both in the agencies in charge of spending and in the various categories of expenditure.

Most countries are modifying their offerings of public services, redefining care models, modifying the offerings of first-level services, and introducing or strengthening specific programs for vulnerable groups. Yet, only a minority seem to be strengthening their referral and counterreferral services. Little information is available about changes in the private sector.

Most countries are making changes in management models and in the relations among various public sector actors. Many

already had or have since established some way to purchase services from and sell them to third parties, and half of the countries are instituting management commitments or accords between the source of financing and the providers inside the public subsector. Very few have included self-management models in public health care establishments; just two have turned over a public service to private management, and only one has partially privatized a service.

A minority of countries report that they are making changes in the training and development of human resources in the sector as a result of reforms, and a significant number indicate that the issue is under discussion. Moreover, all reform processes have complemented their efforts in financing and organization with training components. An analysis of 14 projects aimed at making management-related changes, projects financed by multilateral banks or aid agencies, showed that the training components cost between US\$ 345,000 and US\$ 10 million, depending on the type of project, totaling US\$ 79 million between 1993 and 2000. Estimates are that each component reached between 1,000 and 9,000 people through educational activities (13). Most of the national processes decentralized human resources management to local bodies to varying degrees. Thus, in 16 countries that were analyzed, the following transfers of functions to decentralized units were confirmed: 9 countries transferred decision-making about staff turnover and penalties; 8 now allow decentralized decision-making about firing, and 6 have delegated decision-making about wages and incentives.

Several studies show how reforms are affecting certain categories of health personnel. For example, a 1998 five-country study (Argentina, Brazil, Colombia, Mexico, and the United States), with PAHO's financial and technical support, showed that reforms were altering the number and makeup of personnel and hiring arrangements, and they were creating problems for health care services because of needed overhauls or the need to care for additional groups of patients. For example, nurses are being forced to do more with a smaller staff and to care for the sickest patients with limited equipment and inputs. While these changes affect all health care providers in one way or another, staff nurses are particularly vulnerable to the impact of reform policies because of the number and type of services that they provide (14, 15).

In spite of how important health care personnel are in carrying out reforms, of the 16 countries under analysis only Brazil's health authority has specific institutions for planning human resources, gathering information, and defining principles of nationwide professional accreditation and certification. This reflects a poorly developed steering capability in this field.

The mechanisms for accrediting health care establishments and services seem to be working only in an increasing minority of countries; others are looking into introducing them. There are agencies or programs to promote technical quality enhancement in half of the countries, but only a minority report specific experiences with promoting perceived quality. Lastly, only a minority

of countries have established procedures for managing and assessing health care technologies.

### Assessment of Reform Results in Latin America and the Caribbean

Assessing reform results entails determining the degree to which they are helping to improve equity, effectiveness and quality, efficiency, sustainability, and social participation and control of health care systems and services, these being the five guiding principles of reforms that governments of the Region identified during the aforementioned special meeting (4). An analysis based on the information furnished in early 2000 by nine countries<sup>3</sup> allows some preliminary conclusions to be drawn.

In terms of equity, 17 indicators (16 quantitative and 1 qualitative) were selected to measure disparities in coverage, distribution, access to services, and use of services. These indicators showed that in almost half of the countries reforms were helping to reduce inequalities in coverage, since at least three of the four indicators were improving. It also was found that only in a minority of countries were reforms helping to reduce inequalities in resource distribution. The scant information on equitable access to services and their use made it impossible to draw conclusions about these two categories for the time being.

With regard to effectiveness and quality, 19 indicators (15 quantitative and 4 qualitative) of effectiveness, technical quality, and perceived quality showed that only in a minority of countries were reforms helping to enhance the system's overall effectiveness; only in a tiny minority were they helping to improve technical quality, and only a minority of countries had significantly enhanced the quality perceived by users.

As for efficiency, the analysis of the series of 19 quantitative and qualitative indicators of efficiency in the allocation and management of resources found that in half of the countries under study reforms were introducing more efficient resource allocation mechanisms; that only in a tiny minority were reforms improving the indicators of the system's overall efficiency; and that only in a minority of countries had reforms contributed to a reallocation of resources for intersectoral actions and programs for the prevention of highly prevalent diseases.

<sup>3</sup>Although all profiles included information on the monitoring of reforms, only nine had information on their results. Among the remaining profiles, the lack of information was regarded as justified because of the brief time that had elapsed since the start of reform (three years or less) in 13 of them, and as not justified in 3 others. The analysis of an independent questionnaire directed to the focal points for developing the profiles in the countries showed that the reasons most commonly cited to explain the lack of information on the results of reforms are: 1) the initial proposals do not usually include mechanisms to assess the impact of reforms or oversee their development, nor do they set specific timetables for achieving the proposed objectives; 2) the selection of variables and indicators for assessing results is technically complicated, and attributions of causality are difficult; 3) the information available in the countries is often incomplete, scattered, unreliable, or out of date, and 4) the main actors (among them, the health authorities) do not always show sufficient interest in assessing results.

With regard to efficiency in resource management, it was found that in the most of the countries reforms were helping to introduce "management commitments," and that only in a minority of countries had they contributed to the use of standardized measures of activity, to the improvement of basic indicators of hospital performance, to the autonomous use of new sources of income by public health care establishments, or to the preparation of budgets of health care establishments according to activity criteria. These findings are consistent with the fact that many reforms have prioritized the introduction "from above" of the "management commitments" as a way of enhancing efficiency in resource allocation from public sources of financing to providers. They are also consistent with the fact that the impact of reforms on the handling of standardized measures of activity and other tools for improving management (for example, the systematic use of basic performance indicators, the design of budgets based on activity criteria, or the autonomous use of new sources of income) inside establishments (especially in hospitals) is either less obvious or lags further behind. They are also consistent with the fears expressed by various observers, both before (16) and now (17, 18), that intersectoral actions with a heavy external impact and prevention programs are of secondary importance in reform policies.

As for sustainability, the analysis of six quantitative and qualitative indicators of social legitimacy and financial sustainability found that the reforms had helped to improve the disaggregated information on health care spending, although there is no evidence that they have helped to enhance the capacity of countries to initiate trends; that in half of the countries they had helped to improve the capacity to adjust revenues and expenditures in the public subsystem and to collect from third parties with payment obligations; and that only in a minority of countries had they helped to enhance the legitimacy of the main public health care provider institutions and the medium-term sustainability of programs and services. In no country had reforms enhanced the current capacity to manage external loans or to replace them sometime in the future.

These findings seem to be consistent with the emphasis that most reforms place on controlling spending and recovering costs, and they call attention to three of the main strategic weaknesses of public providers in connection with the reforms under way: low levels of legitimacy, a problem that has not yet been resolved; the precarious sustainability of programs; and the growing dependency on external financing.

As for social participation and control, an attempt was made to determine whether the reforms have helped to increase the degree of social participation and control at the various levels and for the various functions of the health services system, both for the population at large and for certain groups. The analysis of the available information indicated that the reforms could be helping to expand the opportunities for social participation and control at the various levels of the system in most countries. This could help to mitigate some of the aforementioned factors that



are limiting sustainability. Nevertheless, given the wide variety of models and experiences under way (19, 20) and their complex relationship with decentralization processes in many countries (21, 22), the issue requires a case-by-case analysis.

### **Towards a New Generation of Reforms**

In the 1990s, health sector reforms in Latin America and the Caribbean focused mainly on promoting financial, structural, and institutional changes in health systems and on spurring adjustments in the organization and management of health care for individuals (23). Much less attention has been devoted to enhancing the performance of health systems and services, with the focus on reducing inequities in health conditions and in access to health care; to reducing social vulnerability in the area of health; to boosting the effectiveness of health care interventions; to promoting quality care; and to strengthening the steering function of sector and public health authorities.

Reforms have been and are being carried out at a time when economic, social, and cultural exclusion is deepening. Current social welfare and social security systems cannot cope with existing and newly emerging problems. The basic task of countries is to offer their citizens, regardless of their ability to pay, basic, universal social protection in the area of health that will reduce inequality in access to necessary, effective, and quality services. At the same time, this will help to strengthen development and social cohesiveness, as various international organizations are stressing.

To this end, several countries are considering the introduction of innovative mechanisms for expanding social security coverage in health care, mechanisms that are aimed at groups that are outside the economy's formal sector and which do not have the tax-paying capacity to belong to regular social security systems. The new prescriptions that are being proposed rely more on the social capital of the excluded groups and seek to rationalize financing mechanisms and the regressive, out-of-pocket health care spending that today represents a greater financial burden for the least well-off households and individuals. They also attempt to take advantage of community mechanisms for cooperative organization to develop responses that will complement the social protection for health that is today being offered through social welfare and social security efforts. In light of this, the International Labor Organization and PAHO have signed a memorandum of understanding to promote a regional initiative to support Member Country efforts to extend social protection for health to excluded groups.

It also is beginning to be understood that innovations in social protection for health are not by themselves enough, unless they are accompanied by a reorientation of health systems and services in accordance with health promotion and disease prevention criteria. By and large, the poor not only tend to receive curative services of inferior quality, but they also are the group that most needs services reoriented in accordance with health promotion criteria. Therefore, unless the health care model is transformed,

major inequities in the comprehensiveness and effectiveness of services will continue to exist. An increasing effort is being made to see to it that changes in the health system strengthen the essential public health functions under the responsibility of each country's health care authorities, as part of the efforts to redefine and strengthen these authorities' steering function, the public health infrastructure, and the social practices for public health. Many countries are already working to spell out the essential functions of public health and to develop and use tools to gauge the performance of these functions. An attempt is also being made to see to it that these elements are used to improve the practice of public health and to overhaul the infrastructure of public health services.

The relationship between the essential public health functions and the reorientation of services in accordance with health promotion criteria is found to operate on two levels. First, strengthening the State's capacity to perform each essential public health function makes it easier to achieve health promotion objectives. Thus, adequate performance in all public health fields lends greater legitimacy to health care authorities as responsible, capable, and critical components of the health system and boosts the system's capacity to discharge its health promotion function. Second, defining essential public health functions and assessing performance bolster intersectoral alliances, which are indispensable for health promotion. The historic juncture at which sector reforms find themselves at the start of the 21st century presents a great opportunity to overcome current reform shortcomings, which have omitted public health as a social responsibility.

In addition, the reorientation of systems and services in accordance with criteria of quality is being proposed. Indeed, an increasing number of countries intend to incorporate these criteria by promoting more comprehensive care, more continual care, better response capacity (adapting to individual and group characteristics and to the demands of actual and potential users), and better coordination among the different networks of providers. Health systems and services are trying to make the properly treated, satisfied patient the focus of their mission and want the population to perceive them as affordable and nearby; this also relates to the ability of health care authorities to fully perform their steering function. This is seen as a way of enhancing the authorities' social legitimacy and contributing to the sustainability of their actions.

Within this new reform agenda, human resources are increasingly a central element of change. In this regard, national reform agendas seek to include the development and execution of human resources development policies designed to improve working conditions and personnel training; to define frameworks and ways to regulate labor markets, professionalization, professional practice, and educational processes for personnel development; to introduce substantive changes in personnel management that will enhance performance quality and productivity; and as part of professional training, ensure social relevance (in terms of values,

attitudes, and culture) and technical relevance (in other words, in connection with essential and specific competencies). This means not only refining educational institutions, but also ensuring continuing education programs for health personnel.

In short, the new generation of reforms is trying to include new objectives and to assign them the priority that they deserve. Regardless of the specific names that might be adopted in each case, eight pivotal areas can be identified: 1) strengthening of public health infrastructure and practice and the assessment of their processes and results; 2) strengthening the steering function of health care authorities; 3) expanding social protection for health and guaranteeing universal access to services, regardless of an individual's capacity to pay; 4) reorienting health systems and services in accordance with health promotion and disease prevention criteria; 5) enhancing the quality of care; 6) training human resources to sustain the changes mentioned; 7) introducing efficient, solidarity-based mechanisms of financing and resource allocation; and 8) increasing social participation and control at the various levels of the health system.

The challenge is to apply the above-mentioned strategies and to develop a consensus among the actors about the importance of incorporating them into the next generation of health sector reforms. This means redefining, with equity and solidarity, the way in which society will respond institutionally to the different health-related needs of individuals and communities, in accordance with criteria that focus on the health of the population and individual well-being, rather than on the market and mere economic efficiency.

### **The Shared Agenda and Sector Reforms**

In 2000, the Inter-American Development Bank, the World Bank, and PAHO signed an agreement to develop a "shared agenda for health in the Americas," pursuant to three main lines of action: support for health sector reforms, including basic sanitation services; the institutional strengthening of public health programs; and strengthening the leadership role of health care authorities in all spheres of development that affect health.

This shared agenda emphasizes that health is not only important for the well-being of individuals and communities, but is also a key factor in economic growth by promoting human capital and productivity. The concept of health for development entails the improvement of health conditions, as well as such issues as equity-related aspects; poverty reduction; income distribution; and access to essential health care, drinking water, and sanitation services. The implementation of actions is monitored at monthly meetings of the Inter-Institutional Coordination Group, which consists of a representative from each of the institutions. Four main areas of cooperation have been established: national health accounts, drugs, disease monitoring, and environmental health.

In addition, at the Third Summit of the Americas in Quebec, Canada, on 20 and 21 April 2001, the presidents of the Americas

cited the need to steer technical cooperation in health in accordance with the shared agenda. The leaders expressed their concern over mounting inequalities in the Americas, which are manifested in unequal access to quality education, avoidable disparities in health, lack of economic opportunities, and curtailed personal safety. The development of health can play a fundamental role in the Region, inasmuch as it is a requirement for human development and for the achievement of economic and political objectives. The four areas highlighted in the health section of the Plan of Action include sector reforms targeting equity; communicable disease prevention, especially HIV/AIDS; a reduction in noncommunicable disease risks; and improvements in the connectivity and exchange of information.

The interinstitutional dynamic set in motion by the two initiatives could help create areas of convergence that will eventually strengthen reform agendas beneficial to the Region's population.

### **STRENGTHENING THE STEERING ROLE OF THE HEALTH SECTOR AND ESSENTIAL PUBLIC HEALTH FUNCTIONS**

The tendency to remove much of the provision of health goods and services out of governmental responsibility has influenced many of the sector's reform processes undertaken by most of the Region's countries in recent years. Against this backdrop, it is necessary to define which goods and services are primarily public in nature (as their delivery and financing are, therefore, the untransferable responsibility of the State and of health care authorities), and which are of private nature, with private financing, insurance, and delivery (social security systems included).

There is some consensus in the Region that the State ought to offer public health programs and ensure that they benefit all of the population, especially groups at highest risk. In exchange, there should be a redefinition of the scope of personal health care, understood as the package of services that benefit individuals and that must be paid for by such persons, by private insurance, or by both.

The main challenge facing the Region's countries in reform processes is to define the role of the State and, in particular, that of health ministries or secretariats. In general, the latter have tended to focus on and specialize in the broad categories of sector steering functions: defining general objectives and strategies for the sector; regulation, monitoring, control, and assessment of relations among the various actors dealing with health care and directing the performance of public health functions; guaranteeing social protection for health with sustainable, equitable financing; and coordinating the decentralized delivery of health care.

As the role of health ministries or secretariats has been reconsidered, an attempt has been made to give them greater managerial powers in the political and technical sphere, and even in financial allocation, while delegating operational functions of insurance

management and service provision. Moreover, several countries have chosen to decentralize monitoring and control functions to superintendencies or similar institutions. The new profile of health ministries or secretariats emphasizes their ability to make public health care policy in a context characterized by new relations between government and civil society.

### The Health Steering Functions

In accordance with the decision of PAHO's Directing Council in 1997 (CD40/13) (24), health authorities must be able to discharge their steering functions, which focus on:

- executing general health care policy and the actions of the health system, which must be consistent with national development plans and coordinated with other sectors' plans;
- regulating and monitoring the workings of the health care system and of the factors related to preserving and promoting health;
- organizing and discharging essential public health functions under the responsibility of health care authorities;
- channeling financing in order to carry out individual and public health care plans;
- guaranteeing universal access to an insured plan to meet basic health care needs; and
- harmonizing and monitoring health service institutions and other facets of their decentralized operations.

In order to perform these functions, most countries must develop new professional capabilities, create legal means that will enable them to play the steering role, implement technical systems, and reorganize the structure and operations of health ministries. In many cases, they require not only administrative reorganization but also the start of a reengineering effort aimed at coordinating progress in legislation, management, political leadership, technical capacity, and toolkits. This will involve an investment in resources and efforts directed toward institutional strengthening.

#### *Institutional Strengthening of Health Authorities for the Performance of their Steering Role*

In this context, countries have had to ask themselves about the nature and mission of health sector steering as the core function of health authorities in the modern State. As PAHO's Directing Council said in 1997 (CD40/13) (24), health ministries or secretariats have had to strengthen their capacity to:

- develop and pursue policies to enhance equity in access to and use and financing of health services, emphasizing social solidarity;
- politically, technically, and socially reassess the formulation and implementation of public health practices, functions, and services;

- discharge their regulatory and standard-setting role with the necessary flexibility to identify and solve national and local problems within the framework of decentralization of service provision;
- develop policies that will steadily enhance the quality of services in order to satisfy the population;
- promote effective social participation of both the community at large and the various institutions connected with the health sector;
- encourage and make effective use of the mass media to promote healthy habits and lifestyles and prevent health risks;
- promote research on public health and health services in order to guide health policies towards greater equity;
- use research findings for the technological refinement of the health system and for decision-making;
- assess the population's degree of satisfaction in order to monitor the effect of policies on service users; and
- develop the capacity to analyze the demands of and conflicts in civil society and the responses offered, as well as their consequences for public health policy.

The discussion about institutionalizing steering capabilities in health ministries or secretariats has included the following issues:

- The new profile of the steering role, as derived from State modernization and health sector reform processes, differs in magnitude and complexity from the previous sector steering practices and requires the sort of institutional and personal capabilities that do not seem to square with the current legal framework, organization, political leadership, and technical competencies in most health ministries or secretariats.
- The decentralized exercise of health authority means that steering capabilities must be developed not only at the central levels of health ministries or secretariats but also at subnational levels, and they must include social participation.
- The recasting of health ministries or secretariats and the strengthening of their capacity for sector steering cannot be undertaken through isolated attempts at training, organizational reengineering, and tool development; therefore, the planning and execution in this regard must be analyzed with an integrated approach to institutional development.

As society's actors have multiplied in the health field, the "health authority" (understood to mean the set of government actors in health care) emerges as the implementing agent of sector steering, in contrast to the monopoly role that used to be assigned to health ministries or secretariats in this field. Moreover, steering is no longer seen as a monolithic function, but rather as a government process that spans various intervention and functional fields.

There is a growing tendency to not concentrate all steering functions in a single institution, as often happened in the past, and instead to create various, complementary institutional mechanisms that can separately and in specialized fashion discharge some of the different powers, as in the case of the newly formed superintendencies. In any event, given the diversity of actors and the breadth of objectives and functions of health care steering, the subject and the scope of the health authority need to be made more explicit, in accordance with each country's characteristics. In this regard, several political, social, and economic trends should be considered in remodeling sector steering:

- the fragility of the public institutions acting as the health authority, despite the democratization of societies;
- the loss of State decision-making capability regarding the allocation of a growing proportion of national resources; and
- the importance of supranational commitments and accords.

In Latin America and the Caribbean, save some exceptions, health ministries or secretariats cannot meet the functional profile for sector steering that has been described, since to date they have been almost exclusively in charge of the direct management of service delivery. Historically they have been weak institutions, all the more so as regards the functions required by the recast role of health sector steering. In most cases, the "pressure" of many responsibilities for the direct execution of health care delivery shifts priorities, subordinating important problems to urgent ones and paralyzing the institution as it attempts to perform its fundamental role.

The challenges that the new steering profile poses have to do mainly with operational aspects for the performance of these functions, which are discussed below.

#### *Health Care Policy Direction*

The direction of health sector actions implies that steering entities must be able to formulate, organize, and direct the execution of national health care policy by defining viable objectives and achievable goals, to draft and set in motion strategic plans that coordinate the various efforts and resources of both public and private sector institutions and of other social actors, to establish participatory and consensus-building mechanisms, and to mobilize the resources needed to carry out the actions planned.

The direction of the sector is a social process that is essentially political. Although private social actors can perform significant functions in managing parts of the sector, overall direction, with its implications for all of society, is acknowledged as a State function and a government responsibility. Health care sector direction is a political and institutional process whose core is government actions. Directing public health policy entails a joint commitment among numerous social actors (besides the institutions that traditionally make up the formal health sector), not only in executing

programs and providing services but also and above all in building a consensus around priority problems, intervention objectives, and strategies, and in the mobilization of necessary resources (25).

#### *Regulation and Accountability*

Regulation and its necessary counterpart, accounting and control, aim to develop a normative framework that will protect and promote the population's health and will ensure its observance. Regulation, as a subsidiary and complementary function of the core function of direction, is becoming increasingly necessary to ensure the State's role as the organizer of the production and distribution of health resources, goods, and services in accordance with principles of solidarity and equity. Given the expansion of market economies and the trend towards deregulation, however, regulation is increasingly being restricted to its basic aspects.

Regulation is a complex process that includes the design and drafting of standards and the adoption of measures to ensure these standards' effective enforcement. Accordingly, the rule-making function can be distinguished from the task of accounting and control. In terms of health, rule-making has been reserved for health ministries or secretariats. As the health authority, they must define objectives and priorities that reconcile the challenges arising from the population's epidemiological profile with the human, technical, and financial resources for meeting them. Accounting and control is mainly a technical function, as it verifies compliance with rules that have been set down and requires professional specialization and validated independence from those being monitored.

#### *Essential Public Health Functions*

The performance of essential public health functions inherent to the health authority is viewed as the responsibility of the various levels of health ministries or secretariats, in that these are government institutions whose duty it is to safeguard the public welfare in the area of health. At present, a review of public health functions that the health authority cannot delegate has been called for, which will be conducted within the framework of the new concept of public health as a social practice and of the decentralization of the health authority's operations. This means that the scope of public health will be redefined to include programs that are the State's ineluctable responsibility; that should be financed with public funds; that target the entire population, focusing on problems that pose the greatest danger to health; and that should be offered universally, mandatorily, and free of charge.

An initiative has been launched in the Region to improve public health practice and services by identifying the essential functions that the health authority cannot transfer. The initiative will gauge how well these functions are performed and will strengthen the institutional capacity of health ministries or secretariats to discharge them (26). This effort could offset the deterioration caused by sector reforms that have focused primarily on financial changes and changes in the administration of individual care services.

### *Guiding Financing*

The wide range of financing sources and the changes in the ways that health care is financed have led to new patterns of governmental and individual responsibility, in which hiring practices and areas of responsibility pose major challenges to the sector's ability to manage. Until now, health ministries or secretariats have not sufficiently involved themselves in the allocation of funds nor have they exercised enough control over the various sources and modes of financing. In the future, however, health authorities must become responsible for establishing policies that will ensure the equitable access to quality health care services for all people, as well as those that will ease and correct deviations in sector financing and will enhance the capacity to monitor such financing.

In terms of the organization of health sector financing, the reconciliation of health needs and resources from various financing sources in the short- and medium-term; the adequate control of financial flows between different health system agents in accordance with efficacy, transparency, and responsibility criteria; and the establishment of efficient, equitable, and participatory ways and means to allocate resources pose new challenges to and call for the definition of new duties for health ministries or secretariats.

### *Guaranteeing Coverage*

The State has a responsibility to effectively safeguard health by guaranteeing access to a basic plan of coverage for health risks and impairments for all inhabitants or to a specific plan for certain special population groups. To this end, it must bolster the institutional capacity of health ministries or secretariats and define the beneficiary populations, the content of the guaranteed basic coverage plans, and the mechanisms for financing and the methods of administering these plans. It must also establish a system to monitor compliance with these plans, both through public agencies and private insurance or service-provider companies—ensuring that no beneficiary under the mandatory plans is excluded for risks related to age or preexisting conditions—and have in place mechanisms that allow for the timely access to services included in the plans.

The basic task of the health authorities in this connection is to guarantee citizens, regardless of their ability to pay, basic, universal health protection that will diminish inequalities in access to necessary, effective, quality services provided under decent conditions. To this end, effective coverage must be provided to groups that are excluded from social security systems, particularly those within the economy's informal sector and those marginalized by poverty or geographic factors who cannot afford to enroll in customary social security plans for health care.

### *Harmonizing Health Service Provision*

The trend towards decentralization and towards removing the provision of health services from governmental responsibility is shifting the role of health ministries or secretariats: they increasingly will take on the harmonization of the various decentralized public agencies that provide services, rather than directly adminis-

tering health service provision itself. In performing this new function, health ministries or secretariats must discharge several new tasks, in order to define the mechanisms for allocating resources to public agencies or establishments that provide services; harmonize plans of action and management plans of the various decentralized and deconcentrated public agencies that provide health services in the country; specify the content of the basic public health services that are the State's responsibility and distribute areas of responsibility and resources among the various spheres of public management in accordance with criteria of complementarity; provide technical assistance to the decentralized agencies that provide services; and establish mechanisms for contracting or for service management commitments that will pay providers in accordance with performance standards for processes and for results.

The profile of functions summarized in the above paragraph requires that the organizational structure reflect the new tasks. Three criteria have been adopted to guide the structuring of health ministries or secretariats: a focus on functions inherent to steering; complementarity and comprehensiveness in the performance of these functions for unified, effective steering; and streamlining that lends dynamism to decisions and actions.

Given the current consensus about organization and the modern macro-trends in public management changes, most agree that health ministries or secretariats should be configured as smaller, more specialized entities with more responsive organizations; they also should be highly technical and scientific, as well as more competent and competitive organizations. These features also should be reflected in the makeup and qualifications of human resources, which thus become a critical factor. Therefore, revamping health ministries or secretariats and strengthening their capacity for sector steering clearly cannot be carried out through isolated efforts in training, organizational overhaul, and the development of instruments; rather, this requires planning and execution with a comprehensive approach to institutional development that includes political, legal, technical, administrative, training, and financial aspects.

Against this backdrop, the redefinition and legal formalization of the role of health ministries or secretariats is one of the main issues in the debate on the institutionalization of health authorities in the modern State. Addressing it fully requires a diagnosis of the performance of steering functions and the capabilities needed to exercise health authority, as well as of the main trends and the expected scenario in which health steering will be carried out. To this end, over the past five years, steering has been evaluated in two subregions of the Americas (Central America and the Andean area),<sup>4</sup> and a tool for assessing essential public

<sup>4</sup>Results of the initial assessments in: Consideraciones sobre rectoría de los ministerios en Centroamérica y República Dominicana, Reunión Subregional sobre Rectoría Sectorial y Liderazgo de los Ministerios de Salud (Guatemala, 23-24 April 1998), PAHO/WHO, Washington, DC, 1998. Also in: La práctica de la rectoría de los ministerios de salud en los países del Área Andina, Andean Subregional Forum on Health Sector Reform (Santa Cruz, Bolivia, 5-6 July 1999), PAHO/WHO, Washington, DC, 1999.

health functions is being used as a core element in the steering profile in all countries of the Region.

This makes it possible to evaluate organizational structures, the relevance and adequacy of technical-administrative systems, and the tools needed to do so, as well as the planning and development of required human resources. In addition, management training projects have begun to be designed in several of the Region's countries for those who will carry out steering responsibilities.

In short, pertinent processes and mechanisms need to be discussed so that the following critical areas of intervention can be addressed in the coming years: the updating of the legal frameworks that are the basis of national health sector steering; organizational adaptation in order to perform these steering functions; the development of institutional human resources with greater managerial capacity to perform these sector steering functions; the development of information, technical, and management systems for steering; obtaining the resources for sector steering by health ministries; and mechanisms for achieving viability and sustainability with an institutional development approach.

### **The “Public Health in the Americas” Initiative**

Health sector reforms must strengthen the steering role of health authorities, and a major part of this mission involves fulfilling the essential public health functions that are incumbent on the State. To this end, it is crucial to improve public health practice and the means for evaluating their status and assessing the areas in which they must be strengthened.

Accordingly, PAHO has begun to set in motion the initiative called “Public Health in the Americas,” which is designed to define and measure essential public health functions as the basis for improving public health practice and strengthening the leadership role of health authorities at all levels of the State. The initiative's conceptual framework and its instrument for measuring the performance of public health functions have been developed in conjunction with the United States Centers for Disease Control and Prevention (CDC) and the Latin American Center for Health Systems Research (CLAISS).

#### *Essential Public Health Functions and their Relationship to Strengthening the Steering Function*

The concept of public health that underlies the definition of essential public health functions is the collective action, by both the State and civil society, aimed at safeguarding and improving the health of individuals. Public health is not synonymous with the State's responsibility for health, because it encompasses far more than the tasks that strictly belong to the State and does not cover all that the State can do in this area. In this regard, essential public health functions have been defined as the conditions that allow for better public health practice.

It should be noted that the State's role in health, which the health ministry or its equivalent normally performs, is frequently confused with the State's responsibility to guarantee the proper performance of essential public health functions. Although the State plays an untransferable role in the direct delivery of services or in ensuring the performance of essential public health functions, these are just part of its health-related responsibilities.

Also noteworthy is the difficulty in clearly distinguishing between public health responsibilities in the provision of disease-prevention and health-promotion services to specific population groups and the responsibilities relating to the organization of individual curative care services. Recently, major efforts have been made to better define and measure essential public health functions. Prominent among these efforts are the Delphi study conducted by the World Health Organization in 1997 and the National Public Health Performance Standards Program, NPH-PSP, which the CDC conducted that same year. The following is a list of the 11 essential public health functions identified as critical for public health in the countries of the Americas and included in the instrument for measuring their performance that PAHO developed in cooperation with the CDC and CLAISS.

1. Monitoring, evaluation, and analysis of health conditions.
2. Public health surveillance, research into and control of public health risks and harms.
3. Health promotion.
4. Citizen participation in health.
5. Development of public health policies and the institutional capability for planning and management.
6. Strengthening the institutional capacity for public health regulation and accounting.
7. Evaluation and promotion of equitable access to necessary health care services.
8. Development of human resources and training in public health.
9. Guaranteeing and improving the quality of individual and collective health services.
10. Research in public health.
11. Reducing the impact of emergencies and disasters on health.

#### *Measuring Performance*

The purpose of measuring performance has been to identify overall strengths and weaknesses of public health practice. The effort also has allowed for an operational diagnosis to be conducted, which has determined which areas require more support in order to strengthen public health infrastructure in its broadest sense—in other words, one that includes human capabilities and the facilities and equipment needed for proper performance. Defining and measuring essential public health functions is viewed as a contribution to the institutional development of public health practice and to the enhancement of the dialogue be-

tween public health and other disciplines involved in health. In this regard, it seems logical that public health should begin to account for the performance of its mission to the citizenry with those responsibilities that belong exclusively to it, rather than with responsibilities that it shares with other approaches or disciplines involved in broad health policy decisions or decisions about the destiny of health systems. The legitimacy of public health and its capacity for calling on other sectors to undertake joint actions ought to be bolstered by a more accurate measurement of its essential tasks.

An accurate measurement of essential public health functions also makes it possible to more exactly quantify the resources needed to ensure an adequate public health infrastructure and essential information for governments, individuals responsible for decision-making, and international aid agencies.<sup>5</sup> Finally, defining and measuring essential public health functions is fundamental for strengthening public health education in the Region, an activity that is in crisis today largely because the aforementioned roles have not been defined.

## EXTENDING SOCIAL PROTECTION FOR HEALTH

### Difficulties in Measuring Exclusion from Social Protection for Health

The right to health is acknowledged in the constitutions or equivalent documents of all countries in the Region. Nevertheless, and despite health system reforms seen since the middle of the 1980s, many of the inhabitants of Latin America and the Caribbean are not covered by social protection mechanisms against the risk of falling ill or the consequences of being ill. And yet, exclusion from social protection for health does not usually appear on the list of priorities on international social policy agendas, nor does it explicitly show up as much as it should on the health agendas of the Region's countries. Health sector reforms have generally not dealt with this issue either, and when they have, it has been in an indirect, piecemeal manner.

Measuring exclusion from health care is complex, inasmuch as the problem has many causes. Thus, although there are different ways of looking at exclusion, none can fully explain the phenomenon. Exclusion can be measured directly through population surveys, but these tend to ignore some of the excluded population (for example, the rural population, the poor, or people living in hard-to-reach areas) or do not properly probe the issue's various dimensions. Therefore, indirect measurements based on causes of exclusion have generally been used.

<sup>5</sup>Results of the assessments in: Executive Report on the Measurement of the Performance of Essential Public Health Functions Fulfilled by the Health Authorities in the Countries of Central America and the Dominican Republic, XVII Meeting of the Health Sector in Central America and the Dominican Republic (Managua, Nicaragua, 28-30 August 2001), Pan American Health Organization, Washington, DC, 2001.

Table 1 shows some of the indicators used to measure exclusion from health care. The numbers in the table are overall estimates and, although they hint at the scope of exclusion, they do not show the vast differences between and within countries in the Region. Moreover, the data do not provide information about exclusion for cultural or job-related reasons, nor that resulting from differences in the quality of care, gender, or age. Nonetheless, according to some of these gauges, some 20% to 25% of the population of the Americas (about 100 to 150 million people) are without health care.

### Social Protection for Health

Recently, several of the Region's countries have launched public interventions to diminish the negative economic and social impact of adverse personal events, such as illnesses or unemployment, or general events, such as natural disasters, that affect the population as a whole or the most vulnerable social groups. In this context, social protection for health can be defined as society's guarantee, through its public authorities, that a person or a group—regardless of their ability to pay—will be able to meet their health care needs through access to services, either through the country's health system or through one of its subsystems.<sup>6</sup> Persons or groups that cannot avail themselves of this guarantee are considered to be excluded from health care.

Extending social protection for health encompasses several mechanisms designed to ensure that individuals have access to health protection and health care through the allocation of resources of various origins, not just through the measures that the State takes directly to ensure health care under the provision of public services (27). Thus, social protection is understood as a State guarantee of a right that citizens can demand, not as a discretionary welfare function.

Three conditions must be met in order to guarantee that health protection is a reality. First, there must be access to services; in other words, the necessary services must exist and individuals must be able to reach and afford them. Second, the household must be financially secure; that is to say, the cost of the services must not threaten the financial stability of families or their members' potential for development. Third, the care must be respectful; in other words, quality care must be provided, with respect for the consumers' racial, cultural, and economic background, as established in an ongoing social dialogue. If any of these three conditions are not met, some form of exclusion from health care exists.

Poverty is one of the main causes of exclusion from health care. Although the two are not identical, they almost always overlap. In the absence of social protection systems, people living in poverty not only lack access to high-cost care, but also live and work in environments in which they are exposed to high risks of falling ill and dying (28). Among other things, such risks are di-

<sup>6</sup>A similar definition can be found in *Shielding the poor: social protection in the developing world*, edited by Nora Lustig/IDB, 2001, p. 1.

rectly related to the reduced availability and lower quality of foodstuffs, the absence of decent housing, overcrowding, and the shortage of appropriate recreational opportunities. Communicable diseases are concentrated among the poor, and diseases and injuries have both direct costs (in prevention, cure, and treatment) and opportunity costs (loss of work or school days) (29) that depend on the duration and seriousness of the incapacity and that often worsen poverty. But poverty has even more devastating effects on people, robbing them of their dignity, their self-esteem, and their capacity to believe that their situation can improve (30). It also undermines what are called “individuals’ basic functioning skills,” lowers quality of life, shortens life expectancy, and triggers the “vicious circle of exclusion”: poor family, incomplete education, unemployment, poverty. This vicious circle interacts with others, such as lack of access to basic services, illness, job difficulties, dropping out of school, crime, the impossibility of finding acceptable work because of a criminal record, recidivism, and a marginalized existence (31). All of this worsens and perpetuates exclusion from health care.

Extending social protection for health care is a powerful weapon in the battle against poverty and in achieving greater cohesion among member countries. It is a crucial component of a distinctly inclusionary social policy, and it also represents a social wage that provides health security and improves living conditions.

### **Social Protection for Health and the Health Systems**

Recent studies have shown that the way a health system is organized is not neutral with respect to exclusion from health care; rather, it is one of its determining factors (32, 33). The meager response capacity of health systems is associated with four factors. 1) The fragmentation or coexistence of subsystems with different financing, membership, and benefit arrangements, usually compartmentalized arrangements that cover different population segments, generally as a function of their income level and tax-paying capacity. This model usually takes the form of a deficient, poorly run public subsystem frequented by the poor and the indigent, and a customer-oriented private sector with more resources that focuses on the wealthier segments of the population. Between the two are social security systems, which cover workers in the formal economy and their dependents. This coexistence of systems creates and worsens the lack of equity in access to and financing of health services. 2) The fragmentation or existence of many institutions that are not part of a single subsystem, a situation that raises transaction costs inside the system as a whole and makes it difficult to ensure equivalent conditions of care for the individuals treated by the various subsystems. The combination of segmentation plus fragmentation often leads to double or triple coverage within a single household, with the resulting inefficiency in resource allocation. 3) The predominance of partial or total direct payment at the time care is provided (including the purchase of drugs), which means that receiving health care

depends in part or completely on each individual’s capacity to pay. This sort of financing leads to a high degree of inequity in the system, and the high percentage of out-of-pocket expense highlights some people’s vulnerability. 4) Weak or poorly developed sector steering capability, which means that fair rules do not govern the consumer-provider relationship and that the basic benefit packages which the various insurance plans ought to guarantee are not sufficiently spelled out.

### **Causes of Social Exclusion from Health Care**

Although existing legislation in most of the Region’s countries provides for the right of all citizens to some sort of health care coverage, this is far from being the case in practice. Nearly 218 million people in Latin America and the Caribbean lack protection against the risk of falling ill, while more than 100 million do not have access to health services for geographic reasons (34).

As mentioned before, exclusion from health care has three dimensions. The first has to do with problems involving lack of access, which can be lack of access to benefits associated with the provision of public goods (such as drinking water or vaccinations); lack of access to individual health care in general or some type of specific care; and lack of access to a system for protection against the economic and social risks of falling ill. In all these instances, exclusion often is related to one or both of the following considerations: a lack of adequate infrastructure for the provision of both individual and collective health care (for example, shortage of health care establishments or lack of functional coverage by public health programs), and barriers to health care access, even if an adequate infrastructure exists. Such barriers could be geographic (transportation, roads), economic (inability to pay for health care), or cultural (inappropriate care models), or they could be determined by a contractual or employment situation (unemployment, a job in the informal economy), by the systems’ structure (the models with a high degree of segmentation show higher degrees of exclusion), or by the lack of health care systems based on a cross-cultural approach.

The second dimension involves financing problems, particularly the absence of solidarity-based mechanisms. No household should need to spend more than a reasonable proportion of its total income to gain access to health care services, if impoverishment and indigence are to be avoided. Besides ethical considerations that underlie solidarity in financing, the need for a solidarity-based mechanism rests on the fact that the cost of services is an obstacle to access (particularly for the poorest of the poor), represents a high opportunity-cost of maintaining or promoting the welfare of the household (in particular to prevent poverty or rise above it), and is highly regressive (in other words, the poorest households are forced to spend more out of pocket than the less poor, absent an appropriate system of coverage).

The third and last dimension is decent care and involves aspects that have nothing to do with either use or financing, but are



deemed basic to satisfying the legitimate demands of society's members. Among other things, this includes respect for the traditions and cultures of ethnicities that differ from the majority, since lack of respect could lead to self-exclusion; that is to say, individuals will choose not to avail themselves of the services to which they are entitled. Factors such as language, beliefs, or the feeling among patients that they are receiving inhumane or disrespectful treatment are related to this dimension of exclusion.

### Strategies for Extending Social Protection for Health

The available information shows that Latin America and the Caribbean, as a result of financial and budgetary limitations arising from economic crises, have not applied consistent strategies for reducing exclusion from health care. The policies pursued by most countries over the past 15 or 20 years have been designed to contain costs and cut spending on health care. Be that as it may, the interventions that have in one way or another helped to reduce exclusion can be grouped into several categories:

- Establishment of special social security systems without contribution schedules. Several countries have applied these systems, which are designed to meet the demands of specific population groups (mothers, the elderly), production sectors (cane cutters, coffee workers), or specific concerns regarded as having priority (maternal and child care). These experiments may be successful in the short term in bringing in the targeted groups, but they lack sustainability because they are generally financed with special funds, such as loans from international lending agencies, and are thus not properly integrated with other sector activities. When international aid ends, these systems tend to be abandoned or cut back, since future regular budget appropriations have not been planned.
- Voluntary insurance with government subsidies. This allows certain excluded groups to become beneficiaries of a social security system without fulfilling all of the requirements for membership. In this regard, this modality eliminates one of the exclusionary characteristics of social security systems. Subsidized voluntary insurance solves the problem of excluded populations as long as the government is prepared to continue providing the necessary funds. If health care delivery to this group differs from that offered by regular social insurance programs, it is an inequitable model and may be perceived as such by its beneficiaries.
- Limited expansion of supply. This involves providing specific services to certain population groups. Various experiences indicate that this model can be successful in the short term, since it can help the excluded population to gain access to services. The chief disadvantages of this strategy are the absence of financial sustainability and the lack of coordi-

nation with other service provision modalities. At the same time, such interventions tend to be carried out without much research and thus may not reflect real or perceived health care needs of the target population.

- Community services for social protection. Their chief characteristic is direct management by the potential consumers. The experiences in the Region by and large have been conducted in communities in which the degree of exclusion from health care is such that there is no alternative. The success of this approach requires proper coordination with the other public systems, from which they tend to purchase services. An additional problem is the impact of high-cost diseases (AIDS, for instance), which can quickly exhaust financial reserves. Successful experiences reflect situations in which effective coordination has been developed with public services and different sources of financing have been combined, at the same time that community involvement in decision-making processes has been respected.
- Gradual development of unified systems. In this case, a public subsystem, to which the majority of the population has exclusive access, is usually combined with a supplementary private one (private health insurance) that has direct access to services in the public system. This model combines various funding sources (general taxes at the three levels of government, special taxes, and contributions). Its main limitations have to do with lack of resources and of guaranteed access to more complex care, which means that integrated networks of services must begin to be built at the regional and microregional levels. Brazil's Single Health System is an example of this model.

The immediate conclusion to be drawn from the above experiences is that reducing exclusion from health care requires an approach that combines various intervention modalities. In addition, simultaneous efforts need to be made in the areas of steering, financing, insurance, and provision of health services so that the actions undertaken in each are consistent and mutually reinforcing.

As far as the health sector's steering role is concerned, the challenge is to make extending social protection for health the focus of the government's political agenda and to engage all relevant actors in the effort. In this regard, extending social protection for health must be made part of the essential public health function of guaranteeing access to services. Periodically following up and assessing the degree to which this function is being fulfilled will help to sustain efforts to reduce exclusion.

In terms of financing, the challenge is to organize the various sources in solidarity-based financing, so that individuals' health-related demands can be met with equity. It is especially critical to guarantee solidarity-based, sustainable financing for both individual and nonindividual health care services. At this point, solidarity-based financing arrangements, set up as a single, publicly reg-

ulated fund with social control and accountability mechanisms, seem to be most effective in reducing social exclusion.

In regards to health insurance, the challenge is to strike an appropriate balance between mandatory, publicly financed, and/or solidarity-based systems, on the one hand, and privately financed ones, on the other. Above all, the challenge is to avoid the high transaction costs caused by fragmentation and the risks of inequity associated with segmentation that are common today in many countries of the Region. All indications are that a public insurer managed with solidarity, efficiency, transparency, and accountability and holding a prominent position in the insurance field is fundamental to having an orderly insurance market and to reducing the risks of exclusion. A similar effect arises from standardized arrangements for affiliation/incorporation into the system and from pertinent methods of reporting the characteristics of the populations that have and have not affiliated/incorporated into the various subsystems.

Having a set of guaranteed, publicly financed benefits, which are tailored to a country's priorities and epidemiological patterns and that are reviewed periodically, has been useful for enhancing judicial security, extending coverage, and contributing to a more efficient allocation of resources in several countries. The more standardized and unifying their content, the greater their impact, regardless of whether public or private insurance companies manage the insurance. Under mixed insurance systems, the government must meet the challenge of guiding the competence of insurance companies so that coverage of the guaranteed package to yet uncovered populations can be extended or so benefits not included in the package ("fringe benefits") can be offered.

Special mention should be made of community health insurance plans organized for specific groups in society for which traditional insurance plans have not been effective. The predominant sources of financing are various kinds of voluntary contributions and public or national and international external subsidies, and either public or private providers can be hired to deliver the services. The challenge in this case is to promote the financial sustainability of these organizations and to foster coordination between them and formal systems of insurance and service provision. As far as service provision is concerned, the challenge is to reorient the care model and to introduce appropriate incentives so that intermediate and end providers can help reduce or eliminate exclusion.

As far as the health care model is concerned, priority must be attached to strategies aimed at improving access to health services (for example, by shifting the emphasis of services to health promotion and by bolstering the primary care strategy), guaranteeing the continuity of care between levels and subsystems in the health care model, and strengthening the demand for services from populations at greater risk of exclusion (for instance, by enhancing the ability of users to acknowledge and assert their rights to health care). As for incentives, arrangements should be introduced for paying intermediate and end providers that most

help to reduce exclusion (for example, public subsidies for establishments that provide care to excluded groups), while arrangements that may promote exclusion ought to be avoided (for instance, direct, out-of-pocket payments or public subsidies for patients covered by private insurance). As the appropriate incentives are introduced, the model for managing the establishments and services must be kept consistent with the content of the guaranteed benefit package.

### **The Political Economy of Extending Social Protection for Health**

If the above strategies are to be successful, the legitimate interests of interested parties must be acknowledged and consideration must be given to how these interests could affect the strategies designed to combat exclusion. Interested parties often are found in sectors other than health (for example, finance, social policy, labor and employment, education, industry). Therefore, the intersectoral nature of the analysis and dialogue for developing response strategies must be underscored from the outset. In order to spell out the interests of affected parties and enable the strategies to succeed, conditions must be created and mechanisms must be developed to help establish a social dialogue that will enable interested parties to embrace the proposal and promote its implementation over time. Indeed, owing to its potential coordinating effects and its impact on citizens' productivity, employment, and quality of life, combating exclusion and promoting the extension of social protection for health must be conceived as a sustained, long-range effort and ought to be one of the foremost State policies. Such a policy should be periodically reviewed, thus giving rise to successive action plans with specific goals and with accountability at the country's highest level of political life.

### **LEGISLATION TO REGULATE THE PROVISION OF HEALTH SERVICES**

As part of an ongoing trend, in recent years legislation has responded to the need to expand health services coverage and to acknowledge the increasingly marked shift to unfettered competition. The latter has resulted in the coexistence of public and private sectors managing health funds, insurance arrangements, and service provision. Consequently, relations between the two sectors now need to be regulated, as well as the relations between them and clients in order to correct the asymmetries inherent in the interaction of actors with different degrees of power. There also is an ongoing trend towards establishing regulatory agencies that can, under the guidance of the ministry of health, arbitrate relations between sector actors and seek a balance between them, as well as transparency and social equity, within a framework of mutual rights and duties.

Over the past four years, two of the Region's countries have undergone changes in constitutional law, and laws, decrees, and resolutions concerning the regulation of health service provision were issued. Ecuador (1998) and Venezuela (1999) promulgated new national constitutions that acknowledge the right to health care. The Constitution of Ecuador establishes free public health programs and activities for all and free public medical care for those who need it, with funding from the General State Budget, from individuals who use the services and can pay for them, and from other sources that the law indicates. The Constitution of Venezuela ordered the creation of a national public health system, integrated into social security and governed by the principles that it will be free of charge, universal, comprehensive, equitable, socially integrated, and solidarity-based, with priority financing from the State.

In a bid to expand coverage, Decree 446/00 was signed in Argentina. It sought to enhance the system's solidarity by bolstering the Solidarity Redistribution Fund, increasing workers' contributions to the fund based on wage level, and expanding the choice of health agents. Shortly thereafter, however, opposition by the *obras sociales* (union-run health care programs) and private entities caused this decree to be repealed. In Bolivia, Supreme Decree 25.265/98 guaranteed the offer of several essential, effective benefits by, among others, public establishments, health centers, nongovernment organizations, and churches, covered by the basic insurance plan. The decree gives priority to children under 5, pregnant women, and reproductive health, though it also includes the diagnosis and treatment of several communicable diseases. This decree is complemented by Supreme Decree 25.186/98, Regulations Governing the Law on Free Medical Insurance for the Elderly and the Discounts and Privileges System, applicable to those over 60 years of age who are not covered by the mandatory social security system or other insurance. In Chile, Law 19.650 of 1999 administers the financing that the National Health Fund (FONASA) grants to its beneficiaries through both public and private agencies. The national budget must provide the funding for this purpose.

In the Dominican Republic, Law 87 of 2001 created the Dominican Social Security System, which has three categories: contributors, subsidized, and subsidized contributors; the last category is included according to a gradual, progressive schedule. The law seeks to provide comprehensive physical and mental health protection for affiliates and their families in order to achieve universal coverage, and guarantees that affiliates can choose between the national health insurance, which is the public insurer, and health risk administrators, which can be public, private, or joint entities. Health services are delivered by health service providers, which also have such status. The Cayman Islands consolidated their 1999 regulations on health insurance and the amendment that adjusts health benefits for the indigent (35). In the United States, the 1997 Balanced Budget Act made changes in Medicaid, specifically in the schedule of payments to providers. This reform

has not, however, altered the relations between Medicaid, the states, and the program beneficiaries, although previously beneficiaries could choose among various managed care plans and select their health care professionals. At present, states can require affiliation with a plan as a precondition for coverage. As for Medicare, Title XVIII of the Social Security Act was amended to promote the choice of a managed care plan for program beneficiaries under what is called the Medicare+Choice Program. The Balanced Budget Act also extended Medicare coverage for certain procedures that are regarded as cost-effective and created the Programs of All-inclusive Care for the Elderly for persons older than 55 years old who require nursing services under Medicare. It also created the State Children's Health Insurance Program as a way to earmark funds so the states could cover care for uninsured children. Later, the 1999 Balanced Budget Refinement Act strengthened the substance of the previous act (36).

As for the regulation of the private sector, in Mexico the new 1997 Social Security Law seeks to increase the federal government's contribution to health care financing, and the 1997 and 1999 Rules for the Operation of the Health Branch amend the 1935 General Law of Insurance Institutions and Mutual Benefit Associations. Under these provisions, associations and organizations operating as prepaid medical care managers have become insurance institutions specializing in health (ISES), and regulations for their operation have been established with oversight by the Health Secretariat, which determines standards of quality. The rules also establish mechanisms for transparency in the operations and marketing of private health insurance and other guarantees of patient rights. In Brazil, Law 9,656 of 1998 regulated the private health plans and insurance that until then were not subject to regulations. And in Ecuador in 1998, the government issued a law governing the operations of private health care companies and prepaid medicine, in an attempt to establish requirements for their operation and spell out the benefits that they must offer clients, to whom it gave the opportunity to file complaints in the event that they are denied care or ignored.

Also with a view towards establishing a regulatory framework for the activities of the private sector, Barbados enacted its Small Business Development Act, and Grenada enacted its Micro Enterprise Development Act, both in 1999; both laws cover health services (35). In Canada, where there has been debate in recent years about the involvement of the private sector in the provision of health services, the Province of Alberta passed the Health Care Protection Act, which allows the regional health authorities (public agencies that manage health care in the province) to contact private providers for surgeries financed with public funds and also gives them the opportunity to offer other services financed by clients (37). In Panama, Law 27, passed in 1998, created the National Health Coordinator, which coordinates the financing, contracting, and provision of medical and health care services throughout the nation under program-contracts that it enters into with providers.

In addition, the creation of regulatory agencies or the regulation of existing ones has been promoted. In Argentina, Decree 405/98 approved the organizational and administrative structure of the Health Services Superintendency under the jurisdiction of the Secretariat of Health Policies and Regulation of the Ministry of Health and Social Action. For the same purpose, Brazil in 2000 passed Law 9.961, creating the National Supplementary Health Agency, an autonomous agency governed by special rules and with a connection to the Ministry of Health. In Paraguay, Decree 20.553 of 1998 regulated the functions of the Health Superintendency created by Law 1.032 of 1996, in order to oversee, audit, and technically monitor the entities that provide the country's health services.

Concern over quality control of services and professional practice became noteworthy in Argentina, where Resolution 253/98 of the Health Services Superintendency set requirements for the registration of establishments providing medical care and of health care professionals. In addition, Decree 1.424/97 established the National Program to Guarantee the Quality of Medical Care, which is mandatory for all health care establishments, and the Permanent Advisory Council, whose function is to advise health care authorities in implementing measures to fulfill the program's objectives. Moreover, Decree 498/98 approved the definitions and general regulatory framework for professional certification and recertification.

In Bolivia, Ministerial Resolution 28/97 updated and adapted the rules, regulations, and organizational and operational procedures of public and private sector hospitals, both profit and nonprofit. Accreditation must be applied for within two years to the National Hospital Accreditation Commission of Bolivia. In Costa Rica, Decree 28.828-S set forth the General Regulations for the Authorization of Health Care and Related Establishments. In Brazil, the functions of the Health Care Oversight Agency, created by Law 9.782 of 1999, include oversight of routine or emergency outpatient services, inpatient services, diagnostic or therapeutic support services, and services entailing the use of new technologies. In Paraguay, the Health Superintendency is charged with accrediting and categorizing health services providers, be they public, private, mixed, or affiliated with social security.

In Barbados, the 1998 Health Services Amendment Act empowers the Ministry of Health to regulate the management, oversight, and inspection of private hospitals, homes for older adults, and maternity wards; Trinidad and Tobago does likewise for homes for older persons through the Homes for Older Persons Act of 2000. Antigua and Barbuda (1999), Barbados (2001), Grenada (1997), and Saint Lucia (2000) either enacted or reformed laws establishing councils to enhance the quality of services in public hospitals (35). In Mexico, the 1999 Official Mexican Regulations for the Certification of Hospitals provide that certification will be conducted by the Hospital General Safety Council and determine applicable requirements.

Several countries issued regulations governing the practice of health care professionals and promoting training for them. Nursing was regulated in Ecuador (1999), Honduras (1999), and Canada, in order to achieve integration among professionals and to transfer functions. In Canada Ontario (1997) expanded the functions of nurses to include certain diagnostic activities and the prescribing of drugs, and British Columbia (2000) included certain complementary therapies (37). Ecuador also issued regulations governing the practice of chemotherapy and pharmaceutical biochemistry (1998) and of medical technicians (1998); Venezuela issued such regulations for medical aides (2000). Training programs were reformed in Costa Rica (1997) in connection with medical residency and the obligatory social service, and the United States (1998) authorized programs for training health professionals run by the Department of Health and Human Services under the Public Health Service Act (36). In Colombia, Decree 2.147/99 provided that the National Council for the Development of Human Resources in Health Care may establish departmental and district councils to fulfill whatever functions the Council and the National Executive Committee may delegate to them. Brazil (2000) established the Program for Health Care Work in the Interior (Programa de Interiorización del Trabajo en Salud) to encourage high-level health care professionals to work in the municipalities.

Clients are protected by regulatory bodies (superintendencies or agencies) and other vehicles created for this purpose. In Mexico, the Rules for the Operation of the Health Branch provide for a medical overseer, one of whose functions is to monitor the proper implementation of the policies and procedures defined by the Insurance Institution Specializing in Health (ISES), of which he/she is part, in order to guarantee proper provision of the services offered to the insured under the various plans. In the United States, the debate focused on the need to correct what is perceived as meddling by insurance companies in medical decision-making and on including prescription drugs as a Medicare benefit, although to date no laws have been passed. In Chile, the first draft of a law on patients' rights was put to a debate, and there was a continuing trend towards the judicial determination of aspects having to do with patients' rights and towards the strengthening of the functions of ombudsmen. In Brazil, Resolution 3/01 of the Justice Ministry identified several blatantly unfair clauses, one of which prevents a patient from directly suing a private health insurance firm in the event of medical error. Ecuador (1999) approved regulations for suits by consumers in connection with the scope of the ombudsman's powers. In several countries there is still keen debate about establishing this sort of institution.

## REFORMS AND HEALTH SYSTEMS FINANCING

Health systems financing is an essential component of sector reform processes in the Americas. In 1997–2000 financing

approaches that had been introduced in the previous period were critically reviewed, and an attempt was made to identify alternatives that would help reduce inequities in access to and financing of health services. This analysis was at least partially justified by the fact that, over time, the specific objectives of financing reform have evolved from strict financial sustainability to the achievement of equitable access to quality services. The simultaneous achievement of both objectives has required that health sector financing be analyzed from a strategic standpoint that will identify the best alternative mechanisms.

Studying health care financing and spending is a key aspect of an overall analysis of reforms, inasmuch as modifications in this area affect the attainment of efficiency, access, equity, and effectiveness objectives that were analyzed in previous sections. From 1997 to 2000, the countries pursuing sector reform projects focused more on studying changes in financing than on carrying out the changes themselves.

The financing of health services in the Americas is undergoing reforms that are closely linked to economic and social transformations and to reform of the State and public administration. At the start of the 1990s, when social considerations were given renewed value, the role of the State was redefined as the guarantor of financial resources to meet the population's needs, and discussion began about the role of the State in directly providing health services. Towards the middle of the decade, the separation of functions, along with the shortcomings of relying on the market to equitably allocate resources, rendered the need to reassess the State's role as an urgent priority. In the health care sphere, this meant revising and developing strategies for strengthening the steering role of health authorities. From a paradigm of intensive financing based on public contributions and service provision, whose stated goal was universal care (in the 1970s), there was a shift first to a paradigm that, in the midst of an economic crisis and the transformation of the State's role, sought to react to the actual decline in public financing for social sectors (in the 1980s), and then to one that, in keeping with an economic model of growth with equity, called for a strategic look at the possible combinations of financing tools and sources in providing health care (in the 1990s).

In 2000, worldwide spending on health was estimated at US\$ 3.2 trillion, 7.5% of the world economy.<sup>7</sup> As can be seen in Table 2, world per capita income was estimated at US\$ 6,400 and per capita spending on health at US\$ 480. The Region of the Americas accounted for 46% of total world spending on health, about US\$ 1.5 trillion. Regional spending on health accounted for 11.3% of the Region's GDP. Given a per capita income close to US\$ 16,300, national per capita spending on health is estimated at US\$ 1,837, almost four times the world average. In every country

and region of the world there are major differences in incomes, national spending on health in relation to the size of the economy, and per capita spending on health. The Region of the Americas has consistently shown one of the greatest inequalities in income and spending on health (38). Table 2 shows the per capita income, the relative importance of health service markets, national spending on health as a percentage of GDP, per capita national spending on health, and the proportional share of the public and private sectors as "spending agents" in various regions of the world.

Per capita spending on health in Latin American and Caribbean countries (US\$ 498) is similar to the world average of US\$ 480, high in comparison to that of low- and middle-income countries, and relatively low in comparison to that of other regions. National spending on health as a percentage of GDP in Latin America and the Caribbean is high compared to other world regions.

A better indicator of health spending would be public expenditures as a percentage of GDP and the ratio of public to private health care spending, expressed in dollars. In the Americas, public spending accounts for 5.3% of GDP, with variations from country to country. For example, public spending as a percentage of GDP in the United States and Canada (6%) is almost double that of Latin American and Caribbean countries (3.3%).

Variations in public expenditures on health between countries approximate the major variations in the role of governments in financing services. Public spending on health includes expenditures by central and local governments on the production and distribution of health care services or, indirectly, under provincial, state, or departmental public health insurance plans. It also includes subsidies for demand. Table 3 shows public spending as a percentage of GDP, the amount of funds administered by the public sector in millions of dollars, and the amount of per capita public spending on health. Public spending on health as a percentage of GDP ranges from more than 6% in Canada, Costa Rica, and Uruguay to under 2% in Guatemala and the Dominican Republic (38).

Table 4 shows private spending as a percentage of GDP, the amount of resources managed by the public sector in millions of dollars, and the level of per capita private spending on health care. Private spending on health care as a percentage of GDP ranges from highs of 7.1% in the United States and 5.9% in Argentina to lows of 0.7% in Aruba and 0.9% in Guyana.

The analysis of household spending on health care provides a measure of how great a burden it places on household finances and of the choices that are made in purchasing health-related goods and services. Table 5 shows the percentage of household resources allocated for health care spending across income groups in several countries of the Region. Household spending on health tends to decline modestly from lower- to higher-income groups within a country, with the exception of the Dominican Republic and Paraguay. The weighted average of household spending on health care in the countries under study indicates that households

<sup>7</sup>Barring indications to the contrary, the dollar figures cited in this section are expressed in terms of international dollars; the dollar amounts have been adjusted in accordance with purchasing power parity as a conversion factor (PPP US\$ 1999).

devote an average of 6% of their spending to purchase health-related goods and services; the poorest quintile devotes 7.3%, and the wealthiest quintile, 5.9% (38).

In absolute terms, however, the highest-income groups spend much more than the poor. A gross average for the Region suggests that the wealthiest 20% of the population spends 12 times as much as the poorest 20%.

There seem to be two main reasons why spending on health care as a percentage of total household income tends to decline as household income rises. The first is the relatively recent impact of private insurance on household health care expenditures. The broader coverage of private insurance among upper-income groups, with premiums largely paid by employers, lowers the amount of direct payments by clients in these income quintiles. Second, the higher proportion of spending among lower-income groups could also reflect differences in the coverage of the public health system. Households in the lower-income quintiles have limited access to social insurance because many of their members work in the agricultural and informal sectors. But it could also be that they have more limited access to public establishments. When governments allocate the majority of funding for secondary and tertiary establishments in predominantly urban areas, public subsidies could disproportionately favor the urban population and the upper quintiles, instead of lightening the burden on lower-income groups. Focusing on the kind of household spending for health care highlights the stronger impact that it has on household budgets and helps identify how and why different income groups seek care.

Household spending on health can be divided into expenditures for medical consultations (including visits to the doctor or dentist and outpatient treatment), for medication, and for hospitalization and diagnosis, as well as health insurance outlays and other health-related expenditures. The main component of household spending on health care is medical consultations. The weighted Regional average of surveys in selected countries in the Americas shows that medical consultations account for 34% of total spending on health care. Outlays for medications account for 28%, while hospitalizations and diagnostic tests and other medical expenses account for 9% and 12%, respectively. Although data on health insurance are not available for most countries, insurance is the third leading category of expenditure, with 16% (largely because of the weight that Brazil carries in the calculations) (38).

### SERVICE DELIVERY TRENDS AND APPROACHES

Initiatives to change the modes of delivering health services are a constant within health sector reform processes in many countries in the Americas (39, 40). The key elements in reforms of health services provision are:

- Expanding health service coverage to populations or geographic areas without access.
- Guaranteeing and providing a package of health care benefits to the entire population, especially to the poorest sectors.
- Changing the health care model, emphasizing health promotion and disease prevention.
- Incorporating new management methods in public health establishments.
- Integrating health services providers.
- Instituting quality-oriented management and provision of health services.
- Gearing health services to the demand and the consumer.

#### Expanding Health Care Services to Populations and Geographic Areas without Access

In this case, the expansion of the health services supply mainly deals with their geographic expansion. Although coverage expansion historically has been on the agenda of reform processes, new approaches are currently being tried. The following are some of the innovations in this field: use of distance medicine, mobile health equipment and community health agents, special incentives for attracting professionals, and contracting with the private sector, particularly with nongovernment organizations (NGOs). This strategy has also been combined with assuring the provision of a minimum benefit package.

In Bolivia, NGO activities have been significant, because of their sheer numbers, their contribution to the provision of health services, and the volume of financial resources that they manage. NGOs and the Church control 355 establishments in the country. Most have international financing and tend to be located in marginalized urban areas, and a small number, especially those that receive international funding, are located in extremely poor municipalities. NGOs provide health care to an estimated 10% of the population. The Church provides important services to the community, especially in extremely poor zones and marginalized urban areas. Health services run by churches operate for the most part with State human resources, with their own infrastructure, and with funding shared with clients. On the other hand, there are numerous suppliers of traditional medicine, and in many rural or marginalized urban communities there are midwives and folk healers or *yatiris*. The health system is gradually incorporating midwives into local care networks.

In Guatemala, the Program to Improve Health Services has promoted the extension of service coverage, particularly to populations without access. Since 1997 the Ministry of Public Health and Social Assistance has funded and regulated basic health services provided by NGOs to populations that previously lacked access to health care. NGOs mainly engage in preventive care activities (80%), while clinical services are less frequent (20%). From 1996 to early 2000 agreements were signed with NGOs to

provide a basic health care package to 4.5 million inhabitants who previously did not have access to health services. The agreements include several sequential commitments: personnel training, censuses, the drafting of maps, and finally the progressive delivery of the services included in what is called the “basic services package” (40).

### **Ensuring and Providing Health Care for the Entire Population**

This policy aims to assure access to basic health care for the most vulnerable population groups. The content of the State-guaranteed benefit package varies in accordance with the country’s epidemiological situation, but the selection of the interventions that the basic package includes is based mainly on criteria of cost-effectiveness. In general, the benefit package includes immunizations; nutritional supplementation; school health programs for treating intestinal infections, micronutritional deficiencies, and health education; family planning and nutrition education, self-care, vector control, and health monitoring; programs to reduce the use of tobacco, alcohol, and other drugs; programs to prevent AIDS and other sexually transmitted infections; prenatal and childbirth care; family planning services; comprehensive care for children; treatment of tuberculosis; and treatment of sexually transmitted infections.

In Mexico, basic health services and a guaranteed benefits package were provided through the Coverage Expansion Program, whose goal is to provide basic health care to approximately 10 million Mexicans who lacked regular access to health services. This program has two levels of “focus” for expenditures or interventions. The first is to expand the geographic or regional coverage that benefits specific localities in accordance with social, epidemiological, and poverty-related criteria. The second is to expand coverage by type of beneficiary population (mainly mother and child) and by specific health problem. The basic health care package includes 13 low-cost interventions with a strong impact on health and meets the epidemiological needs of the beneficiary rural localities (40).

In Bolivia, the National Mother and Child Insurance Program was enacted in July 1996; it provides several free services to pregnant women, the newborn, and children under 5 years old. Its main objective is to expand coverage to these populations as a way to lower maternal and neonatal mortality rates. In addition, in December 1998 the Government of Bolivia created Basic Health Insurance, a public service of universal access providing quality, culturally sensitive essential benefits. Basic Health Insurance offers 92 health promotion, preventive, and curative benefits, including the detection of maternal syphilis under the Subprogram to Eliminate Maternal and Congenital Syphilis. Nine traditional medicine benefits were recently included for a set of municipalities and for mothers and children; they are to be provided by accredited personnel.

### **Changing the Health Care Model, Emphasizing Health Promotion and Disease Prevention**

Many of the Region’s countries are reforming their health care models, including Argentina, Bolivia, Brazil, Canada, Colombia, Costa Rica, Cuba, the Dominican Republic, Mexico, Panama, and El Salvador. The trend is towards replacing the traditional model of health services provision, which is biomedical and curative in nature and is centered on hospital care, with care that emphasizes health promotion and disease prevention. The strategy for changing health care models invariably entails strengthening and improving primary health care. In this regard, emphasis should be placed on the renewed role of primary health care as a “gateway” to the health system and its impact on the health of families and the community. In fact, several countries intend to establish family medicine or family health models, among them Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, and Panama.

In Brazil, the change was made under the Family Health Program (PSF), which began in 1994 and was built on the foundation of another very successful national program, the Community Health Agents Program. The basis of PSF is the family health team, which consists of a general or family practitioner, a nurse, a nurse’s aide, and four to six community health agents. Other health professionals, such as dentists, nutritionists, and social workers, can be part of the team. The family health team provides basic health care to a population of between 600 and 1,000 families (a maximum of 4,500 persons). The team conducts a complete “census” of the geographic area under its responsibility, gathering information about risk factors and various conditions in the community, household, and individual environment. The team’s services target the family and the community as intervention units, and emphasize health promotion, especially health education and prevention of specific diseases or conditions. Teams work actively with the community in identifying and solving problems, as well as with other sectors, such as education and water and sanitation. In principle, the family health team serves as a gateway to the system, although in some cases this function is not yet being entirely fulfilled.

In Canada, restructuring in most provinces has involved a reduction in the scale of hospital services through mergers and closures, in an attempt to control the most costly segment of health care. Some provinces have also increased pressure on hospitals by insisting that new community care initiatives be financed with the savings of these centers. All provinces have undertaken “well-being” strategies, begun to develop models and networks for primary care, and boosted funding for at-home care.

In Chile, the supply of services is being redefined to expand coverage and enhance problem-solving capacity of outpatient care, improve inpatient care, boost efficiency in resource use, promote public-private complementarity, and integrate primary care with the other levels. The establishments operating under the Health Services employ procedures such as outpatient surgery,

overnight hospitalizations, and abbreviated treatments. At the primary care level the change centers on recognition of the population's health needs, with a comprehensive, family-based approach, and thus the present-day primary care clinics are becoming family health centers. At the secondary care level there are new establishments, such as health reference centers and diagnostic-therapeutic centers. In order to provide care to vulnerable groups, the local management capacity of the poorest communities is being enhanced and campaigns are being conducted to lower morbidity and mortality rates from acute respiratory infections and at-home deaths due to such infections in children under age 3. The Family Health Centers Program is introducing multidisciplinary professional practice with professionals who are being or have been trained in family medicine (40).

In Costa Rica, the overhaul of the health care model is designed to organize it along three closely related levels, which must operate in a coordinated, efficient manner on the basis of the primary health care strategy to ensure timely, comprehensive, and ongoing care for the entire population. The Basic Teams for Comprehensive Care provide a Basic Program of Comprehensive Care that includes, at the very least, comprehensive care for children (0–9 years), adolescents (10–19), adults (20–59), and older persons. The new model is characterized by a biological/psychological/social approach to the health-disease process and comprehensive, ongoing care for the health of individuals and the environment, with emphasis on promotion and prevention, based on the primary care strategy. The subject of care is no longer exclusively the individual, as care is now focused on the family, the community, and the environment (40).

In Peru, the provision of health services is being reoriented towards health promotion, incorporating preventive and promotional aspects, sociocultural adaptation, and community involvement. Around 30 provincial and district municipalities have set up local networks of healthy communities in the country's north (Tumbes and Piura), south (Arequipa), and central part (Lima and Callao). These networks are working mainly in four fields: healthy, safe motherhood; prevention and control of family violence; care for older adults; and healthy spaces (especially environmental health). Health promotion has been incorporated into the activities of the educational sector under the National Program of School Municipalities, which provide children and adolescents with opportunities for training, participation, organization, and speaking out. One of the strategies of the program is the development of Health Promoting Schools, whereby health promotion and disease prevention have been incorporated into the school and home environments.

In El Salvador, the change has taken the form of Basic Systems of Comprehensive Health (SIBASI), which are viewed as the decentralized operational unit of the health services. The hope is that they will help to build more networks of health services and foster greater participation by all local institutions offering services in a SIBASI area. There have been changes in the supply of

health care services, especially at the primary level of care in the Ministry of Public Health and Social Assistance and the Salvadoran Social Security Institute; to this end, the demand for care at establishments and the health problems in the surrounding community have been analyzed. Risk groups and vulnerable populations have thus been identified, and they will be provided services pursuant to the care proposals set forth in health care programs for adolescents, older adults, mental health, and for combating domestic violence. Most of the establishments of the Ministry of Public Health and Social Assistance have organized consultations on a staggered schedule and by appointment, and health units have extended their hours to 7 p.m. There are also plans to provide care on weekends and during vacations. Some of the Ministry's establishments schedule outpatient surgery days. Patients are referred and counterreferred by levels of care, especially where SIBASIs are functioning (41).

In the Dominican Republic, the administration that took office in August 2000 sought to shift the long-standing emphasis on specialized care and continued developing a new care model based on family health teams known as UNAPS (Primary Health Care Units). These units consist of a general practitioner (assistant or resident); a nursing auxiliary; a primary care supervisor (previously called supervisor of promoters); and three, five, or more promoters, as needed. The New Care Model, which has determined the basic range of services by age group, prioritizes the primary level and assigns between 500 and 750 families to each unit. This model also entails the reorientation of the secondary and tertiary levels, a task that has begun with hospital reforms. To date, UNAPS are estimated to cover around 100,000 persons. At present, 85 UNAPS have been set up, each serving a population of between 2,500 and 3,000 people who live within a physical area called a sector. Their decision-making capacity is basic and includes at least 25 health care activities arranged by life cycle. Each household has a health care file in which its risks and the traits of each member and of the household are noted. The UNAPS organize their efforts in different venues (home visits, schools, the workplace) and base their activities on teamwork and the use of information for action. Working with the Health Committee, they encourage an analysis of the health situation and local planning (41).

### **New Management Approaches for Public Health Establishments**

Many of the health sector reforms in the Region have focused on this component, covering both hospitals and health centers (39). In general, the changes seek to enhance the administrative autonomy of establishments, and countries such as Argentina, Bolivia, Brazil, Colombia, the Dominican Republic, and Panama have attempted them. The models vary from country to country, ranging from total or complete privatization of the management of services to intermediate solutions such as the "corporatization" of an establishment or service outsourcing. Other approaches



have maintained the public nature of the provider, but the relationship between the provider and the financing source has been altered through the separation of functions. This is done by introducing a new function called services purchasing, which uses instruments called “program-contracts” or “management commitments” to link the allocation of public funding to verifiable results in health care. Costa Rica, Chile, Argentina, Bolivia, Nicaragua, and Peru, among other countries, have tried this modality. Likewise, such reforms have introduced financial incentives for performance both by individuals and health teams. Besides promoting autonomy, they seek to improve management within the establishment (micromanagement). Their major traits are strategic planning, results- and performance-based management, and quality-oriented management (40).

In Argentina, the Self-managed Public Hospital (HPA) can integrate health services networks with other public or private health care establishments that have been duly certified by the appropriate authority, upon authorization by the authority with jurisdiction. According to HPA rules, in establishments of average or high complexity, management must be supported by a Technical Advisory Council and a Board of Directors with social representation, whose makeup, powers, and duties must be defined in each case by the health care authority with jurisdiction. HPAs can appoint, promote, and relocate personnel within the approved structures, penalize personnel in accordance with the rules in force in each jurisdiction, and accept terminations for any reason. The decree creating these hospitals provides for a fund to be distributed monthly among all hospital personnel in accordance with whatever guidelines the jurisdictional authority determines as a function of the establishment’s productivity and efficiency criteria. HPA rules allow services to be provided between 8 a.m. and 10 p.m., except in the case of emergency services. The legal framework for the purchase and sale of services from third parties is found in HPA rules, under which these hospitals can sign agreements with social security bodies, charge individuals who can afford services or third-party payers, and set up networks of services (40).

In 1998, Panama began reorganizing its health services in the health regions of San Miguelito and Metropolitana in accordance with a new care and management model. The opening of the new San Miguel Arcangel Hospital required the passage of two laws that have made it easier to separate health services financing from health services provision and that enabled the joint financing by the Health Ministry and the Social Security Fund. There are management agreements in the regions of San Miguelito, Metropolitana, and Veraguas; they follow a goals-based management model in which the budget remains as a way of allocating funds but in which indicator-measurable objectives are agreed on. San Miguel Arcangel Hospital has introduced management commitments and program-contracts for health care. This type of contract allows services to be purchased from and sold to third parties. The hospital is run as a self-managed business.

In Costa Rica, the management commitment is an operational tool for applying the new resource allocation system. This is a mutual agreement under which the financing and purchasing agency and the provider of health services specify goals and allocation mechanisms. The change included legal mechanisms so that health care establishments could manage their budgets in a decentralized manner. This model presupposes the existence of a management system with administrative capacity, authority, responsibility, and the willingness to take risks. The aim is not to hand over publicly owned health care establishments or services to private management, inasmuch as this would not square with the principles of the reform. Instead, the aim is to decentralize management to allow the direct purchase of outside services, thus enhancing the management of the establishment and of human resources. Accountability is assured through a fund that withholds 10% of the assigned budget; this money is released when commitments are fulfilled. Only then will the establishment be entitled to use the withholding fund as it sees fit, earmarking a portion for staff incentives (40).

### **Integrating Health Service Providers**

The integration of health services providers has been an ongoing objective of health sector reforms in recent years. There are many forms and definitions of provider integration, depending on the angle from which it is viewed. Nonetheless, the key element in integration is the creation of various kinds of links between the various system parts that seek to work in a coordinated or joint fashion to enhance service provision in terms of equity, quality, efficiency, and effectiveness. Such integration seeks to organize providers in networks, in order to offer health services to a defined population, offer a complete range of services, reduce fragmentation and duplication of services, and maximize the use of existing financial resources. One example is the horizontal integration model, in which providers at the same care level group together (for instance, one hospital combines with another); this type of integration is more common in countries such as Canada and the United States. Another example is vertical integration. In this case, hospital operations are viewed as part of the rest of the services network, which includes health centers and polyclinics at the primary care level, giving rise to what are called “vertically integrated systems of health care providers” (41). There are various examples of vertical integration in the Americas; they were discussed in this chapter’s previous section on changes in the health care model.

### **Quality-centered Management and Provision of Health Services**

Quality is one of the crucial targets of health services reforms. Depending on how it is defined, quality relates to many of the previously described variables. Indeed, some of its attributes are effectiveness, efficiency, acceptability, legitimacy, and equity. Today it

is defined as “doing the right thing the right way.” Thus, quality can be assessed in terms of an individual practice, the performance of a health care establishment, or the management of the system as a whole. The concept of quality and its tools have been changing and have been refined over time. Thus, there has been a shift from the concept of “assuring” quality to the concept of the “ongoing enhancement” of quality. This approach focuses on measuring service performance and results and on the satisfaction of clients. More importantly, health services ought to be managed entirely from the perspective of ongoing quality enhancement, using the most appropriate tools in each case, among them: accreditation, standardization, comparative assessment, guides and protocols, management based on the continuing cycle of quality enhancement, strategic and results-based management, evaluation of health care technologies, and evidence-based medicine (42).

In 1992, Argentina instituted the National Program to Guarantee the Quality of Medical Care. It pursues and regulates the activities relating to the certification and categorization of health care establishments; oversight of the professional practice of health team personnel; the drafting of operating rules and procedures manuals for health services and of medical care rules; advisory services and technical assistance for such activities; health accountability and control; and assessment of the quality of medical care and health services. Regulations are being drafted that will set the minimum requirements for the organization and operation of health services and specify space, equipment, and human resources requirements and procedural rules by risk level (40).

Colombia established the Mandatory Quality Guarantee System, which sets basic requirements that service provider institutions must meet. Decree 2.174/1996 included the following minimum components that health services must include: essential minimum requirements, design and execution of a quality enhancement plan, and medical auditing. Decrees and resolutions were issued in order to gauge the degree of client satisfaction and give consideration to complaints and suggestions. Among them were Resolution 03165/1996, under which the manual of guidelines for health care for the disabled and handicapped was adopted; Decree 2.240 and resolutions 4.445 and 5.042 of 1996 on the minimum requirements for health infrastructure; as well as other legal regulations, such as manuals of scientific/technical and administrative rules, blood banks, and customer information and care (40).

In Cuba, 100% of establishments have quality programs up and running. Each unit has a Quality Assessment Council, which is made up of various committees that assess care, focusing primarily on surgeries, hospital mortality, drug therapy, tumors, hospital infections, resource use, and satisfaction with services. There are organizational and procedural manuals, and clinical-surgical and general hospitals are applying the accreditation manual with its 41 standards and 76 qualitative and quantitative indicators in the quest for hospital excellence. In addition, 100% of establishments conduct client satisfaction surveys (40).

### **Gearing Health Services to Demand and the Consumer**

Although gearing services to demand and the consumer is one of the most important strategies for improving the performance of health services, it also is one of the most overlooked; few countries in the Region have made progress in this field. The sector has a long-standing tradition, derived from the “traditional” model, of looking at health services exclusively from the perspective of the provider of services (supply). In this regard, it is worth noting that the quality of services cannot be enhanced unless they are geared to demand. This means being familiar not only with the demographic and epidemiological profile of the population receiving care, but also with aspects such as patterns of services use, barriers to access, health practices and behaviors, cultural beliefs and preferences, and traditional medicine. It also means promoting self-care, and acknowledging that the patient has “rights” and must be treated in a dignified, humane manner. Finally, it means that the quality of care is assessed not only in terms of objective health care results, but also in terms of client perceptions. Some of the Region’s countries have promoted these principles through community involvement in health-related decisions, social oversight, and free choice of providers.

In Colombia, taxpayers pay 12% of their income into the system, and all receive identical care under the Mandatory Health Plan. People are free to choose the health promotion enterprise or subsidized system administrator with which they want to affiliate and, within the network that they offer, also select the service provider institution where they wish to receive care. A service provider institution can be a hospital, clinic, laboratory, basic care center, and other health service center, as well as all professionals who individually or in a group offer their services through the health promotion enterprise. In turn, the enterprise offers affiliates and beneficiaries various service provider options, from which they are free to choose (40).

In Chile, many hospitals have joined the Friendly Hospitals Program, and various local programs are designed to improve care for consumers. Worthy of note are the bilingual information services that assist the Mapuche population in the Araucania Region and the patient care services that care for patients and their families from hospital admission to discharge. In addition, in the institutional model each beneficiary of the public insurance system (FONASA) can choose the primary health care establishment in which he/she wishes to enroll, but not the specific professional or referral center. In the “free choice” model, beneficiaries can choose their providers, with a prior copayment, in accordance with a national list of fees (40).

In Bolivia, the Strategic Health Plan, through the Identity Health Program with an Intercultural and a Gender Approach, promotes specific procedures geared towards clients. It has been implemented in 100% of first-level establishments, both public sector service providers and NGOs.

Finally, as for the results of reforms to the aforementioned health care models, there is some degree of consensus that in most cases the reforms are very recent and do not permit a complete assessment. On the other hand, in the case of reforms that have been under way for a long time, the results are “mixed,” that is to say, in some cases the benefits have outweighed the costs of change, while in others this has not been the case or else the status quo has not been altered. This point suggests that in accordance with the PAHO/WHO mandate to track and evaluate health reforms in the Region, greater emphasis ought to be placed on assessing changes in service provision models.

## **ANALYSIS OF HUMAN RESOURCES IN REFORM PROCESSES**

Against the backdrop of health sector reforms, many countries in the Region have felt that the issue of human resources had been omitted from the design and the implementation of adjustments to the system. This proved to be a mistake, because when the reforms were put into practice, most of the shortcomings and obstacles had to do with mismatches between what the technical design was proposing and the capabilities and attitudes of those who had to implement it. In other words, the active cooperation of the people working in the new structures and new jurisdictions was needed in order for the reforms to work (43). The imbalances between personnel training models and the needs of services, the inadequate distribution of health care professionals in relation to the population's needs, and managerial shortcomings in addressing poor motivation among personnel are persistent problems that intensified amid the reform processes and grew even more complex because of the fresh demands for results that emerged.

The field of human resources in health care is marked by the always troubled relationship between the staffing needs (type, quantity, and quality) of health services and the output of training institutions, which independently determine the characteristics of their graduates. The reciprocal adaptations of these two groups of agents are mediated by the effects that labor markets have on the training and utilization of personnel. Counterbalancing these trends are the professional or union groups that affect the equilibrium between the production and use of personnel, within a dynamic that the reform alters in essential respects. The following is an analysis of the impact of sector reforms on the leading elements in this field: management in health services, human resources training, repercussions on labor markets, and the action of professional or union groups.

### **Reform and Management of Human Resources in the Health Services**

Health service reforms are linked to other reforms that have the same aims, particularly reforms of the State and labor

reforms. Most national reform processes have to varying degrees decentralized the management of services to local bodies.

PAHO's survey as part of the 2001 Observatory of Human Resources<sup>8</sup> found that of the 16 countries that responded to the survey, 9 transferred decision-making about personnel movements and penalties, 8 allowed decentralized decision-making about dismissals, and 6 delegated autonomy for decision-making about wages and incentives. This gave rise to many personnel management requirements, new forms of hiring, and even the dismantling of information systems. At the same time, the new decentralized decision-making bodies often lacked the adequate tools to meet these requirements. The increasing number of decision-making bodies created new labor situations, with multiple contracts, the cooperativization and outsourcing of services, and new manpower hiring arrangements. These situations raise major questions about how to ensure the quality of services when they are provided under new and precarious labor relations between management and those who actually deliver care.

The new forms of results-oriented services management, which often take the form of management contracts or agreements, mean that directors must translate these results into goals that are assessable by management and desirable for the personnel that have to achieve them. At least seven countries in the Region have set in motion new systems of incentives and functional careers, and several more have them under study, at times pursuant to laws or decrees, as in the case of Chile, Venezuela, and Bolivia. The application of performance assessment systems that are consistent with these needs and the implementation of results-based incentive schemes represent a large-scale social experiment that raises more questions than it answers: how should desirable performance in health care be described, what are appropriate incentives, and how can the effects of monetary incentive plans be made sustainable?

### **Reforms and Human Resources Training**

The expansion of educational offerings and increasing participation by the private sector in professional education have been features of this stage of change in the State's functions. The requirements of the educational market for health care professionals and the corresponding curricular reforms have for long periods followed tracks independent of reforms in the sector of health services provision and even the labor market. Between 1992 and 2000, offerings of courses in medicine rose 68% in Chile, 68% in Peru, 61% in Argentina, and 21% in Brazil. Since this course expansion came from the private sector, it was guided by the educational demands of those who could afford such edu-

<sup>8</sup>Survey prepared by the Human Resources Program of PAHO's Health Systems and Services Development Division and conducted among those in charge of the human resources function within the health authorities in 18 countries of the Region, within the framework of the Human Resources Observatory.

cation, and highly specialized professions were given priority, with a rapid shift to professions involving the use of technology.

However, ongoing reforms that emphasized expanded coverage and cost containment created a new educational market for professionals interested in working in training and comprehensive or family care, and who are concerned about quality as perceived by the client and are aware of the cost of services; this market is still being developed. The definition of essential public health functions also guides the training of a labor force that is able to perform a number of tasks in whose absence the health of the population begins to be exposed to major risks. Some of these training demands exceeded the response capacity of traditional teaching institutions, which were unable to begin offering large-scale adult education programs. As a result of this inability, in most cases these new offerings are marginal to a curriculum that still adheres to the traditional paradigms.

All reform processes also complemented their efforts in financing and organization with training components. A survey of 14 managerial reform projects financed by multilateral banks or aid agencies showed that training components cost between US\$ 345,000 and US\$ 10 million, depending on the type of project, for a combined total of US\$ 79 million between 1993 and 2000 (13). Estimates were that each component reached between 1,000 and 9,000 beneficiaries with its educational activities. In spite of this enormous investment, the survey found that these components were implemented as parallel processes, and were not strategically integrated into organizational changes. The medium-term impact of these processes will have to be assessed in terms of the new capabilities developed and the sustainability of activities that must be permanently undertaken in the services.

### Reform and Health Care Labor Markets

New management forms are reflected in new labor relations, which as noted previously are more decentralized, flexible, and precarious than the traditional paradigms of civil service in the health sector. This reality has fragmented relatively stable markets, inasmuch as the opportunities, incentives, and risks have begun to promote greater mobility among technicians. Technicians also are pressured by additional training requirements to enter the labor market, where paradoxically they are being offered more precarious jobs with low professional standing. A survey of the contracts of hospital medical specialists in Brazil's Single Health System showed that 16% of physicians worked as subcontractors, and as many as 28% in certain specialties such as intensive care (44).

Almost all countries suffer from a relative excess of physicians in urban areas, a shortage of nurses, and a trend towards emigration to developed countries. These imbalances aggravate tensions in the labor market, where demand sets conditions, thus promoting dissatisfaction among contractors, weak identification with institutions (for which they will work only briefly), and social

tensions arising from mounting underemployment or unemployment in several professional categories.

Migration of professionals is an increasing problem for the Region's countries, against the backdrop of economic integration agreements and global phenomena. In the Dominican Republic, Chile, and Argentina conflicts are arising from the immigration of physicians from neighboring countries, thus worsening the domestic glut; in Jamaica, Peru, and Ecuador, on the other hand, problems are being caused by the emigration of trained personnel, especially in the field of nursing. The Caribbean countries have estimated losses of US\$ 16 million in training and retraining costs to replace the human capital lost to emigration. At the same time, excess supply in urban areas has enabled coverage extension programs to be undertaken in regions or decentralized systems that have had the opportunity to offer incentives for attracting general practitioners to positions created through novel arrangements. Thus, programs such as the family health program in Brazil require the training of several thousand new professionals in various disciplines, and the Local Health Administration Committees in Peru have opened positions for physicians and nurses with specializations in comprehensive health.

### Reforms and Professional Associations and Unions

These collective actors, whose working conditions, job stability, and contract status have been adversely affected, spearheaded resistance to reforms in places where they could do so. The introduction of changes has been marked by resistance from medical associations in countries such as the United States and Chile to various aspects of reform and by intermittent conflicts. The governability of public health institutions in conflict situations is in many instances one of the most critical aspects to be considered in determining the course of structural modifications, which could be thwarted, altered, or halted by the conflicts that they trigger.

Moreover, gluts or imbalances in the labor market and the strength of professional associations and unions can reinforce one another. In the short run, associations and unions can impose work and pay systems that are out of line with actual market conditions. In many countries, labor reforms deregulated or fragmented decisions about labor relations, thus creating conditions for the law of supply and demand to prevail without the modulations that collective organizations were imposing, as in the case of Decree 576/93 in Argentina.

In the medium term, however, the perception is emerging that these market laws do not provide automatic solutions to the imbalances either, and in many countries professional associations have regained their role as spokesmen for a reform that envisions proper working conditions to foster better attitudes among professionals towards quality services. The challenge of confronting unions and professional associations with the population's demands for high-quality, readily available health services makes for a dialogue under new conditions about the involvement of

collective actors in reform. Moreover, in their political handling of reform many governments have grasped how important the cooperation of certain collective actors is, for example doctors and nurses associations, which are crucial to the acceptance of these initiatives by public opinion.

### Regulation of Human Resources and the Steering Role

Reform processes have modified the role of the State by reducing its executive functions and emphasizing its managerial functions. In the field of human resources these functions are adapting to a fact that had been realized before reforms were implemented: the development of human resources cannot be organized as if they were just another resource subject to rule-based planning. Labor and educational actors, their organizations, and their interests are forces that health authorities cannot command by giving orders. This does not mean that the State ought to abandon the field and leave it up to market forces or to impositions by the more powerful players. On the contrary, the field lends itself to the development of regulatory capacity, which means a knowledge of the circumstances under which the activities of the players, their interests, and the points at which these specific interests or tendencies can serve the general interest unfold.

In the final accounting, national health authorities need to strengthen their institutional capacity so as to have a reliable information base available; be able to rally and lead other actors, be they educational institutions, professional groups, or employer organizations; have available tools to develop the skills and attitudes of health care personnel; and be able to effectively integrate training efforts into reform processes. Of the 16 countries surveyed, only 3 have structures within the health authority with a mandate for nationwide human resources planning, the gathering of information, and the determination of principles for professional accreditation and certification. This speaks to the need to bolster steering capability as a sphere of action.

Strengthening institutional capabilities in human resources units will enable health authorities to channel the development of health personnel in the direction of the public's demands for greater equity, efficiency, and quality, demands that must be the guide for sector reform processes.

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TABLE 1. Indicators of exclusion, and percentage and number of persons excluded from social protection in health, Latin America and the Caribbean, 1989–1996.

Exclusion indicator	Reference year	Estimated excluded persons (%)	Population excluded (thousands)
By coverage:			
Population without health insurance	1995	46.0	217,779
By access:			
Economic (combined)	1989–1994	27.0	121,245
Geographic	1995	22.0	107,013
By infrastructure:			
Shortage of hospital beds	1996	55.3	267,537
By procedure:			
Births not attended by trained personnel	1996	17.0	83,558

*Source:* Based on the document "Panorama de la exclusión de la protección social en salud en América Latina y el Caribe," presented at the Tripartite Regional Meeting of the International Labor Organization, held in Mexico from 29 November to 1 December 1999.

TABLE 2. National spending on health (NSH) in the Americas and participation in the world market of health care services, 2000.

Regions	Per capita income, 2000 (in 1999 US\$ PPP)	Participation in the world market of health care services (%)	NSH/GDP (%)	Per capita NHS, 2000 (in 1999 US\$ PPP)	Public/private ratio
The Americas	16,293	46.0	11.3	1,837	46/54
Canada	23,178	2.0	9.3	2,156	71/29
United States	32,004	36.0	13.0	4,161	45/55
Latin America and the Caribbean	6,992	9.0	7.3	498	43/57
High-income countries <sup>a</sup>	26,689	72.0	6.5	2,589	62/38
European Union	22,926	17.0	9.3	2,063	74/26
Other high-income countries	25,511	16.0	9.0	1,658	86/14
Low- and medium-income countries <sup>b</sup>	3,767	28.0	5.0	177	40/60
Eastern Europe and Central Asia	7,656	5.0	5.6	429	71/29
Middle East and North Africa	6,092	2.0	4.7	286	51/49
Southern Asia	2,101	4.0	4.7	99	19/81
Southeast Asia and the Pacific	3,910	9.0	4.1	160	41/59
Sub-Saharan Africa	1,606	1.0	4.3	69	40/60
Worldwide	6,400	100.0	7.5	480	56/44

<sup>a</sup>Including Canada and the United States.

<sup>b</sup>Including Latin America and the Caribbean.

*Source:* Compiled by the Public Policy and Health Program, Division of Health and Human Development, PAHO, based on its Data Base on National Health Spending, 2001.

TABLE 3. Public spending as a percentage of GDP, total public sector funds, and per capita public spending on health, countries of the Americas, 2000.

Country/territory	Public spending as a percentage of GDP	Total public sector funds (in millions of 1999 US\$ PPP)	Per capita public spending on health (1999 US\$ PPP)
Anguilla	2.7	3	351
Antigua and Barbuda	3.4	24	362
Argentina	4.1	16,914	457
Aruba	3.7	149	1,522
Bahamas	3.3	150	489
Barbados	4.4	173	640
Belize	2.5	30	126
Bermuda	...	...	...
Bolivia	3.2	601	72
Brazil	3.4	40,258	237
British Virgin Islands	1.5	0.9	452
Canada	6.6	56,156	1,803
Cayman Islands	2.2	...	...
Chile	4.4	5,730	377
Colombia	5.1	11,459	271
Costa Rica	6.9	2,269	564
Cuba	5.5	2,728	244
Dominica	3.9	14	202
Dominican Republic	1.9	949	112
Ecuador	2.0	652	52
El Salvador	3.3	906	144
Grenada	3.2	21	222
Guatemala	1.4	601	53
Guyana	3.7	111	129
Haiti	2.5	296	36
Honduras	2.7	377	58
Jamaica	2.7	231	89
Mexico	2.5	21,607	219
Montserrat	3.9	7	594
Netherlands Antilles	3.3	147	679
Nicaragua	5.5	610	120
Panama	5.4	857	300
Paraguay	2.6	616	112
Peru	2.5	2,918	114
Saint Kitts and Nevis	3.1	13	325
Saint Lucia	2.6	21	138
Saint Vincent and the Grenadines	4.3	25	224
Suriname	3.0	49	116
Trinidad and Tobago	2.2	242	187
Turks and Caicos	2.7	6.2	386
United States	5.9	547,370	1,966
Uruguay	4.8	1,331	399
Venezuela	2.4	2,915	121

Source: Compiled by the Public Policy and Health Program, Division of Health and Human Development, PAHO, based on its Data Base on National Health Spending, 2001.



TABLE 4. Private spending on health, countries of the Americas, 2000.

Country	Private spending on health		
	As a percentage of GDP	Total funds administered (in millions of 1999 US\$ PPP)	Per capita spending (1999 US\$)
Anguilla	2.2	2.3	290.5
Antigua and Barbuda	2.1	14.4	215.4
Argentina	5.9	24,644.6	665.5
Aruba	0.7	28.5	290.8
Bahamas	1.8	82.4	268.3
Barbados	2.2	88.7	328.7
Belize	2.3	28.8	119.5
Bermuda	...	...	...
Bolivia	1.7	315.8	37.9
Brazil	5.0	59,384.0	349.1
British Virgin Islands	2.5	1.6	766.5
Canada	2.7	22,936.8	736.4
Cayman Islands	2.0	0.0	0.0
Chile	2.4	3,164.4	208.0
Colombia	4.2	9,433.3	222.9
Costa Rica	2.2	735.3	182.8
Cuba	1.2	578.4	51.6
Dominica	2.0	7.3	102.3
Dominican Republic	4.6	2,326.4	273.9
Ecuador	2.0	625.6	50.2
El Salvador	4.9	1,342.9	214.0
Grenada	2.4	15.6	167.9
Guatemala	4.0	1,673.0	146.9
Guyana	0.9	26.7	31.0
Haiti	3.4	410.0	49.9
Honduras	4.5	645.5	99.5
Jamaica	2.7	231.6	89.6
Mexico	2.8	24,181.3	244.5
Montserrat	2.1	3.5	319.8
Netherlands Antilles	2.2	95.9	441.9
Nicaragua	3.7	413.1	81.4
Panama	1.9	299.3	104.8
Paraguay	4.5	1,058.2	192.5
Peru	1.9	2,186.1	85.2
Saint Kitts and Nevis	2.1	8.7	224.1
Saint Lucia	2.2	17.9	117.8
Saint Vincent and the Grenadines	1.9	11.6	102.3
Suriname	2.8	43.8	105.0
Trinidad and Tobago	2.3	257.1	198.5
Turks and Caicos	2.2	5.2	324.2
United States	7.1	660,020.4	2,371.1
Uruguay	5.5	1,532.7	459.3
Venezuela	4.7	5,809.6	240.4

Source: Compiled by the Public Policy and Health Program, Division of Health and Human Development, PAHO, based on its Data Base on National Health Spending, 2001.

TABLE 5. Distribution of family spending on health, by income/spending, 1994–1999.

Country	Year	Total	Quintiles by approximate family income/spending				
			1 <sup>st</sup> (poorest 20%)	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup> (wealthiest 20%)
Argentina	1996–1997	8.6	9.2	8.6	7.8	8.2	9.0
Brazil	1995–1996	6.5	8.3	6.5	6.9	7.1	6.3
Dominican Republic	1996	6.3	29.1	14.7	9.4	7.7	3.5
Guatemala	1998–1999	7.3	3.9	5.9	7.0	8.3	7.8
Honduras	1995	2.8	...	...	...	...	...
Jamaica	1998	2.6	2.4	2.5	2.5	2.6	2.7
Mexico	1996	2.9	3.7	3.3	3.3	2.9	2.8
Paraguay	1996	10.7	14.0	13.8	10.9	10.1	8.8
Peru	1997	4.4	4.3	4.8	4.7	4.0	4.5
Uruguay	1994–1995	13	11	14	15	13	11
Total <sup>a</sup>		6.0	7.3	6.2	6.2	6.2	5.9

<sup>a</sup>Weighted regional average.

Source: Compiled by the Public Policy and Health Program, Division of Health and Human Development, PAHO, based on its Data Base on National Health Spending, 2001.



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## IV. PROMOTING HEALTH IN THE AMERICAS

*Health promotion is the process of enabling people to increase control over, and to improve, their health... Therefore, health promotion is not just the responsibility of the health sector, but goes beyond healthy life-styles to well-being.*

–Ottawa Charter for Health Promotion,  
First International Conference on Health Promotion  
Ottawa, Canada, 21 November 1986

The conceptual framework for the main health promotion strategies supported and advanced by PAHO in the Region is based on the understanding that an individual's behavior is affected by cultural and societal norms and values; political, community, and physical environments; and access to behavioral change tools. Healthy individual and community behavior is the ultimate goal. Changing the behavior of individuals is approached through improvements to their environment, such as the implementation of healthy public policy and community development interventions that contribute to healthy environments; the provision of information, using communication and education strategies that promote the adoption of healthy lifestyles and changes in health risk behaviors; and increased access to adequate health services.

This chapter presents a brief summary of the health promotion framework, and a Regional analysis of family and population health, child and adolescent health and development, health of the elderly, and health of indigenous populations. It also addresses such priority areas as food and nutrition; mental health; tobacco, alcohol, and other substances of abuse; safe motherhood and maternal mortality; sexual and reproductive health; and oral health. Finally, the chapter analyzes the advances in creating healthy and supportive communities and environments, especially the progress made with regard to healthy municipalities and communities and health promoting schools.

### THE HEALTH PROMOTION FRAMEWORK

Health promotion emerged as an effective strategy for improving health and quality of life due to a major shift in public health thinking provoked by the Lalonde Report (Canada, 1974). Lifestyles and social and environmental factors were recognized as the key determinants of health, and a decade later, the public health community adopted the Ottawa Charter (Canada, 1986). The Charter lists five key areas for health promotion: (1) healthy public policy, (2) supportive environments, (3) community action, (4) development of personal life skills, and (5) reorientation of health services.

The Ottawa Charter's platform was reaffirmed by subsequent international and regional conferences. The Adelaide Recommendations (Australia, 1988) provided an in-depth review of the concept of public policy and outlined ways toward establishing healthy public policy. The Sundsvall Statement (Sweden, 1991) built on the concept of creating supportive environments and provided examples of good practice.

The Bogotá Declaration (Colombia, 1992) highlighted the relationship between health and development and called for a renewed commitment to solidarity and equity in health. It called attention to the negative impact of violence on the health of individuals and communities, and summoned the political will of people and leaders to modify social conditions and make marginalization, inequality, abuse, and environmental destruction unacceptable.

The Caribbean Conference on Health Promotion (Trinidad and Tobago, 1993) strongly endorsed health promotion and protection, set forth strategic approaches for intersectoral activities, and called for a commitment to community participation, social communication, and the achievement of greater equity in health.

The Jakarta Declaration (Indonesia, 1997) reiterated the global commitment to the strategies put forth in the Ottawa Charter, and provided a clearer understanding of the critical importance of building partnerships for health. It called for the involvement of a wider group of stakeholders and identified key elements aimed at improving health and quality of life, which later were adopted by WHO Member States in the 1998 World Health Assembly (Resolution 51.12).

With mounting evidence of health promotion's effectiveness, many Member States are increasing their investment in the development, implementation, and evaluation of health promotion strategic planning for action. Yet, only a few countries have dedicated adequate resources to building their capacity to promote health in the key settings where people live, study, and work. In the Americas, Canada, Chile, Cuba, Mexico, and the United States of America have implemented countrywide planning for action. In addition, experiences in other countries have demonstrated the effectiveness of health promotion at the community level.

The Fifth Global Conference on Health Promotion (Mexico, 2000) spurred discussion among countries of the importance of health promotion action in improving the determinants of health and addressing inequalities. The Conference outlined the key ingredients for health promotion and provided guidelines for strengthening health promotion plans of action: (a) evidence of health promotion effectiveness, (b) increased investment for health and development, (c) increased social responsibility for health, (d) community empowerment and action for health, (e) increased infrastructure for health promotion, and (f) the reorientation of health services.

Fulfilling the commitment of the Region of the Americas to strengthen health promotion planning for action, which was undertaken when the countries signed the Mexico Declaration in 2000, requires that health promotion be placed high on the political agenda and that priorities be clearly identified. This commitment, embraced by Member States, includes:

- Positioning the promotion of health as a fundamental priority in local, regional, national, and international policies and programs;
- Taking the leading role in ensuring the active participation of all sectors and civil society in the implementation of health-promoting actions; and
- Supporting the preparation of countrywide plans of action for promoting health, following a basic framework agreed upon during the Fifth Global Conference on Health Promotion.

Committed and strong partnership among stakeholders is crucial to progress of health promotion. The role different networks can

play to bring together various levels of government, professional and community organizations, and the private sector to develop health promotion plans for action cannot be overemphasized.

The principles of health promotion outlined in the Ottawa Charter, and the conclusions and agreements from the subsequent international conferences, form the conceptual framework of health promotion today. The framework's basic tenets are the combination of such strategies as using information, communication, and education theory and methods; involving all stakeholders in decision-making, defining priorities, and determining the use of resources; and using advocacy to influence the various agendas that impact the determinants of health, human development, and equity.

## HEALTHY SETTINGS

### Healthy Municipalities and Communities

The Healthy Municipalities Initiative focuses on creating health-supporting environments at the local level through local government support for the establishment of healthy public policies, active community participation, the reorientation of health services, and the promotion of healthy lifestyles.

Since the mid-1990s, the number of healthy municipalities has increased in practically every country in the Region of the Americas (Table 1). The popularity of the strategy has spread in part due to the growing visibility of healthy municipality experiences, national and Regional healthy municipality networks, and Regional forums for sharing experiences.

### Experiences in the Countries

The Healthy Municipality movement in Argentina is exemplified by Rosario, where a variety of activities based on municipal management, community participation, intersectoral involvement, and equity in health have been developed and implemented. The municipality designates 25% of its budget for public health activities. Municipal priorities include strengthening health promotion activities at municipal hospitals, preventing automobile accidents, and pedestrian safety (*J*). The municipalities of Berisso, Ensenada, and La Plata participate in the SIMBEL Project, which focuses on the development of healthy public policies and local participatory planning.

Bolivia's healthy municipalities—El Alto, La Paz, Tupiza, and Sucre—have implemented projects to promote healthy spaces (e.g., markets and schools), nutrition, youth organization and participation, and basic sanitation. Bolivia's first National Meeting on Healthy Municipalities and Communities, held in 1997, involved more than 600 individuals (representing 87% of the country's 314 municipalities) from the health and social sectors at both the local and national levels. The primary goal of the meeting was to promote healthy municipalities as an effective strategy for implementing the National Strategic Health Plan

1997–2002, which identifies family medicine, basic health insurance, epidemiological surveillance, healthy schools, and maternal mortality reduction as priority areas (2).

The healthy municipalities movement in Brazil is distinguished by strong community involvement as well as technical cooperation from the University of São Paulo. CONASEMS, an NGO that is actively promoting the movement, represents the National Association of Municipal Health Officials, which represents approximately 5,000 municipal health officers (3). In the late 1990s, Brazilian universities began to assume a more visible role in the initiative, and a national network was created. Brazil is initiating evaluations in two small municipalities in the state of São Paulo (Limeira and Bertioga), which will be used to develop recommendations for future evaluation initiatives (4). Other Brazilian municipalities with strong healthy municipality experiences include Campinas, Curitiba, Fortaleza, and Santos.

The idea for the global Healthy Cities movement was first conceived in Canada, in 1984, as a result of the “Healthy Toronto 2000: Beyond Health Care” meeting. Since then, Canada has developed strong provincial networks of healthy cities in British Columbia, Manitoba, Ontario, and Quebec; smaller networks exist in New Brunswick and Saskatchewan. Local projects are very diverse, including, for example, a recycling initiative in Lillooet, British Columbia; Project Wheels in Peterborough, Ontario which focuses on providing transportation to individuals isolated because of illness or geography; and appropriate waste management in Sherbrooke, Quebec.

In Chile, in 1999, 250 representatives from municipalities, the health sector, and local and international organizations gathered to reaffirm the national commitment to the Healthy Municipalities Strategy. At the conclusion of the meeting, 12 mayors signed an agreement that established Chile’s National Network of Healthy Municipalities. Later that year, the National Council for Health Promotion (VIDA Chile) and the National Network of Healthy Municipalities convened the 1st Chilean Congress on Health Promotion, which closed with participants pledging to strengthen and support local and Regional capacity for health promotion. The 1999 National Health Promotion Plan identifies healthy municipalities as a main strategy to address the country’s priorities—cardiovascular disease, mental health, accidents, and cancer—through local interventions. Also in 1999, Chile and Canada formed a technical transfer project whereby the two countries share experiences and work together to develop Chile’s national and Regional health promotion strategies (5).

Colombia has made the development of the Healthy Municipalities for Peace strategy a national priority. The national program focuses on fostering and maintaining peace; child rights; eradication of illicit crops and drug use; quality control of health services; and employment generation (6). Targeted action areas include local crime and violence prevention, transportation, the environment, and cultural celebration. The integrated development experience of the municipality of Versalles was pre-

sented as an exemplary case study in health promotion at the Fifth Global Conference on Health Promotion (Mexico, 2000). Cali, La Vega, Manizales, and Teruel also have had successful Healthy Municipality experiences (7).

In 1999, 27 of Costa Rica’s cantons participated in the annual competition for the most exemplary healthy canton in the national network of healthy and ecologically sound cantons. The first- and second-place winners received monetary awards for continued healthy canton activities. Many of the participating cantons focused on environmental issues, such as recycling, waste management, water conservation, water quality, pollution reduction, organic farming, and increasing and maintaining green spaces.

One of the main areas addressed by Cuba’s Healthy Municipalities Movement is healthy lifestyles, including physical exercise, nutrition, stress management, and the reduction of cigarette and alcohol consumption. The Healthy Prisons Project seeks to improve prisoners’ quality of life, reduce prison violence, and prepare incarcerated individuals for re-entry into society (8). In 1999, Cuba’s Ministry of Health, in collaboration with diverse national and international organizations, held the Second Conference for Multisectoral Resource Mobilization, which focused on Cuba’s healthy municipality network, particularly emphasizing health education, water, and sanitation.

The Dominican Republic’s Healthy Municipality strategy enjoys strong national support. Through an innovative partnership between the Ministry of Health and a local university, public health graduate students collaborate with at-risk neighborhoods in Barrio Lindo to improve basic sanitation and foster healthy lifestyles. The first national meeting of healthy municipalities and communities was held in 1999, with the goal of educating and sensitizing key actors from various sectors and organizations responsible for developing and implementing the strategy, and of sharing key insights and lessons learned.

The national priorities addressed by the Healthy Municipalities strategy in El Salvador include improving the environment, promoting healthy child development, and strengthening local sanitation infrastructures. The Ministry of Public Health and Social Assistance has proposed an intersectoral Healthy Industry project to protect the health of workers and the surrounding community through the establishment of adequate health services, improvement of sanitation and environmental conditions, and the evaluation and reduction of risks in the workplace and in the community (9). Health promotion activities addressing child development and family health have been implemented in municipal markets as part of the Healthy Markets strategy (10).

The healthy municipalities concept has been promoted in Haiti for several years. Because of widespread poverty, weak community organization, lack of resources to finance projects, and weak political support for the program, no formal municipal commitments to the movement have been declared.

In Honduras, in 1998, Tegucigalpa was declared a “Healthy Capital,” and several priority areas, such as access to potable

water, basic sanitation, violence, and migration, were targeted for action. However, the process in Tegucigalpa was disrupted by Hurricane Mitch, and has only recently restarted. Representatives from Honduran municipalities participated in the 1998 meeting, "Border Municipalities: Gulf of Fonseca and Surrounding Municipalities," in El Salvador. The meeting, which addressed the health of residents living on the border of El Salvador and Honduras, ended with a declaration by officials from both countries to improve the quality of life of border residents and to create a network of healthy municipalities.

When Mexico signed the Monterrey Commitment in 1993, it became the first Latin American country to establish a national network of healthy municipalities. The United States–Mexico Border Health Association, PAHO, and Mexico's Department of Health Promotion have been studying ways in which healthy municipalities initiatives can be adapted and applied to the border context. At the 1999 Safe and Healthy Cities workshop, the municipal authorities of Reynosa, Mexico, and McAllen, Texas, committed themselves to this initiative (11).

Managua, Nicaragua, was the only Latin American city to participate in the four-year UNDP/LIFE international Healthy Cities Project that commenced in 1995. In 2000, the UNDP Healthy Managua Project was evaluated. As a result of the Project, a municipal health plan for Managua was formulated with the involvement and consensus of key stakeholders. Additional project activities included the organization of community development committees, integration of street gangs in social and educational action, neighborhood watch to reduce crime, and home improvements through low-interest loans (12).

Panama's healthy municipalities participate in the Municipalities for the 21st Century movement, whose main objectives are to facilitate the adoption of healthy municipality policies, encourage the development of local agricultural projects, and strengthen local government. The program is coordinated by the country's First Lady, with the assistance of an intersectoral committee, technical divisions, and local district committees.

The municipalities of Asunción, Capiata, Concepción, Fernando de la Mora, San Ignacio de las Misiones, and San Lorenzo are among those participating in Paraguay's healthy municipalities strategy. Priorities of these municipalities include the revitalization of parks and green spaces, improving sanitation at municipal markets, healthy maternity, and promoting community arts and recreation (13).

Significant advances in multisectoral collaboration have taken place in several of Peru's healthy municipalities, including Callao, Cajamarca, Independencia, Lima, and Tacna. Just south of Lima, Villa El Salvador is an internationally renowned healthy community that began as a squatter settlement of poor families. Current healthy municipality initiatives there include improving food vendor hygiene, integrating the contributions of elderly community members, strengthening youth sports clubs, and developing a local furniture manufacturing industry (14).

A national network for healthy municipalities was established in Uruguay. The network's vision is to incorporate all Uruguayan municipalities in order to improve the physical and social environment, promote community resource mobilization for local development projects, and foster community and intersectoral participation in all development activities. The departments participating in the network are Durazno and Tacuarembó, which have prepared formal healthy municipality framework agreements that outline strategic components and proposals (15).

There are more than 200 self-declared healthy cities and communities in the United States, and a number of others that are involved in the movement at some level. The movement is represented by projects at both the state and city levels. Although diverse projects have been implemented within the Healthy Cities framework in the United States, some common themes have emerged, such as resource conservation, environmental health, domestic and youth violence, adolescent services, and job and life skills training (16). Many of the organizations that support healthy cities and communities are members of the Coalition for Healthier Cities and Communities, which aims to improve the health and quality of life of communities by means of community-based development through the collaboration of the public, private, and nonprofit sectors (17).

Venezuela's Municipalities Working Toward Health Program emphasizes community participation and intersectoral involvement with the general goal of establishing autonomous local health systems to address community-identified problems. The Venezuelan Network of Municipalities Working Toward Health was established to support communication and coordination among municipalities; allow sharing and comparison of experiences; and publicize successes, needs, and lessons learned at both the national and international levels (18). Recent successful municipal experiences include Zamora's community mobilization project to pressure nearby industries to reduce their pollution output; Sucre's activities to improve the quality and nutritional value of food sold by vendors; and Morán's local leadership development program (19).

### Health-promoting Schools

Between 1970 and 1990, primary school enrollment in Latin America steadily improved, becoming almost universal throughout the subregion, with some exceptions among rural poor children. In the Region as a whole, at least 85% of the primary school-age children are enrolled in school. However, disparities still remain among countries. For example, completion rates for primary education vary from 14% in the Dominican Republic to 93% in Uruguay.

Secondary school enrollment rates have also improved in many countries of the Region. In 1970, only 40% of school-age children in Chile had access to secondary school education, while today 80% do. Other countries, including Colombia, Ecuador, Mexico, Nicaragua, and Trinidad and Tobago, have doubled their

secondary school enrollment rates since 1970, though disparities still exist within and among countries. Gender differences in school access have also decreased, and preschool net enrollment rates rose to 23% in 1996. However, despite the fact that most children enroll in school, their actual preparedness to learn varies extensively, in part due to their access to health, nutrition, and emotional resources. As more impoverished children enter schools, more health and nutrition inputs are needed (20).

Latin American and Caribbean countries have well-established school health programs. Historically, school health departments were situated at the ministries of health, and functioned as the countries' disease control offices. Their focus was on disease prevention and control through a medical and disease-oriented strategy that reinforced teacher and student disengagement and passivity.

Several stages have been defined for the development of school health in the Region (20). The integrated models of school health being developed highlight two main approaches: schools as "practical targets" to reach children, adolescents, and communities, and "integrated" school health programming, in which health and education stakeholders seek to make various tasks and activities complementary.

The Health-promoting Schools Initiative provides a comprehensive vision and a multidisciplinary approach that considers people in the context of their daily lives and in their families, communities, and societies. The Initiative focuses on the development of knowledge, abilities, and skills to empower people to take care of their health, to minimize risk behaviors, and to adopt and maintain healthy lifestyles. A critical-reflexive analysis of values, behaviors, social conditions, and lifestyles is encouraged. The Initiative contributes to the development of socially egalitarian gender relations; encourages good citizenship and democracy; strengthens solidarity and community spirit; and protects human rights. Activities are undertaken in a variety of educational opportunities and settings, and not solely in the classroom.

The three key components of the Initiative are comprehensive health education; healthy and supportive environments; and adequate health services and nutrition and physical activity programs. The strategic plan of action includes revising joint health and education policy; strengthening national commissions as intersectoral coordinating mechanisms; developing, implementing, monitoring, and evaluating school health plans and programs to improve health promotion in schools; involving parent-teacher associations, community organizations, and representatives of health and other sectors in promoting health in the school environment; and designing and implementing studies with the school-age population. The Initiative helps the health, environment, and education sectors work together to improve their ability to detect problems and offer assistance to teachers, students, and families in a timely fashion, with the goal of reducing the number of young people and adolescents who adopt risk behaviors that endanger their health. Such behaviors include smoking, consumption of alcoholic beverages, substance abuse, and engaging in unsafe sexual practices.

The success of the Initiative depends largely on the commitment of the countries as well as on the leadership role assumed by the sectors involved. The greatest challenge is the mobilization of the resources and materials necessary to support the implementation of programs, projects, and activities, including the involvement of the society as a whole, international and technical cooperation agencies, political decision makers, the private and public communication sectors, teachers, and parents.

Family and community participation in extracurricular health promotion activities is a vital element of the Initiative, and many activities focus on promoting healthy and supportive environments. The Latin American and Caribbean networks of health-promoting schools provide opportunities to continue the health promotion and health education dialogue at all levels, and facilitate the exchange of ideas, resources, and experiences to nurture the commitment and enthusiasm of the various stakeholders.

A range of school health promotion and education activities have been implemented since the Health-promoting Schools Initiative was launched in 1995. For example, in Central America, health-promoting schools policies and coordination mechanisms have been developed, and schools are participating in the Latin American Network of Health-promoting Schools. In addition, training has been conducted, community participation has grown, and youth risk behavior surveillance and evaluation activities have been undertaken (21).

In Argentina, an innovative strategy of the Ministry of Health seeks to replace universal health screening with a tailored, demand-driven approach in which an initial screening is conducted by teachers and complemented by a questionnaire for parents. This mechanism generates an ongoing information system that supports referral and medical follow-up when required. Municipalities have made faster progress in strengthening this new approach. In the Province of Buenos Aires, some 10,000 psychologists, social workers, and education specialists employed by the Ministry of Education provide complementary support to approximately 30,000 students (20).

In Brazil, the Ministry of Health has prepared a series of television programs that address the most relevant health issues facing the school-age population, such as STIs/AIDS, teenage pregnancy, accidents, oral health, nutrition, violence, and drug abuse. These programs are available to the Ministry of Education and are broadcast on its educational television channel (TV Escola). The education and private sectors are partners in a program that involves both the training of teachers to conduct vision and hearing screenings, and a referral system for children with problems. The program is supported by the Ministry of Education and is implemented in collaboration with the Brazilian Ophthalmology Council. The program covers teacher training, awareness campaigns, screening tools, compensation for ophthalmologists, glasses for students, and surgeries. The new national curricular parameters, introduced in 1999, foster "schools of citizenship." The parameters, which aim to create ties between schooling and society, include the promotion of



healthy lifestyles and the creation of a sense of responsibility for one's own health and that of one's peers. A project in low-income communities of Rio de Janeiro aims to improve the learning environment in disadvantaged schools through health promotion activities, such as dance, drama, writing, storytelling, and other life-skills and health-oriented workshops. It also offers camps and summer programs to schoolchildren and adolescents. These activities are coordinated by facilitators from the Secretary of Social Protection of Rio de Janeiro, in partnership with the Secretary of Health. The National School Health Program and the Fund for Educational Development of the Ministry of Education provide preventive and curative services for students participating in the "Communities in Solidarity" Program (20).

In Chile, the Ministry of Education has implemented a comprehensive school health program that provides free posture, hearing, and vision screening, as well as other benefits. Teachers are responsible for the children's first check-up. This mechanism has been the key factor in guaranteeing equal access to the program's services, and in the success of the daily treatments given to the children and of follow-up services. Since its inception a decade ago, the number of children covered by this program has increased significantly, and in 1999, the program achieved universal coverage for primary schoolchildren (20).

El Salvador's healthy schools program, created between 1996 and 1999, has developed a comprehensive school health and nutrition strategy aimed at primary rural and periurban schools. During this period, the program consolidated a multisector strategy and expanded from an initial coverage of 124 schools in the department of La Libertad, to 3,593 schools in 14 departments across the country. The goal is to benefit 400,000 students. The integration of education, health, nutrition, and social protection objectives into a single strategy has provided the initiative with multiple entry points and has strengthened its impact in the school system (20).

In Paraguay, the "Primera Dama de la Nación" Foundation and the ministries of education, culture, public health and social welfare, with the technical collaboration of PAHO/WHO, have initiated the Healthy Schools Project in 15 schools. Planned activities include workshops for teachers and the immediate school community; standardization of school infrastructures; identification of motivating factors for risk and unhealthy behaviors in schools; diagnosis of the current welfare of the schools and communities; dental care and prevention, aided by a mobile dental unit; and the printing of brochures and other teaching materials (20).

In Peru, a prevention strategy was designed and implemented after authorities recognized the potential for the spread of cholera through the public schools. The strategy included information dissemination; training for 1,700 teachers and parents; and providing basic water and sanitation infrastructure in 757 schools (20).

Life-skills education has been introduced in Barbados, Chile, Colombia, and Costa Rica. Life-skills training fosters abilities for adaptive and positive behaviors that enable individuals to deal effectively with the demands and challenges of everyday life. For

example, following a massacre in Barrancabermeja, Colombia, teaching was suspended so that 15 days of life-skills workshops, which involved the participation of students' parents and siblings, could be conducted to help participants cope with this stressful event. After an initial reluctance to participate, the number of participants slowly increased (20).

## FAMILY AND POPULATION HEALTH

### Child Health and Development

#### *Childhood Health Determinants and Overall Development*

**Poverty.** Poverty is the most important determinant of health and quality of life in childhood, which can be clearly seen by the relationship between per capita gross national product and infant mortality. In 1997, of 204 million people living in poverty, 37 million were in the most vulnerable group—children under 6. This means that approximately 59% of the population under 6 years old in the Region lives in poverty (22). At the dawn of the 21st century, more than half of boys, girls, and adolescents of both sexes were poor, and more than half of all poor people are boys, girls, and adolescents (22).

In 2000, it was estimated that 36% of all children under 2 years old in Latin America were at high nutritional risk (22). In rural areas, this figure is 46%, due to the precarious sanitary conditions and the greater difficulty of accessing public health services (22). In a group of 16 countries, 61% of the variability in weight-for-height deficit is explained by the combination of low income in the home (per capita income equivalent to 75% below the poverty line in the country, or lower) and the mother having less than six years of education (22).

In 2000, approximately 30% of children under 6 were living in homes without access to drinking water systems and, therefore, were at high health risk associated with the quality of water used for housework and food preparation (22). In addition, 40% of these children were at high risk of contracting diseases, owing to a lack of systems for the removal of excreta coupled with the presence of waste around the home (22).

**Inequity.** Approximately 25% of all children under 6 live in homes belonging to persons in the most impoverished population quintile; 15% of children are in the highest income quintile (22). Poverty and its consequences in terms of equity in access to nutrition and healthy environments are determining factors for children's quality of life and health. Figures 1 and 2 show the disparities in access to drinking water in urban and rural areas, respectively.

Despite important advances in preschool education coverage, it is neither sufficient nor of good enough quality, and there are still major disparities by socioeconomic level and between urban

and rural populations (Figures 3 and 4). In almost all Latin American countries, the decrease in poverty among children under 6 years old living in urban areas was less than the decrease in poverty in the total population. In the countries in which poverty remained steady or increased, the deterioration was even greater in homes with children (22). Poverty is concentrated in the Region's population groups that have more children at earlier ages. Inequities exist not just within each country, but also among the countries of the Americas. The priority of social spending with respect to GDP decreased, on average, from 9.2% to 8% in the 1980s, and then bounced back to 9.6%, although there are differences among countries. Social spending is directly related to the human development index.

**Social vulnerability.** The family experiences stress and social vulnerability as a result of lifestyle changes, the instability of couples, the increase in single parent families, and changes in the productive system and the labor market. The lack of social support in the care and protection of children means that they suffer the most.

**Protective factors.** Scientific evidence shows that even in situations of poverty and exposure to risk factors, some children have a healthy psychosocial development. For more than a decade, studies have been conducted to try to discover and analyze the environmental, family, and personal factors that give children resilience (defined as a process of positive adaptation despite adversity). These have been called protective or resilient factors, and some of the most important are community support and containment networks, the presence of a trustworthy adult, self-esteem, and a sense of identity.

#### *Health Situation and Achievement of Goals of the World Summit for Children*

**National children's health programs in the Americas.** Since 1990, most of the countries have developed national plans for children, specifically children's health. The following description is based on a sample of 11 national health programs in the Americas, representing all the subregions. In four countries programs include children from 0 to 5 years; in two countries they include children under 5 years, mothers, and women in general; in three countries they include children, adolescents, and women of childbearing age; and the remaining two countries have general health plans with a component for children. The objectives of the majority of the programs (eight countries) mainly address the reduction in maternal, perinatal, and infant mortality and the prevention of prevalent diseases. Few have the monitoring of growth and development processes and quality of life as their key objectives.

The Integrated Management of Childhood Illnesses (IMCI) strategy is being implemented in most of the countries studied, and more emphasis is being placed on the diagnosis, manage-

ment, and referral of childhood illnesses. Promotion strategies mainly target breast-feeding, parent education regarding child-rearing and recognizing warning signs of prevalent illnesses, and family planning.

Activities aimed at evaluating and promoting biopsychosocial development are scarce. Three countries include emerging problems, such as violence, abuse, child labor, street children, and overlooked populations such as indigenous peoples and the disabled in their plans. Promotion activities center on disease prevention. Program evaluation uses process indicators such as the amount of services delivered, drugs used, or number of trained personnel, and results and outcome indicators are represented by mortality rates.

**Infant mortality.** All the countries of the Americas have experienced a sustained decline in mortality rates for infants and children under 5. In most of the subregions, the ten-year goal of a 33% reduction was achieved, although the regional average was 25%. The trend for children under 5 is similar, although slightly better (23). The Regional average masks inequalities among the subregions, among countries, and within countries, however. Differences observed reveal inequities, since the excess of infant deaths occur in the poorest sectors, rural areas, and among those with less access to adequate health services.

The goal of a 25% reduction in mortality from diarrhea was exceeded, with a reduction of 28% in the Region (23). For respiratory infections, mortality was reduced by more than 20%, which reached the goal for the most recent ten-year period (23).

Inequities among the countries of the Americas also become evident in relation to infant mortality. In a sample of the 26 countries with more than 10,000 births a year, the five countries with the highest infant mortality rates (>40 per 1,000 live births) account for 33% of the total of 170,000 deaths from communicable diseases (23).

Neonatal mortality in the Americas accounts for 63% of deaths in children younger than 1 year; the rest of the deaths are associated with nutritional and infectious problems. Some 78% of early neonatal deaths are associated with low birthweight, the prevalence of which in the Region is estimated at 8%.

**Nutrition.** Rates of childhood malnutrition, in terms of weight-for-age, weight-for-height, and height-for-age, have decreased, although high rates of micronutrient deficit persist in the countries with the highest infant mortality rates.

Low height-for-age reflects chronic malnutrition, the most frequent type of malnutrition in the Region. There has been a declining trend during the last decade, although the goal of a 50% reduction has not been achieved. However, the 33% reduction attained is encouraging, and Latin America and the Caribbean are leaders among developing regions in this regard (24). The regional prevalence of low height-for-age (12.6%) masks important differences within and among countries, especially in relation to variations among urban and rural areas and among ethnic

groups. South America came close to achieving the goal, and is expected to eliminate chronic malnutrition by 2005; Central America shows a slower declining trend, with a prevalence of 24% in 2000 (24).

Acute malnutrition, expressed as low weight-for-age, is relatively less important in the Americas. In the 1990s, the Region as a whole reduced its prevalence by 38%, and only South America achieved the goal of a 50% reduction, with a prevalence of 3.2% (24).

In the Region, 8% of newborns had low birthweight (under 2,500 g) in 2000, which achieved the goal for the 1990s (10%). Figures for Central America and the Caribbean remain around 11%, however (24).

Overnutrition is an important risk factor for the development of chronic diseases such as hypertension, diabetes, and coronary heart disease; the 1990s saw a variable increase in obesity in preschoolers and schoolchildren.

The prevalence of exclusive breast-feeding varies greatly among the countries of the Region, with maximums of approximately 60% and minimums of 20%; the Regional average is 39%.

### *Emerging Problems*

**HIV/AIDS.** Approximately 28,000 children between 0 and 14 years of age in Latin America, and 9,600 in the Caribbean, are infected with HIV/AIDS. Some 110,000 children in Latin America and 85,000 in the Caribbean have been orphaned by AIDS (25).

**Accidents and violence.** Accidents and violence constitute the leading cause of death from preschool years to adulthood. Canada has carried out national studies to determine the incidence of child mistreatment and abuse. A 1999 WHO estimate shows that 40 million children worldwide were mistreated and abandoned, requiring social and health care (26). Results show an overall rate of child abuse investigations of 21.52 per 1,000 children in 1998 (n: 135,573). The categories studied were physical abuse (31%), sexual abuse (11%), neglect (40%), and emotional or psychological abuse (19%) (27).

**Child labor.** Child labor is the principal cause of absenteeism from and dropping out of school. It is estimated that 20 million children under 15 work in the Americas, and more than half of them are under 10 (28). Twenty countries in the Region have not ratified International Labor Organization Convention 138, which provides that the minimum working age should not be younger than the age up to which education is mandatory, or younger than 15 under any circumstances (29).

**Disability.** The Inter-American Development Bank estimates that 85 million people in the Americas have a disability, and that the percentage of children is 18%. In Latin America, 13.8 million people suffer from mental retardation and 48 per 1,000 have se-

rious congenital problems. WHO estimates that just 5% of disabled children in the developing countries have access to services, and that less than 2% attend school (30).

## **ADOLESCENT AND YOUTH HEALTH AND DEVELOPMENT**

Since 1996, PAHO has been working under a new and more holistic conceptual framework that places adolescent development within the context of health promotion. Young people in the Americas represent a large and increasingly important segment of the population. The number of young people in the Region was estimated at 155 million in 2000. In Latin America and the Caribbean, young people between the ages of 10 and 24 make up 30% of the population, with adolescents aged 10–19 representing 20% of the population; 80% of adolescents live in urban areas (31).

In the Latin American and Caribbean subregion, children and adolescents, particularly females and rural youths, are the groups most affected by poverty (32). In 1997, 47% (32.5 million) of adolescents between 13 and 19 years of age were living in poverty; the percentage was higher in rural areas (66%) than in urban areas (40%) (31). The highest percentage of youths is concentrated in the poorer countries and communities of this subregion (33). For example, Barbados and Uruguay have a smaller percentage of youths and adolescents, while Bolivia, Guatemala, Haiti, Nicaragua, and Paraguay have a significantly larger proportion of youths and adolescents (33). Many youths are indigenous and, as such, are marginalized from mainstream culture. For example, nearly 1 million indigenous youths live in Bolivia and Guatemala, and 2.7 million in Peru (34).

### **Education**

Though education levels of youths in Latin America and the Caribbean have improved dramatically over the last few decades, geographic, socioeconomic, and gender disparities still exist. Overall, the illiteracy rate (for those age 15 and older) dropped from 26% in 1970 to 12% in 2000; the female illiteracy rate decreased from 30% in 1970 to under 13% in 2000 (35).

Despite these advances, some aspects of youth education are a concern. Differences in secondary-level education by socioeconomic status were not reduced in Latin America in 2000. It is estimated that 50% of urban youths age 20 years and 75% of rural youths abandoned school before completing secondary education (32).

Studies have been conducted to determine the minimum education level necessary to achieve a basic standard of living in rural and urban areas in the Region. In urban areas, it is estimated that at least 12 years of education are necessary, and in rural areas, 9 years. However, the parents of an average 80% of urban youths in the Region received fewer than 10 years of

schooling (32). Although youths achieve more years of education than their parents, of the nine countries with available data—Brazil, Chile, Costa Rica, Colombia, Honduras, Panama, Paraguay, Uruguay, and Venezuela—only urban youths in Chile come close to achieving the 12 years of schooling necessary to achieve a basic standard of living (11.7 years of education), followed by Panama, with 11 years. In Brazil, the average urban youth achieves 7.9 years of education, while in Honduras, the average is 8.6 years. In rural areas, the situation is more severe. Youths living in rural areas in Chile average 8.8 years of education (close to the threshold of 9 years), while youths in Honduras average 5.3 years, and youths in Brazil only 4.2 years of education (33).

Gender and rural/urban disparities are more pronounced at higher levels of education. For example, in the Dominican Republic and Mexico, approximately 11% of women age 15–24 years in urban areas received 13 years of education or more, compared to approximately 2% of young women in rural areas (32). Despite considerable advances in women's education, most children in Latin America are conceived and raised by mothers who have not exceeded secondary education and whose level of fertility is generally double that of women with higher levels of education (31).

Educational attainment is an important variable in predicting certain adolescent health and development outcomes, such as pregnancy, substance abuse, delayed sexual activity, and condom use (36, 37). The literature suggests that the schooling a woman receives strongly influences the number of children she has, and that the higher her level of educational attainment, the lower her fertility. In Colombia, the Dominican Republic, Guatemala, and Mexico, for example, girls with 10 or more years of education were four times less likely to have initiated sexual activity by age 20 than those with less education (38). In Ecuador, 60% of young women age 15–24 years with no education have been pregnant, versus 29% of young women the same age with a university education (39).

### Employment

Males age 15–24 years account for between 44% (Chile) and 71% (Brazil) of the economically active population in Latin America and the Caribbean. Females age 15–24 years make up a smaller proportion of the economically active population, ranging from 30% in Chile to 51% in Brazil and 52% in Paraguay (40). Conditions for youth employment are not optimal: the official youth unemployment rate for Latin America is 16%, ranging from approximately 35% in Argentina and Colombia to 6% in Mexico (41); six out of ten new jobs created in the last decade corresponded to the informal sector; approximately 10 million children under age 14 work illegally, with no social security benefits; and youths are paid low wages and often work under hazardous conditions, with few opportunities for on-the-job training (31).

The proportion of adolescent women in the workforce ranges from 7% in Trinidad and Tobago to 46% in Mexico. In Bolivia, 30%

of girls age 10–12 years are involved in some type of labor activity without their parents' consent and without remuneration (42).

Despite these conditions, the Region's youths are twice as likely as their adult counterparts to want or need employment, but are at a greater disadvantage for obtaining work. Although education and literacy rates have increased over the years, youths have more difficulty integrating into the labor market, particularly those from economically disadvantaged families (41). Today, working class urban youths suffer an unprecedented risk of social exclusion (31). Insufficient education and labor market constraints tend to exclude these groups from better paying jobs. Even in Canada, job opportunities and real earnings for young people have declined (43). Data from household surveys in 15 countries show that youths age 15 to 24 years who neither study nor work represent between 12% and 40% of poor households and between 2% and 10% of richer households (33).

### Family Structure and Dynamics

The family is a determining factor in adolescent health and development (44–46), yet the family structure is changing in many countries. Divorce; the decreasing number of extended families; and the increasing number of consensual unions, women entering the labor market, and single-parent families are influencing youth development (32). Today, many youths in the Region are raised in female-headed households. Since 1994, one in five households in Latin America have been headed by women, many of which had adolescents under 18 years of age (33). In Costa Rica, 21% of households are headed by women and 44% of births were registered as “father unknown” in 1998 (47); in El Salvador, 35% of households are headed by women. In Trinidad and Tobago, 25% of households are headed by females, with the prevalence reaching 32% in urban settings (48). The Caribbean Adolescent Health Survey (CAHS), conducted in 2000 among youths from nine English-speaking Caribbean countries, indicated that 48% of adolescents live with both their parents; 34% live with their mother only; and 17% live with other youths. Such living conditions tend to have a negative impact on a youth's situation, particularly since the incidence of poverty tends to be higher in female-headed households (48). For example, it is estimated that in Latin America, 80% of adolescent mothers in urban areas and 70% in rural areas belong to the poorest 50% of households (33).

The CAHS also revealed that adolescents reported family problems such as drinking (13%), violence (9%), and poor mental health (8%). Youths reported that their mother (24%) and father (32%) understand little about their problems (48). A PAHO study on the sexual and reproductive health of adolescent males in Latin America reports that their fathers are key figures in their development. Yet, the data indicate that adolescent males feel a lack of communication with their fathers, and in many cases

where communication exists, messages promote sexual promiscuity, early sexual activity, and “machismo” (49).

### Morbidity and Mortality

Mortality rates for adolescents are low—0.74 per 1,000 population in 1996 (50). The leading causes of death among adolescents age 10–19 years are external, including suicides, homicides, accidents, and other injuries, followed by malignant neoplasms, infectious diseases, and complications of pregnancy. Mortality rates are higher in males and in youths 15–24 years old (51), as male adolescents are more vulnerable to disability and mortality due to risk-taking behaviors that lead to unintentional and intentional injuries, sexually transmitted infections/human immunodeficiency virus, violence, and drug use.

According to the CAHS, one in five adolescents feel that their health is poor or fair. Almost 10% of young people (more boys than girls) report having a handicap, disability, or chronic illness that limits their activities. Twenty-seven percent of girls and 22% of boys report that they never exercise; this number increases for younger adolescents, as 30% of youths under age 12 report never exercising. Eighty-five percent of adolescents say they have a place where they usually receive medical care; however, only 36% have had a check-up in the last two years, and fewer than half had seen a dentist in the last two years (48). Surveillance of oral health in the Region is conducted by measuring the total number of decayed, missing, and filled teeth (DMFT) as a result of dental caries. The DMFT index for 12-year-olds ranges from 0.63 in Belize to 4.4 in the Dominican Republic and 5.5 in Grenada.

### Sexual and Reproductive Health

Most youth programs in the Region focus on adolescent sexual and reproductive health, which has contributed to improvements in this area. Awareness of contraception is high, as is awareness of HIV/AIDS in most countries (52). However, there are still important gaps in terms of knowledge and behaviors. Overall fertility rates for adolescent females age 15–19 years have decreased in Latin America (Figure 5), which is attributed to increasing educational attainment. However, fertility rates remain higher than 100 births per 1,000 population in Central America (except Costa Rica), the Dominican Republic, Jamaica, and Belize (53). In Canada, pregnancy is the leading cause of hospitalization among adolescent females (43).

**Onset of sexual activity.** Approximately 50% of adolescents under the age of 17 are sexually active in the Region (38). The average age of first sexual intercourse in many Latin American countries is approximately 15–16 years for girls and approximately 14–15 years for boys (42, 54). Adolescent boys in certain Caribbean countries initiate sexual activity as early as 10–12 years of age (48).

A significant number of adolescent girls are married or in a common-law union. Thirty-eight percent of adolescent girls in El

Salvador, 34% in Trinidad and Tobago, and 18% in Peru are married by 18 years of age (42).

The Caribbean Adolescent Health Survey reported that 4.9% of adolescents feel sexual attraction to only the same sex, 49% to only the opposite sex, 4.8% equally to both sexes, 21% are not sure, and 28% did not understand the question (48). Lesbian, gay, bisexual, or transgender youths may face added challenges, such as fear of rejection and discrimination, and are at a higher risk of suicide, STIs/HIV, violence, and substance use (52).

**Adolescent males.** As a new area of focus, PAHO conducted qualitative surveys on masculinity in nine countries. Findings indicate that males know about sexuality, express fear and frustrations, and have feelings of fear during their first sexual experience. The same study reports that adolescent males receive most of their sexual and reproductive health information from their peers and the media. They report that sexual information given by schools and parents often comes too late, is too negative and prohibitive, and does not address eroticism or pleasure. In addition, they perceive health services as being very female-oriented and unfriendly; most have had negative experiences with sexual and reproductive health services. Most agree that they would like health services with male providers, in spaces separate from adults but integrated with females, and with spaces dedicated to discussion and education for adolescent males (49).

**Contraceptive use.** Estimates show that only one in 10 single and sexually active teens uses contraception, and this number is lower among poor adolescents (42). Surveys in the Caribbean suggest that 40% of girls and 50% of boys have no access to contraceptives during their first sexual intercourse (55). Data from Guatemala indicate that although 69% of adolescents age 15–19 years report knowledge of at least one family planning method, only 4% of sexually active adolescents report using one regularly.

Early sexual activity and lack of knowledge has led to certain adverse reproductive health outcomes for youths. Between 35% and 52% of adolescent pregnancies were not planned. On average, one-third of women become pregnant before age 20 (38). In most Latin American and Caribbean countries, 15%–25% of all babies are born to adolescents (54). In Jamaica, 39% of 20-year-old women have had their first child. In Puerto Rico, 19.7% of births are to adolescents under 20 years of age. In Chile, 17% of babies are born to adolescent mothers, and in the Bahamas and Argentina, 15% of babies are born to girls under 20 years of age.

Maternal mortality remains one of the leading causes of death for adolescents (56). Estimates suggest that an average of 4 out of 10 pregnancies end in abortion, a practice that is illegal in most countries in the Region (57). In Latin America, the principal cause of death for young women age 15–19 years is obstetrical in nature, such as complications of pregnancy and delivery, and complications arising from abortion, particularly unsafe induced abortion (42). In Nicaragua, adolescent girls accounted for 24%

of maternal deaths between 1994 and 1998 and, according to 1998 hospital records, for 26% of abortion-related hospitalizations (58). In Cuba, where abortion is legal, the number of abortions among adolescents age 18–19 years has decreased from 120 per 1,000 population in 1988 to 40 per 1,000 population in 1998 (43). In Canada, the abortion rate among adolescents has climbed since 1974 (59). In Bolivia, an estimated 69% of abortions are to young women 14–19 years of age.

**HIV/AIDS and sexually transmitted infections.** Young people are disproportionately affected by the AIDS epidemic. Around half of new HIV infections are in people age 15–24 years, the range in which most people initiate sexual activity (60). Youths in Haiti, Honduras, Panama, Brazil, and various English-speaking Caribbean countries are particularly affected by the epidemic (61). It is estimated that 4.9% of adolescent males age 15–24 years in Haiti, and 1.7% of adolescent girls and 1.4% of adolescent boys in Honduras are infected. In Brazil, 0.7% of adolescent boys are estimated to be infected, and given the size of Brazil's population, the actual number of adolescents with HIV is reason for concern given their potential to spread the virus. Between 25% and 50% of girls age 15–19 in Brazil, Guatemala, Haiti, and Peru do not know that a person with AIDS may appear healthy (61).

Countries in the Southern Cone demonstrate that the AIDS epidemic is moving towards younger age groups. Intravenous drug use is the main mode of transmission of HIV infection among Argentine youths. It is estimated that 46% of males and 32% of adolescent females with HIV are infected due to drug use. In Canada, the main modes of HIV transmission among youths age 15–19 years are heterosexual contact (32%), homosexual contact between males (29%), and intravenous drug use (22%) (43).

Each year, 15% of adolescents age 15–19 years acquire an STI, the main cause of reproductive tract infections (42). Young women are particularly vulnerable to contracting chlamydia, gonorrhea, syphilis, and HIV/AIDS; their physiology makes them more susceptible than adolescent boys or even older women. Younger women have fewer protective antibodies than do older women, and the immaturity of their cervixes increases the likelihood that exposure to infection will result in transmission of HIV or other STIs. They also have reduced vaginal secretions, which results in more friction and abrasion during intercourse and increases the likelihood of transmission. Young women are more vulnerable than males because the vagina has a greater surface area exposed to the virus, and because semen and pre-ejaculate contains a higher concentration of HIV than does a woman's vaginal secretions (62).

Adolescents are at a stage of cognitive development that makes analytical decision-making difficult. As a result, youths tend to be more susceptible to peer pressure and are less likely to be able to negotiate sex and use condoms. There is a correlation between cognitive maturity and sexual activity, whereby those with a

higher level of cognitive maturity are less sexually active (63). The spread of HIV/AIDS and STIs is influenced by behaviors such as condom use. Evidence shows that although youths may have more partners, sexually active youths are more likely to have used a condom with their most recent casual partner than older age groups. Condom use in high-risk sex also rises with educational level in all countries studied (62).

### *Violence*

The leading causes of death among adolescents age 10 to 19 years are external, and include violence and homicide. Violence in adolescence is not limited to physical trauma but also includes sexual aggression, emotional and verbal abuse, threats, and other types of psychological abuse. Youths in this age group represent 29% of all homicides in the Region. Colombia and El Salvador are two of the countries hardest hit by violence. In Colombia, an important contributing factor to this epidemic is drug trafficking, while in countries such as El Salvador and Brazil, the emergence and growth of youth gangs is a key factor. The problem of gang violence is increasing in many other countries, too. Youth gang violence has contributed to the rise in homicides, particularly in El Salvador, which has one of the highest homicide rates in the Region. Young men are the most affected group, especially poor urban youths.

The CAHS found that nearly one in three adolescents surveyed are worried about violence in their community. Seventeen percent of males reported having been in a fight where weapons were used, 20% had carried a weapon to school in the last 30 days, 31% carried a weapon at times other than school in the last 30 days, and 22% have belonged to a gang at some point in their lives (48).

Sexual abuse and domestic violence are also problems in the Region. The majority of young women report that their first sexual contact was coerced (64). The CAHS indicated that 17% of adolescent males and 15% of adolescent females report having been physically abused, and 11% of females and 9% of males report having been sexually abused (48).

### *Mental Health and Substance Abuse*

Social development disorders are very common in young people and are likely to have a substantial impact on their overall health (65). These disorders are reflected in the high incidence of depression, suicide, and abuse of alcohol and other substances. The CAHS found that one in six youths see themselves as generally sad, angry, or irritable; the same proportion feel that their friends care very little about them. Half have felt so down that they wondered if anything was worthwhile, and 23% of females and 20% of males had a family member or friend try to kill themselves (48).

Suicide is one of the top three causes of death among youths in the countries of the Region (66). However, such deaths are often underreported due to the cultural stigma associated with them. Eighteen percent of suicides in the Region are among persons age 15–24 years (67). The countries with the highest suicide rates are

Canada, Cuba, El Salvador, Trinidad and Tobago, the United States, Uruguay, and Venezuela (66).

Most smokers in Latin America began the habit during adolescence. Forty-eight percent of Bolivians report that they began smoking between the ages of 18 and 24 years; few started after the age of 25. Thirty-five percent of 12–15-year-olds in Argentina report using alcohol and tobacco in the last 30 days, and in Uruguay, 35% of students age 11–15 reported having tried cigarettes. Adolescents in Nicaragua are initiating smoking and alcohol use at earlier ages, regardless of socioeconomic status (58).

Illegal substance use, although not prevalent in most countries, is on the rise, particularly among marginalized youths. In El Salvador, 75% of delinquent adolescents have some type of drug addiction, including marijuana and cocaine; nine out of ten gang members in El Salvador report using drugs. In Mexico, drug use is increasing among adolescents age 12–17 years. According to the 1998 national survey, 4.2% of adolescents had used an illegal drug; the drugs most used were marijuana, inhalants, and cocaine. A 1997 study in Jamaica indicated that use of inhalants was as high as 16% among post-primary students (68).

Data on eating disorders vary throughout the Region, but most studies focus on anorexia nervosa and bulimia nervosa. A study conducted at the University of Buenos Aires, in Argentina, of a sample of females age 18–25 years seen for a routine exam showed that 13% presented some type of eating disorder. Another study of 600 adolescent male and female students age 13–18 years in Mar de Plata, Argentina, indicated that 47% of females feared weight gain, 37% were not satisfied with their body image, and 37% were concerned about gaining weight (66).

#### *The Programmatic Response to Youth and Adolescent Needs*

At the 40th Directing Council Meeting of the Pan American Health Organization (September 1997), the Member States approved the Plan of Action for Adolescent Health and Development (1998–2001), and a resolution (CD 40.R16) recognizing the long-term benefit of investing in the healthy development of adolescents and youths, and calling for the Member States to advocate for the inclusion of adolescents and youths in the public and political agendas (69).

Ninety-five percent of the countries in the Region established national adolescent health programs by 2000 compared to 85% that had such programs in place in 1996. Eighty-five percent of the countries surveyed had conducted a national diagnosis of the health situation of adolescents and developed norms and guidelines for action, compared to 50% that had in 1996. These figures include all of the priority countries of Central America (70, 71).

Member States have made several advances with PAHO's support and through strategic alliances with the W.K. Kellogg Foundation, SIDA, UNFPA, GTZ, IDB, and other partners. With the support of SIDA, important improvements were achieved in El Salvador, Guatemala, Honduras, and Nicaragua, where intersectoral committees on adolescents have been formed to design ado-

lescent and youth policies. The Dominican Republic approved a Youth Law in 2000, and has assigned 1% of the national budget and 4% of the municipal budgets towards its implementation (72).

Countries in the Region have developed different strategies to improve the capacity of human resources in adolescent health through in-service training, targeting primary health care providers and using new technologies, such as distance education courses (70, 71).

Health services for youths face a challenge in Latin America and the Caribbean. Whereas the general public also faces a services shortage, adolescents are more vulnerable due to several factors: they are not economically independent to access health services; they lack the level of maturity required to make responsible decisions; and health services are not oriented to meet their health and development needs. Five countries in this subregion have integrated youth services in their national network. Norms and guidelines have been developed but are not yet being fully applied (70, 71).

#### **SAFE MOTHERHOOD**

Currently, 79% of deliveries in the Region take place in institutional settings, and few countries in the Region report institutional deliveries below 50%. However, the rise in institutional deliveries has not resulted in a corresponding decrease in maternal and perinatal mortality. In fact, there are even greater variations in neonatal and maternal mortality among countries with high rates of institutional delivery.

Women seeking care may face constraints in accessibility, client knowledge, hospital receptivity, and quality of care. On one hand, women in the higher socioeconomic level have very high rates of cesarean section, with the assumption that quality care is characterized by the use of technology and surgical delivery. On the other hand, unnecessary interventions, such as routine episiotomies, are common and result in harm, maternal discomfort, and rising costs of care. Simple, beneficial, and inexpensive interventions, such as active management of the third stage of labor and support during labor, are not used. Quality of care must become a major preoccupation of health authorities, with adequate resources allocated to equipping facilities and obtaining skilled personnel who practice evidence-based interventions for the improvement of maternal and perinatal health.

#### **Maternal Health**

As we enter the 21st century, 15% of expectant mothers in the Region will suffer potentially fatal complications during the pregnancy, birth, and postpartum periods, and each year, at least 22,000 women of reproductive age in Latin America and the Caribbean will die as a result (73). Compared to other mortality reduction efforts in the Region, little progress has been achieved in recent years towards reducing maternal mortality.

The plateau in reduction of maternal mortality has resulted in part from the broad approaches traditionally taken to address maternal mortality. A more focused approach, concentrating on cost-effective interventions such as Essential Obstetric Care (EOC), skilled attendance at birth, and improved access to quality maternal health care services, is currently being promoted by PAHO.

One of the most significant achievements in the construction of a new paradigm for maternal mortality reduction has been placing Safe Motherhood in a human rights framework. These rights include access to reproductive health education, contraceptive availability and choice, and health care without discrimination. A recently developed judicial framework for Safe Motherhood provides a legal matrix to analyze the existing Safe Motherhood legislation by identifying legal constraints and enabling factors that will assist countries in the Region in making informed policy recommendations (74). Many countries in the Region already have explicit policies for reducing maternal mortality, and several countries have developed maternal mortality reduction plans and programs.

Progress in policy and program development has been facilitated in several countries through the Latin American and Caribbean Initiative for Maternal Mortality Reduction (LAMM). The Initiative, which began in 1996, is a partnership between PAHO, USAID, the Quality Assurance Project (QAP), and 11 countries in the Region that have high maternal mortality rates (Bolivia, Brazil, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Nicaragua, Paraguay, and Peru). The goals of the LAMM Initiative are to reduce maternal mortality by strengthening the delivery of essential obstetric care, promoting the development of supportive policies, and enabling communities to overcome barriers in accessing services.

### Maternal Mortality

The Region of the Americas has some of the largest inequities in maternal mortality of any region in the world. A woman born in Latin America has a 1 in 160 lifetime risk of dying as a result of complications in pregnancy and childbirth, compared to a woman from North America, who has a 1 in 3,500 lifetime risk, or 21-fold difference (75).

Maternal mortality rates for countries in the Region range from 5 to 523 deaths per 100,000 live births (73). Haiti's maternal mortality rate—the highest in the Region—is nearly 100 times greater than Canada's, the lowest in the Region. In addition to wide variations in rates among countries, there are differences in rates within countries as well.

Disparities in maternal mortality estimates within a country often reflect inequities in socioeconomic conditions and access to quality health services. In almost all countries, maternal mortality rates are lower in urban areas than in rural areas, reflecting increased access to health services in urban areas, with greater referral capacity and ability to treat obstetric emergencies in an opportune manner.

Causes of maternal deaths in Latin America and the Caribbean mirror worldwide trends, and occur as a result of complications of pregnancy, childbirth, and postpartum. The most common direct obstetric causes of mortality are: hemorrhage (25%), sepsis (15%), unsafe abortion (13%), eclampsia (12%), and obstructed labor (8%) (76). Unsafe abortion continues to be a leading cause of maternal death in many countries, such as Chile, where it accounted for 25% of maternal mortality in 1998 (77). In other countries, such as Argentina, Jamaica, and Trinidad and Tobago, more than 30% of maternal deaths in 1997 were due to abortion (78). The religious and legal implications of reporting abortions in many countries further complicate this issue, and thus deaths due to abortion may be underestimated. Indirect causes account for 20% of all maternal deaths, and these include among others accidents, domestic violence, suicide, malaria, and AIDS (79).

Direct obstetrical causes of death account for more than 70% of all maternal deaths in the Region, even in countries such as Canada, Cuba, and the United States, which have low maternal mortality rates. It is interesting to note that in these countries, however, the leading causes of death (puerperal thromboembolism, surgical complications, and postpartum cardiomyopathies) are not easily preventable. In most countries of the Region, excluding Canada, Cuba, and the United States, hemorrhage and toxemia, which are preventable with quality prenatal care, are still the leading causes of death. Indirect obstetrical causes tend to be underreported by physicians, as the complicating disease is often listed as the main cause of death instead of noting that it occurred during pregnancy, childbirth, or the puerperium (77).

One persistent problem in measuring maternal mortality is that of ill-defined causes of deaths. In many countries, the proportion of ill-defined causes of death is high, often due to poor reporting by physicians on death certificates. Underreporting of deaths, which is present in most countries in the Region, further exacerbates this issue, and underscores the need to make improved measurement of maternal mortality a priority (79).

### Prenatal Care

Prenatal coverage has generally improved in the Region during the past decade. However, disparities continue to exist among and within countries. The percentage of women receiving prenatal care ranged from less than 50% in Venezuela and Brazil, to greater than 90% in Colombia, Cuba, the Dominican Republic, and Uruguay in 1995–2000 (80).

### Quality of Maternal and Perinatal Care

Indicators of the quality of maternal and perinatal care include the incidence of cesarean section, episiotomy rates, use of corticosteroids, and active management of the third stage of labor. Cesarean section is a potentially life-saving medical intervention



in the face of some obstetric complications, and the extent to which it is used in the Latin American and Caribbean subregion varies widely among countries. WHO recommends an overall cesarean section rate of 15%, based on the number of women who expected to face life-threatening complications during labor and delivery. A country's rate of cesarean sections can therefore serve as an indicator of access to or overuse of obstetric interventions. Low rates of cesarean section in countries such as Haiti (1.6%) and Peru (12.7%) (23, 24) indicate that women with complications do not have access to services because of financial or geographic barriers, or that health services are not sufficiently equipped or trained to address complications. High rates of birth by cesarean section, such as those seen in Brazil (32%) and Chile (40%), indicate overuse of this procedure, which can also have negative health effects and can unnecessarily overmedicalize a normal event in women's lives (Table 2) (81). Twelve countries of the Region have been shown to have cesarean section rates that range between 17%–40% of all births (26). Institutional delivery rates for these countries are 60% to 99%. The incidence of cesarean sections is much higher among women in higher socioeconomic groups. It is estimated that there are over 850,000 unnecessary cesarean sections per year in the region, which increases health risks for these otherwise healthy women and infants (82).

A recent review showed that the rate of episiotomy among nulliparous women with spontaneous vaginal delivery in Latin America is 92% (83). Much evidence exists to demonstrate that there is no justification for the routine performance of episiotomy, as this intervention can cause greater harm than benefit (84, 85).

A recent survey of low birthweight infants (500–1,500 g) in one Latin American country showed that only 23% of their mothers received corticosteroids before delivery, even though use of corticosteroids is a proven intervention for the prevention of neonatal respiratory distress (86).

Surveys in several countries of the Region show that active management of the third stage of labor occurs in less than 5% of institutional deliveries. In the majority of the Region's public hospitals, women are isolated during labor despite evidence that active management of third stage labor is a proven intervention that results in the reduction of postpartum hemorrhage (87).

### **Institutional Births**

The vast majority of deliveries in the Region take place in institutional settings. Data from 1997–1999 show that 86% of the 11.5 million deliveries per year took place in institutions; the data also show a trend of increasing institutional births (88–91). Currently, only two countries in the Region report figures for institutional deliveries below 50%, compared with eight countries in 1990–1995. Twelve countries, which account for some 5.5 million deliveries (48% of deliveries in the region), reported over 90% institutional deliveries.

The trend toward institutional births varies among countries. For example, from 1992 to 1998, the percentage of institutional deliveries in Bolivia increased by 35%, to reach 57% coverage (91). However, in other countries, growth has been slower. In Peru, institutional delivery coverage slowly increased from 49% in 1990 to 55% in 1996 and 58% in 2000. Some countries already have high coverage rates; for instance, coverage in the Dominican Republic has been close to 95% since 1996 (91). Nearly 80% of births in Haiti, which has the highest maternal mortality rate in the Region, occur outside of institutions and are not attended by skilled personnel.

A tendency toward lower figures of neonatal mortality in relation to higher percentages of institutional deliveries has been seen in the Region, but the correlation is low ( $r=0.56$ ). A neonatal mortality rate of approximately 20 per 1,000 was seen in countries with institutional delivery coverage varying from 35% to 98% of all births. On the other hand, in countries with institutional deliveries above 95%, neonatal mortality varies from 4 per 1,000 to 22 per 1,000 (81, 92–102).

There were variations in neonatal and maternal mortality in countries with institutional delivery rates above 80%. In countries with institutional deliveries above 80%, maternal mortality fluctuates between 6.6 and 125.7 maternal deaths per 100,000 live births. Neonatal mortality varies from 4 per 1,000 to 24 per 1,000. The differences in maternal and neonatal mortality in these countries are not explained by differences in the per capita gross domestic product, since countries belonging to groups II and III are randomly distributed along mortality figures (81, 90–102).

### **HEALTH OF THE ELDERLY**

In many countries in the Region, population aging is occurring in a context of insufficient economic resources and inadequate services, national policies, legislation, and programs on aging. Seventy percent of countries in the Region have public policies that address at least one aspect of the health and well-being of the elderly. However, coordination among the different sectors to provide comprehensive and sustainable national and local policies and programs for the elderly is lacking.

Poverty and discrimination negatively impact the health of elderly persons. Less than 50% of those interviewed in SABE say they have enough economic resources to meet their daily needs.

A review of demographic data and indicators from selected countries of the Region revealed that in over half of the countries, approximately 33% of elderly persons in urban areas live in poverty. Over 30% of the population in rural areas in eight out of 10 countries analyzed are poor. More than 50% of elders in rural areas in five countries are poor, including Honduras and Bolivia, where over 70% of the rural elderly live in poverty. Although there are no significant differences in poverty between older men and

women in urban areas, the gap widens in rural areas. Though the majority of the elderly in the Region live in urban areas, a higher proportion of rural populations are 60 years and older (103).

The insufficiency of epidemiological studies impedes the projection of the elderly population's health care needs. Only half of the countries in the Region have established programs in geriatrics or gerontology to adequately train providers to serve the growing elderly population. Additional research and training programs are needed to prevent illness and promote health among this population, and to dispel myths about aging. Also, the participation of the elderly as advocates in the development of public policy to address their needs is generally lacking in the Region.

Until recently, information on the health status of the elderly in Latin America and the Caribbean was derived primarily from analysis of census and mortality data. Coordinated by PAHO and conducted in collaboration with numerous national and international institutions in the Region, a population survey on health, aging, and well-being—the SABE survey—was conducted in 2000 in seven urban centers with a large aged population: Buenos Aires, Argentina; Bridgetown, Barbados; Havana, Cuba; Mexico City, Mexico; Montevideo, Uruguay; São Paulo, Brazil; and Santiago, Chile (104). In this discussion the SABE survey sites will be referred to by the country name. The SABE survey describes the health conditions and functional limitations of the elderly in the sampled population. The basic demographic characteristics of the SABE sample are summarized in Table 3. The SABE survey data are used here to illustrate the health conditions of the urban elderly and to discuss health inequalities related to age, sex, level of education, and socioeconomic status. In rural areas and urban areas not included in the SABE survey, information on the health status of the elderly can only be obtained from census data, focus groups, subregional forums, and through consultation with regional geriatric and gerontological health experts. While this information is useful at the local level, it cannot be used to generalize about the health status of older people. Thus, the data used in this report are limited to the SABE survey data and to statistical health information from similar studies in the United States and Canada.

### Health and Aging Indicators

The aging of the population in Latin America and the Caribbean is largely due to sharp reductions in mortality since the 1940s. These reductions were the result of medical and public health interventions and improvements, particularly in infant mortality, but for the most part, were not accompanied by comparable improvements in economic or social well-being.

A growing body of research is finding increasing evidence that exposure to and contraction of illnesses or deleterious conditions early in life may have enduring physiological effects that may strongly influence health in adulthood (104). In Latin America and the Caribbean, persons born before 1940 may not only have

higher prevalences of illness and disability later in life, but also less economic, social, or health protection than their contemporaries in developed countries.

Four indicators of health status that provide evidence to support this theory were calculated from the SABE survey data: (1) self-reported health status, (2) difficulties in performing activities of daily living, (3) chronic health conditions, and (4) cognitive and emotional well-being.

#### *Self-reported Health Status*

Self-perceived health is considered a strong indicator of morbidity among persons 60 years and older. The percentage of older persons that report themselves to be in good health is higher in the United States and Canada than in the Latin American or Caribbean cities surveyed (Table 4). In the United States, 73% of the elderly have reported their health as good or excellent. Sixty-five percent of respondents reported good or excellent health in Buenos Aires, 61% in Montevideo, and 51% in Bridgetown; in the remaining cities surveyed, less than 50% of older persons reported good or excellent health (Table 4).

There are also gender disparities, with males in the SABE survey generally reporting better health than females. This contrasts with findings in the United States and Canada, where females report themselves in better health than males. If the observed gender differences do indeed reflect latent ill health or physical limitations, these patterns are significant, since older women have a higher risk of economic vulnerability than older males. The combination of worse health status and lower standards of living for older women, combined with their longer life expectancies, creates a large population of dependent older women.

Self-reported health status is closely related to educational status (Figure 6). Self-reported good health was lowest among persons with no education or fewer than 7 years of schooling in all SABE survey countries. The implication of this correlation is a concern, given that more than 70% of older persons are illiterate in some Central American and Andean countries.

#### *Difficulties with Activities of Daily Living*

One measure of functional limitation is a person's ability to carry out activities of daily living (ADLs) and instrumental activities of daily living (IADLs). ADLs encompass activities considered necessary for an individual to live independently, including walking across a room, bathing, dressing, toileting, and feeding. IADLs encompass activities considered relevant, but not essential, to independent living, such as managing medication and shopping for food. ADLs provide information on a population's morbidity, need for assistance, risk factors, and frailty.

Table 5 shows the proportion of older persons with at least one ADL and IADL. The total prevalence of difficulties with activities of daily living follows the same patterns as self-reported health status: Argentina, Uruguay, and Barbados appear to be in a better

position than the other countries surveyed. Similarly, there are also gender disparities in the prevalence of difficulties with ADLs and IADLs in the SABE countries, with women reporting a higher prevalence of difficulties than males. The prevalence of difficulties also increases with age.

### *Chronic Health Conditions*

About two-thirds of persons 60 years and older in Latin America and the Caribbean have at least one of six chronic conditions: arthropathies, cerebrovascular disease, diabetes, heart disease, hypertension, and pulmonary disease (Table 6). Arthropathy, diabetes, heart disease, and hypertension are the top four diseases among the elderly in the Region.

Although the percentage of persons reporting hypertension is similar across the SABE cities surveyed, there are significant differences in the use of medication, exercise, and diet for the prevention and management of hypertension. In Brazil, Chile, and Cuba, fewer than 60% of persons with hypertension use medication, compared to higher medication use in Argentina (80%), Barbados (72%), and Uruguay (70%). The use of diet to control hypertension varies from 23% in Cuba to 45% in Brazil and Chile. Also, exercise among persons with hypertension ranges from a low of 11% in Buenos Aires to a high of 40% in Bridgetown (Figure 7).

Heart disease among persons with hypertension appears higher in those countries with the lowest percentage of persons taking medication to control hypertension, as in the case of Chile and Cuba. Conversely, it is lower in those countries reporting the highest combination of medication, diet, and exercise to manage hypertension.

Females in the SABE survey report a markedly higher prevalence of hypertension and arthropathies than males. These conditions, when not properly managed, are two of the greatest contributors to disability in older persons. Gender differences are also seen in the prevalence of arthritis. Reported arthritis among men ranges from a low of 14% of men in Chile to 40% in Cuba, while for women it ranges from 31% in Mexico to 67% in Cuba. Almost three times more women (41%) than men reported arthritis in Chile.

### *Cognitive and Emotional Well-being*

The level of frailty among the older population can be determined by a number of age-related conditions that tend to increase the level of dependency and therefore the need for assistance. Memory impairment and depression are two of the most important frailty indicators. In the United States and Canada, cognitive deterioration has been observed to be one of the key indicators for long-term care needs.

The prevalence of cognitive impairment is lower among the younger age group (60–74 years) in the SABE survey cities (Table 7). The data also reveal the close relationship between cognitive impairment and education. For instance, persons scoring low in the cognitive test were more likely to be either in the age group 75 and older or to have low levels of education.

Symptoms of depression are also important indicators of general well-being and mental health among older persons. Older Barbadians are least likely to have depressive symptoms (4%) compared to older persons in the rest of the SABE survey (15%–19%). The prevalence of depression is higher among the younger age group (60–74 years), and women in both age groups are more likely to have symptoms of depression than men.

## **Health Behaviors of the Elderly**

### *Nutrition*

Older persons have a variety of nutritional problems and needs that are related to the various social, economic, and physical changes associated with aging, and studies have shown a correlation between obesity and higher mortality rates and risk of cardiovascular disease among this age group (105).

The proportion of obese elderly persons in the SABE survey ranges from 13% in Cuba to 35% in Uruguay. Approximately 27% of individuals age 65–74 years in the United States are obese. Individuals age 75 years and older are less likely to be obese than individuals age 60–74 years, and are more likely to have low bodyweight. The difference is especially pronounced in Cuba, where 41% of persons age 75 years and older are severely underweight compared to 32% of persons age 60–74 years. In all five SABE survey countries, women are more likely to be obese than men. The percentage of obese women age 60 years and older ranges from a low of 10% in Cuba to a high of 40% in Uruguay, while the percentage of obese men ranges from a low of 5% to a high of 17% in those same countries. With the exception of Mexico, men age 60 years and over are much more likely to be underweight than women. For example, in Cuba, the country with the highest prevalence of low bodyweight, 45% of men age 60 years and over have low bodyweight compared to 29% of women of the same age.

### *Physical Activity*

Unfortunately, most persons 60 years of age and older do not engage in any rigorous physical activity on a regular basis. The percent of participants in the SABE survey who did not do any type of physical activity (defined as exercise or any rigorous activity, such as playing a sport, dancing, or heavy housework, three or more times a week) on a regular basis in the last 12 months ranged from 56% in Barbados to 86% in Argentina. In the remaining countries, over 69% of the elderly did not report engaging in regular rigorous activity. This level of inactivity contrasts sharply with data from the United States and Canada, where initiatives for physical activity have been established.

### *Smoking*

Among the SABE survey countries, Barbados has the lowest prevalence of smoking among the elderly (6%) and Cuba the highest (32%); the prevalence of smoking in the remaining coun-

tries ranges from 12% to 17%. The lowest percentage of elderly persons who smoked and quit is seen in Barbados (21%), and the highest percentage (32%) in Brazil and Chile. Elderly men are two to three times more likely to smoke than elderly women in all SABE survey countries. The highest percentage of elderly men who smoke is seen in Cuba (47%) and the lowest in Barbados (12%). In addition, 48% of males in Barbados never smoked, compared to only 22% in Cuba.

The general profile of health behaviors in the Region reveals that older persons are not actively participating in promoting their own health and well-being, and that health systems are not properly preventing or managing chronic diseases in this population. The training and education of primary health workers determine the focus of health education and the present generation of health and social workers were trained with a focus on infectious diseases and child and maternal health. Primary health care services have not yet changed their focus to prevent and manage chronic diseases and the complex health needs of older persons.

## HEALTH OF INDIGENOUS PEOPLES

As discussed in Chapter 2, indigenous peoples generally tend to lack access to basic health and social services. Potential barriers to access are physical distance from health services, insufficient financial resources, and the lack of culturally appropriate, quality health services. Language, illiteracy, disregard for indigenous peoples and their beliefs, and lack of understanding of traditional health systems and healing practices can also be barriers. Indigenous peoples tend to live in rural, often isolated areas. Bolivia, Guatemala, Honduras, and Ecuador, which have large numbers of indigenous peoples, are also among the countries with the highest percentage of rural populations (106). As a result, many indigenous peoples are self-employed and do not have access to employment-related health services. In Guatemala, only 30% of indigenous peoples are estimated to be employed and have access to health services, compared to 60% of the general population (107). In Ecuador, nearly 90% of indigenous peoples lack sufficient social coverage needed to access basic services (108).

Significant disparities between the health of indigenous peoples and that of the general population continue to exist. For example, malnutrition and parasitic and communicable diseases, such as malaria, yellow fever, dengue, cholera, and tuberculosis continue to affect a large proportion of indigenous peoples. In Ecuador, the primary causes of morbidity and mortality are all largely preventable—respiratory diseases, diarrhea, tuberculosis, parasitic infections, and malnutrition (109). In Colombia, indigenous peoples have limited water and sanitary services, food security, and health services (110). In the United States, certain health problems affect indigenous peoples to a greater extent than they do the population as a whole. For example, mortality

rates for alcoholism are 627% greater among indigenous peoples than among the population as a whole, mortality rates for tuberculosis are 533% greater, diabetes mellitus 249% greater, accidents 204% greater, suicide 72% greater, pneumonia and influenza 71% greater, and homicide 63% greater (111).

In general, indigenous peoples suffer disproportionately from psychosocial problems resulting in high rates of suicide, depression, substance use (alcohol, tobacco, and drugs), and violence. In Canada, roughly one-fourth of all injury deaths among Aboriginal peoples are suicides, for a rate three to four times higher than the national average (112).

Child and infant mortality and morbidity is still a serious problem for indigenous peoples. For example, while Panama's national infant mortality rate is 17.6 deaths per 1,000 live births, in indigenous areas it reaches 60–84 deaths per 1,000 live births (113). In Brazil, the national average of women over the age of 15 who have lost at least one child born alive is 16%, while among indigenous women the average is 33% (107).

The overall and persistent poor health status of indigenous children is particularly problematic, considering that the indigenous population tends to be younger than the general population. For example, in the United States, approximately 33% of the indigenous population was younger than 15 years of age, compared to 22% for the general population (111). Many of the causes of illness for indigenous children are preventable. In Peru, 25% of deaths among children under 1 year of age are due to acute respiratory infections; 12% of deaths are due to diarrhea (114).

Data from Central and Latin America clearly indicate that health and nutritional status, as well as the general socioeconomic conditions, are worse among the indigenous population than among non-indigenous groups. For example, in El Salvador, Guatemala, Honduras, Nicaragua, and Panama, the prevalence of stunting is higher in those municipalities that have the highest proportions of indigenous population (115). In El Salvador, an estimated 40% of indigenous children under age 5 years are malnourished, compared to the national average of 23% (116). In Honduras, an estimated 95% of indigenous children under 14 years of age suffer from malnutrition (117).

Maternal mortality among indigenous women continues to be a serious problem. In Honduras, the maternal mortality rate has fallen by over 40% during the last decade, from 182 to 108 deaths per 100,000 live births. However, the rates in areas with large numbers of indigenous peoples, such as the departments of Colón and Copán, were 200 and 203 deaths per 100,000 live births, respectively (117).

Indigenous communities continue to face worse environmental conditions than the general population. In Peru, only 42% of indigenous households have direct water connections, and 49% draw water from streams, ponds, or wells (9). Indigenous peoples in northern Canada are exposed to higher levels of persistent organic pollutants and metals than the general population (118).

Such noncommunicable diseases as diabetes, obesity, and cardiovascular disease, often the result of changes in diet and lifestyle, are increasingly affecting indigenous peoples. For example, the Pima Indian tribe, of Arizona, U.S.A., has the highest rate of diabetes in the world (118), and some 50% of Pimas between the ages of 30 and 64 have diabetes (119). On a more positive note, the heavy reliance on traditional, locally available foods seems to reduce the risk for certain health problems. For example, indigenous groups in the Canadian Arctic have among the lowest age-standardized prevalence rates of diabetes in the country.

### The Response of the Region's Countries

At the country level, there has been progress toward improving the health conditions of indigenous peoples. For example, the old ways of interacting with indigenous peoples, grounded in assimilation-oriented approaches and paternalism, are clearly giving way to new policies centering on participation, consensus building on issues of mutual interest, and promotion of forms of development that respect and benefit indigenous peoples and, at the same time, are consistent with national objectives (120). By including indigenous peoples in dialogues between governmental and nongovernmental sectors, public policies are given a chance to reflect their interests and concerns (121).

The holistic model of health emphasizes equilibrium between an individual's physical, spiritual, mental, and emotional states. Traditional healing systems are still vital parts of the healing strategies of most indigenous communities, as many communities rely on traditional knowledge of plants, animals, and the environment for basic survival and to address medical needs (122). In North America, aboriginal peoples see traditional healing practices and philosophies as the foundation for community wellness and empowerment. Indigenous communities in Canada and the United States utilize such approaches as healing circles, sweat ceremonies, and the passing of knowledge from elders to younger generations.

Throughout the world, Western medical care and traditional healing systems coexist to some degree. According to WHO estimates, at least 80% of the rural population in developing countries rely on traditional healing systems as their primary source of health care (121). A study conducted in Bolivia, Chile, Costa Rica, Ecuador, Guatemala, Mexico, Nicaragua, Peru, and the Dominican Republic (123) verified the existence of traditional health systems in each country, and found that in some countries, the number of doctors is only slightly higher than the number of traditional healers. For example, there are approximately 3,500 doctors and 2,500 traditional healers in Nicaragua. In several countries, there are 2.5 or more traditional healers per 10,000 population.

The ethnic and cultural heterogeneity of indigenous peoples makes it difficult to adopt a single program or universal health care model. Ongoing health sector reforms in the countries of the Region also pose challenges, particularly due to their emphasis

on improving efficiency and reducing costs. For example, user fees tend to be regressive and are an additional financial burden for most poor indigenous people.

Within the Region, several governments have established or expanded national-level departments for indigenous health in the country. For example, in 1999, Ecuador created a new office to work towards improving the quality of life of indigenous peoples by recognizing and strengthening indigenous health systems and by ensuring adequate access to other health systems and services.

Many countries have implemented programs specifically targeted at improving the health and social conditions of indigenous peoples. For example, in 2000, Argentina initiated a new program to foster health promotion and disease prevention among indigenous communities (124). A key component of this program is respect for the traditional beliefs and health systems of indigenous populations.

Canada and the United States also have made progress towards improving the health status of their respective indigenous populations. This is largely attributable to improved access to health services and to public health measures. However, in both countries, this progress has slowed in recent years as disease patterns have changed, and injuries, chronic diseases, and lifestyle-related diseases have emerged as new challenges (111). However, the United States is implementing an initiative to eliminate racial and ethnic disparities in health by the year 2010. The initiative addresses the health disparities of American Indians and Alaska Natives in the areas of infant mortality; diabetes mellitus; cardiovascular disease; HIV; breast and cervical cancer screening and management; and child and adult immunization (125).

### International Organizations and Intersectoral Integration

Virtually all governments and international organizations understand the importance of partnering with indigenous peoples in order to achieve equity in health status and access to needed services. There is a new appreciation that programming is more effective when there is indigenous ownership and when culturally specific approaches have been incorporated. There is also a new emphasis on the right of indigenous peoples to preserve their cultural values and institutions (126).

The Health of Indigenous Peoples Initiative, launched by PAHO in 1993, represents the contribution of the Organization and its Member Governments to support both the United Nations' International Year of the World's Indigenous Peoples (1993) and the International Decade of the World's Indigenous Peoples (1995–2004).

Other international organizations have also acknowledged the need to improve the efficacy of poverty interventions that focus on indigenous populations. For example, both the IDB and the World Bank have created development and poverty reduction programs focused on indigenous communities.

## DISABILITY

Factors that have contributed to the rise in disabilities in the Americas include the aging of the population, malnutrition, accidents, alcohol and drug abuse, extreme poverty, war, social violence, the displacement of population groups, and natural disasters. The rise in emerging, reemerging, and chronic diseases also is responsible for causing disabilities.

There are approximately 85 million disabled persons in Latin America. Probably more than one-quarter of the Region's total population is directly or indirectly affected as family members, friends, or members of the community. Accessibility and mobility are the leading problems confronting the disabled population, with architectural and urban-living barriers making it difficult for the disabled to enter the labor market and carry out daily activities.

In analyzing the status of rehabilitation efforts in the Americas, several factors must be considered, including those outlined in this paragraph. First, sectors involved in rehabilitation have developed with little coordination, and have advanced more in health and education areas. Second, the quality of life for disabled persons and their families is further diminished by the fact that much of this population segment lives in poverty. Advances in occupational rehabilitation also have not kept pace with those in medical and educational rehabilitation, and the disabled have only been partially incorporated into rehabilitation programs and services in the Region, with only 2% of this group having access. Only 78% of the countries have institutions charged with developing rehabilitation policies, only 51% have rehabilitation programs, and only 62% have enacted legislation specifically dealing with the issue; most countries have no registration system for disabilities and rehabilitation. In addition, research in this area has been extremely limited. Human resource training in the Region has mainly concentrated on physical and occupational therapists, and the number of general health personnel that has received rehabilitation training is very low. Finally, social security programs cover occupational risks, illnesses, and accidents, and disability pensions that benefit the urban wage-earning population.

The leading causes of disability are associated with health and the environment. In the area of health, they include congenital defects, chronic diseases, malignant tumors, infectious diseases, nutritional deficiencies, and parasite infestation, as well as problems related to fetal development and childbirth. Environmental causes include pollution—such as an indiscriminate pesticide use on crops—and its effect on health. Other causes are violence, inadequate measures to prevent occupational or traffic accidents, psychological and emotional trauma due to armed conflict, and anti-personnel mines.

Most of the countries have established rehabilitation services in tertiary health care centers, but there is a shortfall of these services at secondary and primary levels of care. The limited availability of orthosis and prosthesis shops and the scarcity of

other accessories or devices that can help the disabled aggravate the problem.

A strategy for establishing community-based rehabilitation services has been widely promoted in the Region's countries for the last 20 years; this approach is designed to ensure that disabled persons receive comprehensive care. With PAHO's cooperation, it has been implemented in most of the countries, although it is still not a priority in the health plans. The greatest progress has been made in Argentina, Brazil, Colombia, Cuba, Mexico, Nicaragua, Venezuela, and English-speaking Caribbean countries. Special projects also were launched in Bolivia, El Salvador, Guatemala, and Honduras, and work is under way to implement the strategy in indigenous areas of Bolivia, Guyana, Peru, Venezuela, and in the Miskito area of Nicaragua and Honduras.

Under the framework of the Ottawa Treaty for the destruction and ban on the use, stockpiling, and production of anti-personnel mines, the governments of Canada and Mexico set up a program for the comprehensive rehabilitation of victims of anti-personnel mines in Central America. PAHO joined the effort as an organization that specializes in health and has a regional rehabilitation program. To date, El Salvador, Honduras, and Nicaragua are part of the program, which not only covers mine victims, but any disabled person requiring medical care and reintegration into society.

## FOOD AND NUTRITION

In the Region of the Americas, problems of undernutrition increasingly coexist with problems of overnutrition. Undernutrition primarily affects infants and young children under the age of 2 years, manifesting as stunting and anemia. Overweight and obesity are becoming increasing problems among adults, contributing to hypertension, cardiovascular disease, and type II diabetes.

### Nutrition in Infants and Young Children

#### *Breast-feeding and Complementary Feeding Patterns and Trends*

The period of greatest risk of malnutrition coincides with the period of breastfeeding and complementary feeding. Although most women in Latin America breastfeed and do so for a relatively long period of time, breastfeeding practices are far from optimal. The duration of exclusive breastfeeding, the behavior most associated with reduced infant morbidity and mortality, is far less than the 6 months recommended by WHO (127) (Table 8). Little is known about complementary feeding practices in the Region. Data from Mexico and Peru, however, show that young children's diets are lacking in energy, iron, and zinc (128).

While national programs to support breastfeeding have been successful (129–131) and the WHO/UNICEF Baby-friendly

Hospital Initiative has been widely implemented throughout the Region, enforceable legislation on the International Code of Marketing of Breast-milk Substitutes is still not in place in a number of countries. Only Brazil, Costa Rica, the Dominican Republic, Guatemala, Panama, Peru, and Uruguay have enacted legislation encompassing all or nearly all of the provisions of the Code. Argentina, Barbados, Bolivia, Chile, Dominica, Ecuador, Grenada, Guyana, Jamaica, and Trinidad and Tobago have adopted a voluntary code or health policy encompassing nearly all the provisions of the Code, but with no enforcement mechanisms. Several other countries have legislation regarding various provisions of the Code, and several have drafted laws or are studying how best to implement the Code. Most Latin American and Caribbean countries are members of the Codex Alimentarius Commission, which determines the labeling and content of foods for infants, as well as the appropriate age for introducing complementary foods.

#### *Undernutrition*

Undernutrition in the form of stunting (low height-for-age) and underweight (low weight-for-age) is often a contributing factor to common childhood diseases, and as such, is associated with many causes of death of children under 5 years of age. Chronic undernutrition, as measured by stunting, is the most prevalent form of undernutrition in the Region. The age-specific risk pattern for stunting (from birth to 24 months of age) is similar for all countries in the Region, despite widely varying levels of stunting. The period of risk of acute undernutrition is from 3 to 24 months of age, though this is not a serious problem in the Region. After 24 months of age, mean weight-for-age values in the Region are above the reference value, indicating the presence of overweight.

#### *HIV and Infant Feeding*

The demonstration of HIV transmission through breastfeeding has complicated infant feeding recommendations. Mother-to-child transmission of HIV, the main cause of pediatric HIV/AIDS, is a growing problem in Latin America and the Caribbean, where over 10,000 cases have been reported (132). Recognizing breastfeeding as a significant and preventable mode of HIV transmission, UNAIDS, together with WHO and UNICEF, issued new guidelines on HIV and infant feeding in 1998 (133).

#### **Micronutrients**

Although great strides have been made in addressing micronutrient deficiencies in the Region, they continue to be highly prevalent. Iron deficiency anemia, vitamin A deficiency, and iodine deficiency have received the most attention.

The most easily recognizable sign of iron deficiency is nutritional anemia, which affects 77 million children and women in Latin America and the Caribbean, including 6 million infants, 13

million preschool-age children, 31 million school children, 23 million women of reproductive age, and 4 million pregnant women (134). It is the most prevalent nutritional deficiency among infants and young children in the Region, ranging from 9% in Chile (135) to 33% in Mexico and Argentina (136), and is the leading cause of anemia in the Region. Several countries in the Region use targeted fortification of complementary foods and/or milk for young children to reduce the prevalence of anemia in this age group (135, 137). In many communities, iron deficiency is also a problem among adolescents.

In addition to iron deficiency, there are other non-nutritional causes of anemia, such as menstruation, genetic anomalies (e.g., sickle cell anemia), and infectious diseases that destroy red blood cells (e.g., malaria). Parasites, such as hookworm, and consequent blood loss are another cause of anemia. Given the extent and scope of iron deficiency in the Region, programs with broad coverage to increase iron intake, including increased consumption of iron-rich foods, food fortification, and supplementation, are needed.

Most countries in the Region fortify wheat or corn flour with some combination of iron and B vitamins, including folate, niacin, riboflavin, and thiamin. Several also fortify margarine, milk products, and sugar, with vitamin A. In the developing world, the Latin American and Caribbean countries are leaders in food fortification due to their well-developed food industries; growing urbanization and the use of industrially processed foods; government and public acceptance of food fortification with micronutrients; and the passage of legislation to support fortification efforts.

Because of the high iron requirements of pregnancy, gestating women need daily iron supplementation. However, despite norms calling for this practice and large-scale programs targeting pregnant women in the Region, for the most part, supplementation strategies have not been successful due to low levels of coverage and compliance.

When consumed during the periconceptional period, folic acid plays an important role in preventing neural tube defects in infants, one of the most common forms of congenital malformation. Food fortification is one strategy used to increase folate levels among women of reproductive age. Most countries in the Region fortify cereal flours with folic acid with the aim of reducing the incidence of neural tube defects.

Vitamin A deficiency is the most important cause of childhood blindness in developing countries, and at subclinical levels, contributes significantly to high morbidity and mortality due to common childhood infections. Though clinical vitamin A deficiency is still evident in Brazil and Haiti, in the Region of the Americas, vitamin A deficiency manifests mainly as a widespread subclinical disease in many countries, where more than a quarter of all children under 5 years of age are estimated to be affected.

Recent studies show that 15% or more of preschool-aged children are affected by subclinical vitamin A deficiency in the Dominican Republic, Ecuador, and Mexico, and that subclinical

deficiency persists in children under 3 years of age in Colombia, Guatemala, Honduras, and Peru. Subclinical vitamin A deficiency has also been a problem in Bolivia and Northeast Brazil, although no recent national data are available to assess the extent of the problem; several other countries also lack recent data to confirm the presence or lack of subclinical vitamin A deficiency as a public health problem.

Prophylactic supplementation of high-dose vitamin A is the most widespread intervention against deficiency of this micronutrient, though food fortification with vitamin A is slowly becoming more extensive.

Over the past decade, all of the countries in the Region for which vitamin A deficiency is a problem have started to implement vitamin A supplementation programs. Important programmatic achievements include the incorporation of vitamin A supplementation into immunization activities to increase coverage among young children, and supplementation of postpartum women. In addition, there is increasing awareness of the need to strengthen supplementation programs through integrated efforts and regular monitoring, as is seen in the greater involvement of staff from different health programs in supplementation activities.

In most of the Region's countries, coverage rates for first-dose vitamin A supplementation among children under 1 year of age were generally above 60% during the period 1998–2000 (Figure 8). This has been the result of linking vitamin A supplementation with immunization campaigns.

The coverage for the first dose of the annual series of vitamin A supplements among children over 1 year of age, on average, is not consistently as high as the coverage rates among infants. Reaching children targeted for vitamin A supplementation becomes progressively difficult with age, as contacts with regular health services become less frequent. Coverage rates for the second dose of the annual series of vitamin A supplements are extremely low in most of the countries of the Region. Vitamin A supplementation of women at the beginning of the postpartum period is a relatively new strategy being implemented by some countries.

At present, interprogrammatic coordination to increase vitamin A supplementation coverage and education in dietary diversification are being widely promoted in the Region. In addition to reinforcing the link with the Expanded Program on Immunization (EPI), vitamin A supplementation is being incorporated into other programs, such as the Integrated Management of Childhood Illness (IMCI).

Food fortification with vitamin A is a central strategy for vitamin A deficiency reduction in several countries and is being adopted by many others. Currently, El Salvador, Guatemala, Honduras, Nicaragua, and Venezuela have ongoing food fortification programs that include fortification with vitamin A, particularly of sugar. Central American countries, which have the most extensive experience with food fortification, have achieved significant improvements in vitamin A status.

In the Region of the Americas, all countries at risk of iodine deficiency have implemented national salt iodization programs. However, programs in Belize, Bolivia, Cuba, El Salvador, Nicaragua, and Paraguay need to be strengthened, and programs in the Dominican Republic, Guatemala, and Haiti need to be greatly reinforced. Nearly all countries have access to either locally produced or imported iodized salt. Because of the commitment of the salt industry and public sector involvement in developing national programs for the prevention and control of iodine deficiency disorders, salt iodization has reached 90% of the homes in Latin America, making this the highest coverage reached in the world. Bolivia, Colombia, Ecuador, Peru, and Venezuela have already been certified as free of iodine deficiency disorders.

### The Obesity Epidemic in the Americas

Non-communicable diseases, particularly cardiovascular diseases, diabetes, and certain cancers, now rank as the leading cause of death in the Region of the Americas. Overweight and obesity—which are due to a positive nutritional balance in which intake and energy savings exceed energy expenditure—are a common denominator in these diseases.

Some of the changes in morbidity and mortality patterns caused by chronic diseases originate with changes in the population's diet and physical activity patterns. This is reflected in the Region's current obesity epidemic.<sup>1</sup> Where information is available, the prevalence of overweight among school-aged children is between 25% and 30% (139).

Obesity is distributed differentially by sex and social class. Women have higher obesity rates than men, and there also is a negative relationship with social class, which is greater among women. While more women tend to be overweight, it is important to note that the higher on the social gradient a woman is, the lesser the difference. This could be explained by the fact that women experience cultural pressures to be thin, as well as because women tend to adopt positive eating habits earlier than do men (139).

In women 14–49 years old, higher levels of education and higher socioeconomic levels have a differential effect on the probability of obesity. In the Region's poorer countries, such as Haiti, more education and higher income levels have a positive correlation with obesity; on the other hand, among United States women of Mexican descent, more education and higher income levels protect against obesity. Thus, higher income has a positive effect on obesity, while more education has a protective effect. In Peru's urban population, the protective effect of education is greater for women than for men.

A sedentary lifestyle is a factor conducive to obesity worldwide, especially in cities. Physical activity levels tend to be low in

<sup>1</sup>To define overweight and obesity, WHO recommends using the Body Mass Index (BMI), which is derived by dividing weight (in kilos) by height (in meters squared). The following classification is used: low weight,  $\leq 18.5$ ; normal, 18.5–24; overweight, 25–29; and obesity,  $\geq 30$ .



the Region of the Americas, particularly among low-income sectors. A 1993 survey conducted in Chile showed that only 24% of the population participated in any sport (more men than women); 61% of young persons 8–14 years old participated in some type of sport, compared with 22% of 45-year-olds (140). These patterns of physical activity are very similar to those reported in the United States (141), in the 1997 Sports Survey of Peru (142), and in Brazil.

It is important to stress the positive effect of citizen alliances in the Region, such as “Agita São Paulo” in Brazil and “Muévete Bogotá” in Colombia, which encourage the population to be physically active. Along those lines, PAHO and the Centers for Disease Control and Prevention (United States), working with various organizations in the Region, established the Physical Activity Network of the Americas in October 2000; the network will coalesce and bolster various efforts to promote physical activity in the Region. Also worth highlighting are efforts of local or neighborhood governments to protect and/or create safe spaces for recreation and leisure activities.

## MENTAL HEALTH

In the countries of the Region, there is great concern about and a growing need to respond to the challenges presented by the increasing burden of mental health disorders. There is general agreement that action should be directed towards the promotion of awareness regarding the prevalence, causes, and prevention of mental health conditions, as well as the adoption of appropriate treatment practices. Beyond their health effects, these disorders have serious repercussions on the individual's role and participation in society.

### Prevalence of Mental Disorders

The SABE survey found that the prevalence of depression among the respondents ranged from a low of 4% in Georgetown, Barbados to a high of 18% in Montevideo, Uruguay.

The subregions of Central America, the Caribbean, and a large part of the Andes, have suffered several devastating natural disasters, such as hurricanes, floods, earthquakes, and volcanic eruptions. Such events have a strong impact on the mental health of the affected populations. A study examining the risk of developing mental disorders, levels of violence in the post-disaster period, and rates of health service utilization found that 20% of the survey population had suffered a major depressive episode and that 11% suffered from posttraumatic stress (143).

### Costs and Burden of Mental Disorders

Knowledge about the economic consequences of mental disorders is still limited, especially in developing countries. However,

economic studies show that work impairment accounts for a significant part of the economic impact of mental health problems. For example, a study in the United States showed that psychiatric disorders are responsible for 1 billion lost days of productivity per year in the civilian workforce (144). Furthermore, several studies show that depression has both a greater length of disability and disability relapse than comparison medical conditions.

### Policies and Services

Despite the importance that mental disorders have on the global burden of disease and their influence on society's development and productivity, mental health is not a priority when it comes to resource allocation. Most persons who suffer mental disorders do not have access to health services or do not seek care. In the United States, for example, more than half of those experiencing mental disorders do not receive adequate care (145).

The 1990 Declaration of Caracas represents an important advance in the effort to incorporate mental health into primary health care, establish community mental health services to gradually take the place of psychiatric hospital services, and protect the rights of persons suffering from mental disorders. In 1997, as a result of a resolution adopted by PAHO's Directing Council (DC40.R19), the ministers of health of the Americas unanimously endorsed the principles established in the Declaration of Caracas and committed themselves to promote mental health and deal with the most prevalent mental disorders.

Advances in mental health include the fact that 64.5% of the countries of the Americas have specific policies dealing with mental health, 80.6% have mental health plans, and 67.9% have enacted mental health legislation. On the other hand, available data show that although the average available resources for mental health in the Americas exceed the worldwide average, stark deficiencies remain in most aspects (Table 9).

The percentage of the national health budget assigned to mental health varies considerably from country to country, ranging from less than 1% to 11%, but it tends to be low in most countries. For example, 30.8% of countries assign less than 2% of the budget to mental health, 46.2% assign between 2% and 5%, and only 23.1% assign more than 5%. The financing of mental health services comes from taxes in 66.7% of the Region's countries, from social security funds in 16.7%, from user fees in 13.3%, and from private insurance in 3.3%.

The Declaration of Caracas and the adoption of Resolution DC40.R19 notwithstanding, in most of the countries, mental health services continue to be offered mainly in large and centralized psychiatric hospitals. And, although most of the Region's countries carry out mental health activities in their primary health care services, only 66.7% of them treat severe conditions at these services, and only 41.9% train primary health professionals in mental health. The number of psychiatric beds is 3.3 per 10,000 population; 47.6% of them are in psychiatric hospi-

tals, 16.8% are in general hospitals, and 35.6% are in other institutions (such as community residences). Nongovernmental organizations participate in mental health activities in 90.3% of the Region's countries. Figure 9 shows the distribution of human resources working in mental health.

Most of the countries have recently established prevention programs targeting alcohol and drug abuse, and others have set up programs dealing with suicide and violence. In addition, the mental health component has been increasingly incorporated into health promotion programs in schools.

## DRUG USE AND DEPENDENCY

### Tobacco

#### *Mortality Attributable to Tobacco Consumption*

Tobacco consumption is the leading cause of avoidable death in the Americas and in the world. In the Region, more than one million persons die each year from this cause, 46% of them women. Table 10 shows the mortality attributable to tobacco consumption in the Americas for the first five years of the 1990s; the most complete information on mortality, updated for the Region as a whole, is available for this period, making it possible to formulate reliable estimates. Half of these deaths were in Latin America, and the Southern Cone experienced the highest proportion of mortality attributable to smoking in the Americas (25% of all estimated deaths in that subregion), followed by North America (23.5%) and Brazil (18.8%). When comparing these figures to those from a previous study (146), it can be seen that the proportion of deaths caused by tobacco consumption has increased substantially, although figures are not fully comparable due to methodological differences. Tobacco consumption causes approximately one-third of all deaths from diseases of the heart and cancer in the Region. One-half of habitual smokers will die because of smoking, and half of these deaths will occur in middle age.

#### *Prevalence of Tobacco Use*

Tobacco consumption rates vary widely in the Region; the highest are found in the Southern Cone, particularly in Chile and Argentina (approximately 45% of men and 35% of women), and the lowest in some of the Caribbean countries, such as Dominica, Guyana, and Jamaica, which have prevalence rates under 17.0% (147, 148). Table 11 shows the most recent data on prevalence of smoking available for the countries of the Americas (between 1994 and 1999). Available data on trends indicate that Canada and the United States have significantly and continuously reduced the prevalence of smoking (147). In most other countries, the prevalence of smoking has remained relatively stable.

Tobacco addiction usually begins in adolescence. In the majority of the Region's countries, more than 70% of smokers began smoking before age 18. The Global Youth Tobacco Survey has

made it possible for the first time in Latin America and the Caribbean to compare young people's attitudes, knowledge, and behavior with respect to tobacco consumption. In late 2000, 13 Latin American and 18 English-speaking Caribbean countries already had results or were conducting the survey. Between 14% and 40% of the Latin American youths 13–15 years old were using tobacco at the time of the survey. As with adults, the highest prevalence was seen in the Southern Cone. The numbers in the Caribbean are lower, ranging between 14% and 21% (149).

#### *Distribution of Tobacco Use by Sex and Socioeconomic Level*

Although overall prevalence of tobacco use in most of the Region's countries has remained relatively stable during the last decade, it is increasing among women. For example, in Argentina and Costa Rica, the prevalence of tobacco use in adolescent females is higher than in males of the same age. In 1998, 61% of non-smoking women in Mexico were exposed to second-hand tobacco smoke, compared to 39% of non-smoking men (150). The results of a recent study (151) indicate that women who have never smoked but who live with a smoker have a 21% higher risk of contracting lung cancer at some time in their lives. If these same women have been exposed to the second-hand smoke from a parent since childhood, the risk increases by 63%, compared to the risk of non-smoking women who have always lived in homes without smokers.

In some countries where the tobacco use epidemic is more advanced, such as Chile and Colombia, tobacco use is generally more prevalent at the lowest socioeconomic levels. In Colombia, the current level of tobacco use at high socioeconomic levels is 18% for men and 9% for women, and at the lowest levels, it is 38% and 16%, respectively. In Chile, the respective rates are 42% and 38% versus 50% and 37%. For countries at early stages of the epidemic, such as Peru and Bolivia, this pattern is reversed. However, it is expected that the lowest socioeconomic levels will start smoking in larger numbers as the epidemic advances. In fact, between 1995 and 1997, the prevalence of tobacco consumption in Peru increased from 27% to 32% in the lowest socioeconomic level and decreased from 43% to 37% in the highest.

#### *Effect of Interventions to Reduce Smoking*

Current scientific knowledge indicates that the most effective means of reducing tobacco consumption are raising the tax on tobacco, banning promotion of tobacco products, and creating smoke-free environments (152). All these interventions have a cost-effectiveness similar to that of childhood vaccinations and the comprehensive care of prevalent childhood illnesses (153).

The single most effective measure for controlling tobacco consumption is levying tax on it (153). There is a significant relationship between per capita consumption of tobacco products and their real price. Taxes have an even greater impact on decreasing tobacco consumption in low-income populations and in young people. Similarly, the effect of price on tobacco consump-

tion is greater in the low- and middle-income countries than in the high-income countries. In Latin America and the Caribbean, a 10% increase in the real price of tobacco products will result in a decrease in per capita consumption of approximately 8%. In other words, this measure, in and of itself, would result in 4 million additional smokers quitting. For example, while in the United States the real price of a pack of cigarettes of a given brand has increased approximately 5% a year over the last decade, in many Latin American countries it has decreased: 0.03% in Guatemala, 0.4% in Argentina, 3.8% in Uruguay, and 6.4% in Costa Rica. Another measure of the affordability of tobacco is its price in relation to other consumer goods. For example, a person has to work 21 minutes to buy a pack of cigarettes in Toronto (Canada) and 13 minutes to buy a hamburger; in contrast, to buy a hamburger in Venezuela a person has to work three times as much as to buy the pack of cigarettes, and in Colombia and Rio de Janeiro, a person has to work twice as much (154).

Some studies indicate that comprehensive restrictions (total or partial bans) on the promotion of tobacco will reduce tobacco consumption; partial restrictions, however, have little or no effect (153). Canada, Brazil, and Cuba are enforcing laws that substantially limit the advertising of tobacco products and the sponsoring of sports and cultural events by tobacco companies. In many countries, restrictions are few, and those that exist are not always enforced. For example, Honduras prohibits broadcasting tobacco-product advertisements before 8:00 p.m., but 39% of these ads were seen between 6:00 p.m. and 8:00 p.m., and nearly half of them were broadcast during programs intended for children or families (155). The limited effect of these restrictions translates into a high level of exposure to messages from the tobacco industry, particularly in countries with high prevalence rates among adolescents, such as Chile and Argentina (Table 12).

Exposure to second-hand tobacco smoke seriously harms the health of non-smokers, causing such diseases and conditions as asthma, bronchitis, pneumonia, and ear infections in children, and lung cancer and cardiopathies in adults (156). In the home, spouses and children can have high levels of exposure to second-hand tobacco smoke (Table 13). Exposure in the home ranges from 70% in Argentina to 19% in Antigua and Barbuda. In the Caribbean, the prevalence of exposure in the home ranges between 20% and 30%, while in Latin America it ranges between 40% and 60%.

Exposure of young people to second-hand tobacco smoke in public places ranges from 88% in Argentina to 34% in Huancayo, Peru. In the Caribbean and in Latin America, the prevalence of exposure in public places ranges from 45% to 70%. Among young people, the highest prevalence of exposure to second-hand tobacco smoke from friends who smoke is 37% in Chile; the lowest is 6% in Guyana. In the Caribbean, the prevalence of exposure to second-hand tobacco smoke from friends who smoke ranges between 5% and 10%, while in Latin America it ranges between 10% and 35%. In the United States, more than half of young people are exposed to second-hand smoke, while

in Canada one-third of children under 12 are regularly exposed at home (157, 158).

In most of the Region's countries, restrictions on smoking in public spaces are minimal. The ban on smoking in enclosed areas must be total to effectively protect the health of non-smokers, since partial restrictions, such as setting up separate areas for smokers and non-smokers, even when they have ventilation systems, are insufficient. A ban on smoking in enclosed areas also reduces the prevalence and overall consumption of tobacco by smokers.

## Alcohol

### *Alcohol Consumption*

Table 14 shows the per capita alcohol consumption in the population 15 years old and older in 30 countries of the Americas. Habitual drinkers usually constitute a relatively small proportion of all drinkers (approximately 10%), but they consume half the available alcohol. In 1996, wine producing countries, mainly Argentina and its neighbors, were the heaviest consumers of wine, while Venezuela and the United States were the heaviest consumers of beer. Certain Caribbean nations, such as Guyana and Bahamas, were the heaviest consumers of hard liquor, making them the countries with the highest per capita alcohol consumption in the Region. Table 14 shows the registered consumption of legally-produced alcoholic beverages. Many countries also produce large quantities of alcoholic beverages clandestinely or for home consumption, however. For example, clandestine production in Brazil almost triples the country's estimated per capita consumption; in Chile it amounts to 20% of legally produced alcohol (159), and in Ecuador it is three times the amount of legal alcohol. Therefore, the data in the table underestimate actual consumption. Between 1998 and 1999, some 24,000 million liters of alcohol were consumed in Latin America, 200 million more than in 1998 and 4,300 million more than in 1990. In North America, 29,000 million liters were consumed in 1999, 600 million more than in 1998.

In the countries of the Americas, the only comparable information on alcohol consumption are prevalence data on ever having consumed alcohol. The percentage of men who have drunk alcohol at some time in their lives ranges from 60% in Haiti to 95% in Canada. Among women, these percentages range from 37% in Mexico to 90% in Colombia.

### *Prevention Challenges*

The first challenge is to reduce the consumption of unregulated alcohol, to ensure that the population consumes alcohol of guaranteed quality. The second is to reduce accessibility to alcohol. A study in the United States estimated that a 10% price increase would reduce the average number of drinks consumed in a year by 6.5%. Several studies indicate that increasing the price of alcoholic beverages by raising the sales tax decreases the percentage of women and young people who consume alcohol,

among frequent and occasional drinkers. In this respect, it has been found that young people do not replace alcohol with marijuana or other drugs when they have less access to alcohol.

## Illegal Drugs

### *Cultivation and Production*

Illegal drugs are a US\$ 600 billion a year business in Latin America and the Caribbean (160). Latin America produces all the leaf and pasta base for the world's cocaine, and Bolivia, Colombia, and Peru produce 98% of the world's coca leaf. In addition, Latin American and Caribbean countries devote more than 1% of their arable land to illegal crops. Between 1994 and 1998, the area devoted to growing coca in the Andean countries seems to have decreased 17%, but the crops' yield has remained basically stable. It is estimated that in 1996, 300,000 tons of coca leaf were produced, and 1,000 tons of cocaine were extracted.

Heroin production in Latin America and the Caribbean represents a very small proportion of the more than 300,000 tons produced worldwide each year. Poppy growing is on the rise in Latin America, mainly in Mexico and Colombia; the amount of land devoted to growing poppies in Colombia increased 17% from 1996 to 1998.

An increase has been seen in the amount of land devoted to growing cannabis. In Colombia, for example, there are 5,000 hectares devoted to cultivating the plant. It is estimated that between 850,000 and 1,000,000 hectares of forest were destroyed in Colombia between 1974 and 1998 in order to cultivate coca, cannabis, and poppies.

### *Consumption*

Marijuana is the most commonly consumed illegal drug in the Americas, with an estimated 45 million users in the Region. Contrary to popular belief, marijuana consumption creates dependency and leads to significant health problems. The percentage of the Region's population that has used marijuana at some time ranges from 2% in Paraguay and the Dominican Republic, to 17% in Chile, and to 35% in the United States.

Cocaine is the second most commonly used drug. In most of the countries, between 1% and 4% of the population has used cocaine at some time (161). In the United States, this number is around 11%. This use, however, is concentrated in adolescents and young adults at lower socioeconomic levels. Among adolescents, the prevalence of habitual cocaine use may be between 1% and 5%.

### *Social and Health Consequences of Drug Use*

The production of, trafficking in, and use of drugs in the Americas spawns violence, illness, and death, and affects the governability of the Region's countries. Furthermore, drug use is a determining factor in the transmission of AIDS and other infectious diseases, especially in the Southern Cone. Drug use by preg-

nant women also is associated with physical and mental deficits in the development of the fetus and the newborn, and especially affects the most disadvantaged population.

Drug use is partly responsible for a high rate of school dropouts. In Chile, for example, 20% of the students have used illegal drugs in the last 12 months. Many of them, especially those from low-income families, never finish primary school. In Peru, the failure rate in primary school due to drug consumption is 21% (162). After leaving school, many of these young people, having become addicted, support themselves by selling drugs and join violent gangs for social support, which aggravates their marginalization and poverty. In El Salvador, nearly half of gang members use illegal drugs on a daily basis (163).

### *Response of the Health Sector*

In Latin America, 12 countries have National Drug Control Plans. These plans stress control of availability through crop destruction, police action against trafficking, and penalties for consumption. The results of this approach have been limited. It is, therefore, necessary to reinforce control of demand through interventions for prevention, detoxification, treatment, rehabilitation, and damage reduction.

## SEXUAL AND REPRODUCTIVE HEALTH

### **Reproductive Health across Population Groups**

Although traditionally, reproductive health services were available only for women of reproductive age, it is now recognized that initiating activities at that age is much too late. Developmental studies have shown that attitude formation is initiated in the early years of a person's lifetime. Long before children reach school age, they have learned about relationships between men and women, and have formed attitudes regarding behavior and lifestyles. The average age of intercourse initiation in the Region is 14 years, with 50% of adolescents under age 17 years being sexually active. Studies show that most 20-year-olds have had multiple partners without the use of protection to prevent STIs or pregnancy. This has motivated many countries to incorporate educational prevention and promotion activities at early ages. One problem recognized in several countries is the urgent need to prepare teachers for primary and middle school teaching on sexuality and good reproductive health practices.

However, this approach posed difficulties in some situations and generated controversy, partly because it raises the question of the rights of minors and those of parents. In several countries, adolescent groups themselves have chosen to become active in disseminating information and in peer counseling after training.

The International Conference on Population and Development drew attention to the fact that males were a neglected group in the provision of reproductive health services and called for increasing their active participation in responsible fatherhood, sexual behavior, and other aspects of reproductive health (164).

Brazil, Chile, Costa Rica, Cuba, Nicaragua, Venezuela, and Uruguay have made advances in institutional educational programs aimed at males, and have put in place a legal framework to support responsibility. Here too, there are groups who are helping to disseminate information and provide counseling, especially in the areas of family planning and HIV prevention.

### **Abortion**

Voluntary abortion is illegal in most Latin American and Caribbean countries, and data on abortions are not readily available. Where available, legal abortions often have complicated procedural requirements, limiting the establishments and the professionals able to perform them or prohibiting all abortions except to save the life of the pregnant woman or in cases of rape. Although not strictly permitted by law, the performance of abortion in the case of fetal malformation is occasionally granted by judicial discretion in some countries. In addition, studies have demonstrated conservative attitudes in the medical community, reducing even further the small number of legal abortions performed in these countries.

NGOs and women's groups are quite active in addressing the rights implications of the illegality of abortion. Advocates from Argentina, Brazil, Bolivia, Chile, Colombia, Costa Rica, Cuba, the Dominican Republic, El Salvador, Ecuador, Haiti, Honduras, Mexico, Nicaragua, Peru, Puerto Rico, Uruguay, and Venezuela participated in the September 28 Campaign to decriminalize abortions, which are estimated at four million in Latin America each year. There have been several important court battles over abortion issues. For example, in the United States, serious challenges have been mounted against the federal law allowing abortion, and Chile's Supreme Court made all abortions illegal. In addition, anti-abortion violence is a problem in some countries.

Studies indicate that most women having abortions are in their 20s or older and married, and that many are already mothers. Socioeconomic inequities are evident in this area, as women with resources are able to seek care from trained professionals under better conditions. Some efforts to introduce social services, such as housing and birth assistance for pregnant women who opt not to abort and who choose to offer the child for adoption, are available in urban areas in many countries, usually under the aegis of religious or anti-abortion groups.

The burden of clandestine abortion in Latin America and the Caribbean is unquestionably high. Conservative estimates say that up to 31% of all pregnancies may end in abortion, and that there are approximately 444 abortions each year for every 1,000 live births. The implications of this activity on the utilization of health services are staggering, with an estimated 300,000 hospitalizations for complications in the period immediately following the procedure. Death due to complications of abortion is not uncommon, and is one of the principal causes of maternal mortal-

ity in women of reproductive age. An estimated 12% of registered maternal deaths are due to complications of unsafe, illegal abortions. Recently, the relatively easy access to misoprostol, an anti-ulcer drug that may cause abortion in pregnant women, has been cited in some studies as having reduced morbidity and mortality due to illegal abortions, although its increasing use by adolescents is cause for great concern.

Postabortion care has been recognized as a critical opportunity for intervention in order to save lives and prevent additional abortions, and is increasingly being offered as part of reproductive health programs. It is also being used as an opportunity to begin to integrate health services. For example, Bolivia, Ecuador, and Jamaica are introducing family planning and cancer screening to this population during postabortion care.

### **Contraception**

Access to information has increased and the use of contraceptives among women of childbearing age in union is estimated to be 70% in the Region. The increased use of effective methods of family planning has contributed to declining population growth rates, though unwanted and mistimed births are still common. The decrease in the desired family size in developing countries has fueled demand for reproductive health services.

Although contraceptive prevalence has increased in Latin America and the Caribbean, this is due predominantly to increased use by females. The method most frequently used is the pill, followed by the intrauterine device (IUD) and condoms. A significant group of women still practice periodic abstinence, rhythm, withdrawal, or douche as a method of contraception. The majority of family planning clients accessing public sector services continued to be women; however, there is some evidence that modern contraceptive use is increasing among adolescents and men.

## **Response of the Health System**

### *Policy and Regulation*

Half of the countries in Latin America and the Caribbean have altered or are in the process of altering their legislation in the area of reproductive health. Changes address a wide range of issues, including policies for reproductive health, the creation of conditions for implementing reproductive health and rights, violence against women, women's empowerment, male involvement in reproductive health, reproductive health education, family laws, family planning, abortion, and increasing access to quality reproductive health services.

An exemplary participatory process was realized by Panama in the development of an integral plan for reproductive health. Civil society actors, NGOs, armed forces, private and public sectors, religious actors, and others came together over a period of a

year to conduct small focus groups and share opinions and ideas for the goals and strategies of the plan.

#### *Human Rights Efforts*

Many women's organizations have been active in promoting a human rights-based approach to reproductive health. Studies in the United States have shown that one of the underlying problems among women in particular is ignorance of these rights. Other studies in Guatemala and Bolivia revealed that women were deprived of the possibility to exercise their rights or they chose not to exercise them due to local or ethnic cultures and the potential consequences for themselves and their children. With evidence that women were being sterilized without their consent and without being given proper information, women's groups in Peru joined with the legislative bodies to confront the violation of women's rights by the health system, which had established sterilization quotas.

#### *Organization and Functioning*

Following the 1994 International Conference on Population and Development, the ministries of health of some countries in the Region made efforts to integrate the different components of reproductive health into a functioning unit. The Dominican Republic, El Salvador, Mexico, Nicaragua, Paraguay, Peru, and Saint Lucia have attempted to develop national models for integration through population councils or similar mechanisms. Vertical programs continue to be the norm.

In many countries, the panorama is even more complex, as responsibility for the planning and national administration of reproductive health policies continues to lie within the ministries responsible for sustainable development, evidencing the inherited bias towards population size concerns as opposed to the expanded concept. The provision of services, however, remains the responsibility of the health sector.

An increase in the development of service models with a family focus has been observed, most notably in Brazil, whose family health program highlights an integral multidisciplinary approach to communities through attention to the family in primary health care. Colombia, the United States, and others countries have utilized a family approach to develop some reproductive health care models, but this has yet to achieve policy status.

In some countries, NGOs provide services that for traditional or religious reasons are difficult to incorporate into the public domain. For example, family planning services in Colombia were traditionally managed this way. New alliances are being formed with non-traditional partners such as labor organizations in Brazil, Paraguay, and Peru, which have initiated training for their members in healthy sexual practices. Industries such as tourism, textiles, and others are initiating programs for workers and their families in the Dominican Republic, El Salvador, and Nicaragua, and the armed forces in Peru and Paraguay have developed similar efforts.

Ecuador and Panama have developed social communication programs specifically designed to improve population knowledge and utilization of existing reproductive health services, and increasingly, population education efforts are being included as part of the services packages in the countries.

#### *Quality*

The development of tools and processes to facilitate local activities to insure quality of care has been a priority. The quest to improve the quality of reproductive health services has been very effective in Bolivia and is gaining momentum in El Salvador, Honduras, and other Central American countries. The English-speaking Caribbean, with the support of the Italian Government, is also making progress in this area.

Research continues to emphasize the area of contraceptive technology. In the United States, there have been important advances in genetic and embryonic research, although these have raised significant ethical and policy concerns.

#### *Human Resource Development*

To develop opportunities for health personnel to be more aware of changes in and tools for implementing reproductive health services, a number of universities have begun to offer specialization or courses at the postgraduate level. Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico, Nicaragua, and Uruguay have been leaders in this effort. Master's-level programs specific to reproductive health have been established in Brazil, Chile, Colombia, Costa Rica, Mexico, and Nicaragua. Training modules for reproductive health services management have been offered in Brazil, Costa Rica, the Dominican Republic, Paraguay, and Venezuela.

Some countries, most notably Chile, Cuba, Peru, and the English-speaking Caribbean countries, have managed to increase coverage and user satisfaction, and significantly reduce maternal mortality through strategic placement of qualified nurses, midwives, doctors, and other personnel, while strengthening the system with adequate logistics, and structured and supported programs at the primary health care level.

#### *Financing*

A serious problem facing reproductive health services is that for many years these programs, particularly family planning, have been dependent on external funding. In the past four years, several countries have lost subventions for these activities as they have improved their reproductive health statistics.

## **ORAL HEALTH**

In the 1990s, almost all the Region's countries showed a declining trend in the prevalence of dental caries. In addition, more cost-ef-

fective technologies were employed in order to expand oral health service coverage and maximize available public sector resources. The important factors affecting these changes are the initiation, continuation, and sustainability of national programs for salt and water fluoridation.

Epidemiological surveillance of dental caries in the Region is carried out through clinical surveys of a cross-section of specific population groups, in accordance with protocols established by WHO (165). Table 15 shows the prevalence and severity of dental caries in 12-year-old schoolchildren in various countries of the Region; it uses the average DMFT (decayed, missing, or filled teeth) index from various sources—epidemiological studies carried out in the 1990s (166–172), government publications (173–177), and reports submitted to PAHO's Regional Oral Health Program (178–183).

Data from Belize (184), Bolivia (185), Costa Rica (186, 187), Chile (188), Ecuador (189), El Salvador (190), Honduras (191), Jamaica (167), Nicaragua, Panama, Paraguay (192), the Dominican Republic (193), Uruguay (194), and Venezuela (174) were obtained from baseline evaluations that are part of each country's epidemiological surveillance system within national fluoridation programs. Information on Brazil comes from a comparative study carried out in 1993 (171) and another carried out in 1986 at the national level in urban areas. For Canada, a review was conducted of research carried out in Ontario (169), the country's most populous province. The source for the United States was the first part of the national study ("The National Health and Nutrition Examination Surveys") that collected information between 1988 and 1991 (195).

The Table shows great disparity in the average number of decayed, missing, or filled teeth at age 12. In the 1980s, the average DMFT was 6 in Anguilla, Belize, Bolivia, Brazil, Chile, the Dominican Republic, Honduras, Nicaragua, Jamaica, and Uruguay. In Costa Rica and Guatemala, the average DMFT was 8 or more. During the 1980s and 1990s, average DMFT values decreased by 2.5% in Bahamas to nearly 90% in Belize. The goal of an average DMFT of 3 has been achieved by Anguilla, Antigua, Aruba, Bahamas, Barbados, Belize, Canada, Cayman Islands, Colombia, Costa Rica, Cuba, Curaçao, Dominica, Ecuador, El Salvador, Grenada, Guyana, Haiti, Jamaica, Nicaragua, Saint Kitts, Suriname, the United States, Uruguay, and Venezuela, as well as some states in Mexico and Brazil. Some countries, such as Bolivia, the Dominican Republic, and Trinidad and Tobago, as well as certain regions of Chile, still have average DMFTs exceeding 4.

If the trends observed in table 15 continue, most of the Region's countries would be expected to achieve a decrease in the prevalence and severity of dental caries, as has occurred in the countries of the Region that have had preventive programs in place for several years, such as Canada and the United States.

Table 16 presents information from a group of countries where epidemiological studies were conducted in the 1980s and 1990s. It

shows a group of countries in which 40% or more of 12-year-old students had no dental caries (Belize, Cayman Islands, Guyana, Jamaica, and the United States) and another group in which this percentage ranged between 10% and 25% of the population (Bolivia, the Dominican Republic, Ecuador, Nicaragua, Panama, and Paraguay). Moreover, in Bolivia, the Dominican Republic, and Honduras, more than 50% of the 12-year-old population had three or more teeth with dental caries or their sequelae (DMFT  $\geq$  3). In Bolivia, Ecuador, the Dominican Republic, Honduras, Panama, and Paraguay, more than 10% of the 12-year-old population has seven or more teeth with dental caries or their sequelae.

Analyzing the percentage contribution of each DMFT element in those who have had dental caries (Table 16) makes it possible to infer what types of dental services are available. Populations with access to restorative treatment have high percentages of the filling component and low percentages of decayed and extracted components. Conversely, populations with limited access to restorative treatment have high percentages of decayed and extracted teeth. The values for Costa Rica, the United States, and the Cayman Islands, with high percentages of filled teeth (between 49% and 71%), contrast with countries such as Bolivia, Ecuador, Honduras, Panama, Paraguay, and the Dominican Republic, where the percentages of teeth with untreated caries represent more than 80% of DMFT.

Jamaica and Guyana experience two situations that merit additional explanation. Both countries have similar percentages of teeth with untreated caries lesions (73% and 77% of DMFT, respectively), but Jamaica has a higher percentage of individuals who are free of caries (66%), and restored teeth make up 17.5% of DMFT; in Guyana, restored teeth make up just 0.6% of DMFT. These data indicate that Jamaica's population has, on average, more access to restorative clinical interventions than Guyana's population, where oral health needs are basically addressed through extraction. Guyana's low DMFT (1.3 in 1995) may be due to the fact that the sampling in that study included isolated rural populations that had not yet adopted cariogenic diets (196). Moreover, in Belize, which has the lowest DMFT in the Region (0.63), the lack of access to restorative treatment is reflected in a high percentage of untreated caries lesions (87%).

### Multi-year Fluoridation Plan in the Americas

In 1994, PAHO's Oral Health Program launched a multi-year regional plan to implement programs for the prevention of dental caries through salt and water fluoridation. Initially, the plan carried out a situational diagnosis of the Region's countries, based on the most recent reports on the prevalence and severity of dental caries and the existence of preventive programs. Based on this diagnosis, a typology of oral health development was established: an emerging stage, defined by a DMFT-12 of more than 5; a growth stage, defined by a DMFT-12 of 3 to 5; and a consolidation stage,

defined by a DMFT-12 of under 3. DMFT was chosen as the principal criterion due to its ease of measurement and its accessibility in most of the countries; moreover, this indicator makes it possible to make valid, reliable comparisons among countries.

It is important to note that not all fluoridation programs cover 100% of the population. In Bolivia, for example, less than 50% of the salt is fluoridated, and Guatemala, Honduras, Nicaragua, and the Dominican Republic are still in the initial stages of production. Moreover, in Chile, water fluoridation has been extended to the Metropolitan Santiago area (having previously been limited to the area of Valparaíso and Viña del Mar), and the same has occurred in some metropolitan areas in Argentina.

#### *Effectiveness of Salt Fluoridation*

Costa Rica, Jamaica, and Mexico initiated salt fluoridation programs in the late 1980s. Costa Rica achieved decreases of 43% in DMFT in 1992 (166) and 73% in 1999 (197), with compound percentages of annual decrease between 11% and 13%. Jamaica achieved a decrease of 84% (167, 168) (15% a year). The State of Mexico reported a decrease of 46% (7% a year). Similar results were recently reported in Uruguay between 1992 and 1999.

#### *Enamel Fluorosis*

The prevalence of enamel fluorosis in the Americas ranges from 2% in Honduras to 26% in Valparaíso and Viña del Mar, in Chile. In the United States and Chile (Valparaíso), it is important to consider that the high prevalence of enamel fluorosis may be due, not just to the consumption of water fluoridated to optimal levels, but also to the ingestion of fluoridated toothpaste. In Santiago, where drinking water contained minimal amounts of fluoride, the prevalence of fluorosis was 9%. In Bahamas, the high prevalence (24%) could be explained by the existence of mass preventive programs using fluoridated supplements. The high prevalence observed in Belize, Bolivia, Costa Rica, Paraguay, and the Dominican Republic can be explained by the fact that these countries have communities that consume water containing natural fluoride. In Costa Rica, the marketing of fluoridated salt is permitted only in communities where the concentration of fluoride in the water is under 0.3 mg/l (198). However, a recent study (199) identified communities with natural fluoride in the water in addition to those in the 1988 baseline study. Belize has areas with fluoride concentrations above 1.5 mg/l, and fluoridated salt from Mexico and Jamaica also is consumed. The combined consumption of fluoride is sufficient to produce the observed levels of enamel fluorosis.

#### **Status of Dental Services**

Public or private dental services in the Region respond to the attitudes or perceptions of potential users as well as to their purchasing power. For example, in Canada, the visit to the dentist

was the most common type of consultation of a health professional. Income level and dental insurance were determining factors for access to dental care (200).

PAHO's technical cooperation approach is an attempt to increase oral health coverage; to assign greater importance to prevention; to establish new models for service delivery; and to improve the quality of care, based on priorities, degree of urgency, and potential for patient referral. One of the strategies for improving the availability of oral health services in the Region is implementation of Non-traumatic Restorative Technique, which is being carried out in the national oral health programs of Bolivia, Colombia, Ecuador, El Salvador, Jamaica, Mexico, Panama, Uruguay, and Venezuela.

Latin America, the Caribbean, the United States, and Canada combined have more than 400,000 dentists, with an average of 3.1 per 10,000 inhabitants. The actual number of dentists per 10,000 inhabitants ranges between 0.2 and 10.5. There are 202 dentistry schools in the Region, 65% of which are in Brazil, Canada, the United States, and Mexico. As a rule, those schools' curricula emphasize costly interventions and are intended principally to prepare professionals for private practice.

#### **Periodontal Disease**

While there is no single index for assessing the population's periodontal status, WHO recommends the Community Periodontal Index, which measures the presence of bleeding and periodontal pockets in six groups of teeth called "indicator" quadrants (165). In various Caribbean countries, the presence of periodontal pockets has been reported in more than 50% of the population between the ages of 12 and 15 (177).

#### **Buccopharyngeal Cancer**

Buccopharyngeal cancer includes malignant neoplasms located in the buccal, buccopharyngeal, and nasopharyngeal cavities; 96% of tumors of the oral cavities and pharynx are carcinomas, and approximately 90% are of the epidermoid type (201). Many of these lesions are diagnosed in the advanced stages of the disease, when there is regional or distant dissemination, despite the fact that there are clearly differentiable pre-malignant lesions and direct access to the oral cavity for visual and tactile inspection. Consequently, only 50% of individuals diagnosed with buccopharyngeal cancer survive the fifth year after diagnosis.

Tobacco and alcohol use increases the risk of oral and pharyngeal cancer, and their combined use has a synergic effect (202, 203). Statistics on buccopharyngeal cancer have changed little over the last five years. This is due, in large part, to the lack of specific programs for the prevention of these neoplasms, to the diversity of their presentation and clinical behavior, and to the absence of effective epidemiological surveillance systems. To this



is added the need to evaluate periods of 5 to 10 years in order to be able to observe changes in incidence, survival, and mortality.

### Cleft Lip and Palate

In the United States, the most common craniofacial anomalies are cleft lip and palate, occurring in 1 to 2 of every 1,000 births, for a total of more than 8,000 cases a year. In Latin America, the number comes to 12,975 per year, and 30% of these children never undergo corrective surgical treatment.

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TABLE 1. Growth of the healthy municipalities movement, selected countries in the Americas, 1995–2000.

Country	Total municipalities	Participating municipalities			
		1995		2000	
		No.	% of total	No.	% of total
Argentina	2,432	1	0.0	4	0.2
Bolivia	314	2	0.6	4	1.3
Brazil	5,525	2	0.0	40	0.7
Colombia	1,108	3	0.3	200	18.1
Costa Rica	81	30	37.0	40	49.4
Cuba	169	52	30.8	79	46.8
Dominican Republic	110	3	2.7	14	12.7
Ecuador	205	10	4.9	12	5.9
El Salvador	262	10	3.8	32	12.2
Guatemala	331	7	2.1	50	15.1
Honduras	291	1	0.3	9	3.1
Mexico	2,400	670	27.9	1,540	64.2
Nicaragua	201	9	4.5	15	7.5
Panama	32	13	40.6	13	40.6
Paraguay	600	2	0.3	10	1.7
Peru	1,800	7	0.4	30	1.7
Venezuela	333	18	5.4	64	19.2

TABLE 2. Selected indicators related to childbirth, selected countries in the Americas, 1995–2000.

Country	Annual mean number of births 1995–2000 (1,000s)	Institutional or trained attendant deliveries, 1996 (%)	Cesarean section rates by institutional or trained attendants (%)	
			All hospitals	Year
			Argentina	714
Bolivia	262	28	15.8	1997
Brazil	3,210	92	32.0	1994
Chile	292	100	40	1994
Colombia	873	96	...	...
Costa Rica	87	97	20.8	1993
Cuba	145	100	23.0	1997
Dominican Republic	197	95	25.9	1996
Ecuador	309	59	26.3	1996
El Salvador	167	67	22.1	1996
Guatemala	405	35	...	...
Haiti	255	46	...	...
Honduras	203	54	...	...
Mexico	2,338	84	31.3	1995
Panama	62	89	20.5	1996
Paraguay	162	36	20.7	1997
Peru	613	56	...	...
Uruguay	54	99	21.9	1996
Venezuela	572	95	21.0	1995

Source: Adapted from Belizan JM, Althabe F, Barros F, Alexander S. Rates and implications of caesarean section in Latin America: ecological study. *Br Med J* 319:1397–1402; 1999.

TABLE 3. Basic demographic characteristics of the SABE survey sample, selected countries of the Americas, 2000.

Country	No.	60–74 years of age (%)	75 years and older (%)	Median age	Feminity index	Persons with low education <sup>a</sup> (%)		Persons currently married (%)	
						M	F	M	F
Argentina	1,043	72.4	27.6	70	162	63	74	75	43
Barbados	1,812	63.1	37.0	71	142	76	78	60	34
Brazil	2,143	46.8	53.2	68	139	84	90	74	36
Chile	1,306	66.1	33.9	70	192	62	73	70	29
Cuba	1,905	69.1	30.9	70	144	47	61	64	23
Mexico	1,247	75.9	24.1	68	129	75	80	76	39
Uruguay	1,450	69.9	30.1	70	176	67	73	72	35

<sup>a</sup>Defined as those with fewer than seven years of schooling.

Source: Pan American Health Organization. SABE Survey, 2000.

TABLE 4. Self-reported health status among persons age 60 years and older, selected countries of the Americas.

Country	Males				Females			
	Poor (%)	Fair (%)	Good (%)	Very good (excellent) (%)	Poor (%)	Fair (%)	Good (%)	Very good (excellent) (%)
Argentina <sup>a</sup>	3.9	24.6	45.7	25.9	6.3	32.5	45.2	16.0
Barbados <sup>a</sup>	5.0	37.7	37.9	19.4	5.6	47.6	33.8	12.9
Brazil <sup>a</sup>	7.2	44.4	37.7	10.8	8.9	46.7	33.7	10.7
Chile <sup>a</sup>	18.1	39.7	32.8	9.4	23.2	44.9	27.3	4.6
Cuba <sup>a</sup>	9.7	45.1	38.9	6.3	15.3	53.1	26.7	4.9
Mexico <sup>a</sup>	19.6	47.0	27.8	5.6	22.6	48.5	24.8	4.1
Uruguay <sup>a</sup>	4.2	26.8	50.1	18.9	8.5	34.9	40.6	16.1
United States (Blacks) <sup>b</sup>	12.6	22.5	30.6	34.3	12.0	22.7	33.1	32.2
United States (Blacks) <sup>c</sup>	20.4	30.0	28.0	21.6	19.7	29.7	27.6	22.9
United States (Whites) <sup>b</sup>	7.7	12.3	28.8	51.2	6.7	14.3	25.8	54.6
United States (Whites) <sup>c</sup>	12.5	21.0	32.0	34.6	11.5	22.5	30.4	35.6

<sup>a</sup>Pan American Health Organization. SABE Survey, 2000.

<sup>b</sup>Smith and Kingston, 1997.

<sup>c</sup>Assets and Health Dynamics of the Elderly (AHEAD) survey.



TABLE 5. Prevalence of difficulties with activities of daily living (ADL) and instrumental activities of daily living (IADL), by sex and age groups, selected countries of the Americas, 2000.

Country	ADL				IADL			
	Males (%)	Females (%)	60–74 yrs	75 yrs of age	Males (%)	Females (%)	60–74 yrs	75 yrs of age
			of age (%)	and older (%)			of age (%)	age and older (%)
Argentina	12.9	20.3	12.9	29.6	9.6	22.2	11.9	32.1
Barbados	10.7	15.7	9.1	21.4	15.8	23.6	12.4	34.2
Brazil	14.9	22.3	15.5	32.3	18.3	32.4	19.3	52.1
Chile	14.2	22.5	13.9	30.7	14.5	24.8	10.9	42.1
Cuba	18.1	29.7	19.3	38.4	16.7	32.1	16.6	46.8
Mexico	16.4	21.6	14.2	35.8	14.7	29.0	15.1	47.1
Uruguay	10.9	21.0	13.4	26.4	7.8	16.4	8.8	23.8

Source: Pan American Health Organization. SABE Survey, 2000.

TABLE 6. Prevalence of selected chronic illnesses among persons age 60 years and older, selected countries of the Americas, 2000.

Country	One or more chronic illnesses	Arthropathies	Diabetes	Heart disease	Hypertension
	(%)	(%)	(%)	(%)	(%)
Argentina	80	53	12	20	49
Barbados	76	47	22	12	48
Brazil	76	33	18	21	53
Chile	80	32	13	34	52
Cuba	80	56	15	24	44
Mexico	68	24	21	10	43
Uruguay	77	48	14	24	45

Source: Pan American Health Organization. SABE Survey, 2000.

TABLE 7. Prevalence of cognitive impairment, by age group, selected countries, 2000.

Country	60–74 years (%)	75 years and over (%)	Total (%)
Argentina	2.75	18.25	7.02
Barbados	2.28	12.84	6.18
Brazil	8.02	29.67	12.80
Chile	6.84	23.48	12.48
Cuba	4.38	22.87	10.09

Source: Pan American Health Organization. SABE Survey, 2000.

TABLE 8. Breastfeeding initiation and median duration of breastfeeding, selected countries of the Americas.

Country	Year	Breastfeeding initiation (%)	Median duration of exclusive breastfeeding (months)	Median duration of any breastfeeding (months)
Bolivia	1998	96.6	2.3	17.5
Brazil	1996	92.5	1.1	7.0
Colombia	2000	95.5	0.7	13.1
Dominican Republic	1996	93.2	0.6	7.6
Ecuador	1999	97.0	2.2	15.5
El Salvador	1998	94.0	0.9	17.7
Guatemala	1998–1999	96.5	0.9	19.9
Honduras	1996	96.7	2.1	17.3
Nicaragua	1998	92.4	0.7	12.2
Paraguay	1998	94.2	Not reported	11.5
Peru	1996	96.8	2.7	19.5

TABLE 9. Mental health resources, by percentage of countries that have them available, Region of the Americas, 2001.

	Countries of the Americas (%)
Mental health policy	64.5
National mental health program	80.6
Community care in mental health	71.0
Mental health legislation	67.9
Disability benefits	87.1
Substance abuse policy	71.0
Therapeutic drug policy/list of essential drugs	86.7
Availability of three essential therapeutic psychotropic drugs (phenytoin, amitriptyline, and chlorpromazine) at the primary care level	90.0
Specified budget for mental health care	92.6
Training facilities for primary care personnel in mental health	41.9
Median number of psychiatric beds per 10,000 population	3.30
Mental health information system	67.7

Source: World Health Organization. *World Health Report 2001. Mental Health: New Knowledge, New Hope*. Geneva: WHO; 2001.

TABLE 10. Mortality attributable to smoking, by sex and subregion, Region of the Americas, 1990–1994 average deaths and 1985 deaths.

Region	Estimated number of deaths		Estimated percentage of total deaths				
	Average 1990–1994	1985	Average 1990–1994			1985 <sup>a</sup>	
	Total	Total	Males	Females	Total	Males	Females
Latin America	500,427	98,100	...	...	...	7.1	2.1
Andean Area	94,911	8,200	14.3	16.1	15.1	3.3	1.8
Brazil	205,438	32,400	19.0	18.5	18.8	7.5	2.3
Latin Caribbean	26,268	10,200	12.2	11.2	11.7	8.6	3.6
Central America	24,675	900	11.1	11.8	11.5	1.3	0.5
Southern Cone	108,701	32,100	26.7	24.7	25.9	12.4	1.8
Mexico	40,434	14,200	8.3	10.2	9.0	3.7	1.8
Caribbean	5,601	1,900	17.0	15.7	16.4	6.2	1.5
North America	565,527	426,100	24.4	22.5	23.5	19.9	9.5
Total	1,071,555	526,000	...	...	...	14.6	6.7

<sup>a</sup>Of total deaths recorded.

Source: Tobacco, Alcohol, and Drugs Unit, Mental Health Program, Pan American Health Organization.

TABLE 11. Tobacco consumption in the general population, by sex, selected countries in the Americas, by subregion, 1995–1999.

Country	Year of study	Age range	% started <18 years	Sex	Prevalence (%)			
					Lifetime	Last year	Current use	Ex-smokers
Andean Area								
Bolivia	1998	12–50	58.6	M	69.7	57.9	22.7	11.8
				W	43.2	27.8	18.1	15.4
				T	55.8	42.1	29.8	13.7
Colombia	1996–1998		16.7	M		29.0	26.8	
				W		14.2	11.3	
				T		21.3	18.9	
Peru	1997–1998	12–50	75.4	M	71.5	60.7	41.5	10.3
				W	51.6	33.4	15.7	17.4
				T	60.5	46.4	27.8	14.3
Ecuador	1995	12–49	75.0	T	51.6			
Caribbean								
Cuba	1995	15+		M			48.1	
				W			26.2	
				T			36.8	
Dominica				T	17.0			
Guyana				T	15.0			
Jamaica				T	14.0			
Saint Vincent and the Grenadines	1997	19–70		M	52.9		26.4	
				W	14.3		03.5	
				T	31.1		13.5	
Southern Cone								
Argentina	1999	16–64	54.6	M	76.7	51.1	46.8	25.6
				W	58.1	37.8	34.0	20.3
				T	67.0	44.2	40.1	22.8
Chile	1998	12–64	50.0	M	77.1	53.1	47.2	24.0
				W	67.5	41.9	35.5	25.6
				T	71.9	47.1	40.9	24.8
Uruguay	1999	12–70		M	71.0		38.0	33.0
				W	44.0		26.0	18.0
				T	57.0		32.0	25.0
Mexico and Central America								
Costa Rica	1995	12–70	77.6	M	53.5	29.6	28.6	23.9
				W	17.2	7.2	6.6	10.0
				T	35.3	18.4	17.6	16.9
Mexico	1998	12–64		T	42.6		27.7	14.8
North America								
Canada	1994–1999	12+	80.0	M			27.0	
				W			23.0	
				T	54.5	27.0	25.0	26.3
United States	1998	12+	16.1	M			29.7	
				W			25.7	
				T	69.7	30.6	27.7	39.1

Source: Pan American Health Organization; Mental Health Program; Tobacco, Alcohol, and Drugs Unit.

TABLE 12. Percentage of young people aged 13 to 15 exposed to various tobacco marketing situations, selected countries in Latin America and the Caribbean, 1999–2000.

Country	City	Have seen many anti-tobacco messages (%)	Have seen many messages promoting tobacco consumption (%)	Own some item related to tobacco advertising (%)	Have received an offer of free cigarettes from a tobacco company (%)
Latin America					
Argentina	Buenos Aires	16.9	47.0	18.3	10.4
Bolivia	Cochabamba	29.3	42.0	17.9	11.6
	La Paz	29.4	43.0	19.3	13.9
Chile	Santa Cruz	31.4	43.6	20.2	11.9
	Coquimbo	32.1	29.2	11.3	9.9
	Santiago	27.3	37.4	12.2	8.9
	Valparaíso-Viña	30.4	33.2	11.2	10.3
Costa Rica	Entire country	30.6	54.0	13.4	7.8
Mexico	Monterrey	48.0	52.0	25.7	12.1
Peru	Huancayo	43.1	14.7	12.0	11.7
	Lima	39.6	19.6	13.3	9.3
	Tarapoto	58.8	19.4	8.0	9.3
	Trujillo	47.4	15.8	11.3	10.0
Venezuela	Entire country	44.5	37.6	14.8	10.4
Caribbean					
Antigua and Barbuda	Entire country	37.1	18.3	15.0	11.5
Bahamas	Entire country	46.6	16.1	15.3	10.8
Barbados	Entire country	26.0	16.3	14.8	8.3
Dominica	Entire country	37.5	15.8	21.0	12.2
Grenada	Entire country	35.6	21.7	17.6	16.8
Guyana	Entire country	43.4	31.7	17.5	12.6
Jamaica	Entire country	38.5	16.9	13.7	8.6
Montserrat	Entire country	36.3	16.8	15.3	13.4
Suriname	Urban area	31.9	28.3	22.6	13.8
Trinidad and Tobago	Entire country	32.2	31.8	19.4	11.0

Source: Organización Mundial de la Salud. Encuesta mundial de tabaquismo en los jóvenes 1999–2000. Geneva: OMS. (Unpublished).

TABLE 13. Percentage of young people aged 13 to 15 years who are exposed to second-hand smoke, selected countries in Latin America and the Caribbean, 1999–2000.

Country	City	Percentage of young people exposed to smoke		
		At home	In public places	From their friends
Latin America				
Argentina	Buenos Aires	69.6	87.6	27.6
Bolivia	Cochabamba	43.3	61.4	16.6
	La Paz	40.3	61.0	18.3
Chile	Santa Cruz	56.3	65.2	16.6
	Coquimbo	53.6	68.3	37.7
	Santiago	61.3	71.9	37.5
	Valparaiso-Viña	57.3	67.5	37.6
Costa Rica	Entire country	33.5	56.6	....
Cuba	Entire country	67.6	64.6	15.9
Haiti	Entire country	32.8	47.3	11.3
Mexico	Monterrey	46.3	57.7	19.1
Peru	Huancayo	22.8	34.4	10.5
	Lima	31.1	45.2	17.2
	Tarapoto	34.2	41.7	11.4
	Trujillo	28.1	42.2	13.9
Venezuela	Entire country	42.4	45.6	8.8
Caribbean				
Antigua and Barbuda	Entire country	18.6	45.9	5.9
Bahamas	Entire country	28.9	51.4	6.7
Barbados	Entire country	22.9	51.5	6.8
Dominica	Entire country	28.1	58.8	12.8
Grenada	Entire country	34.7	48.3	8.1
Guyana	Entire country	34.3	62.3	5.5
Jamaica	Entire country	30.8	59.0	7.4
Montserrat	Entire country	20.1	44.9	3.0
Suriname	Urban area	57.2	69.0	8.3
Trinidad and Tobago	Entire country	38.0	67.5	7.6

Source: Global Youth Tobacco Survey 1999–2000.

TABLE 14. Recorded liters of per capita consumption of pure alcohol in the population aged 15 and older, Region of the Americas, 1996.

Country	Total	Beer	Liquor	Wine
Guyana	14.0	1.0	13.0	0.0
Bahamas	12.1	1.1	9.8	1.2
Paraguay	9.7	3.2	6.1	0.4
Argentina	9.6	2.1	0.4	7.1
Venezuela	9.4	5.8	3.5	0.1
United States	8.9	5.4	2.4	1.1
Netherlands Antilles	8.8	4.6	3.4	0.8
Barbados	8.4	2.8	5.1	0.5
Uruguay	8.2	1.8	1.3	5.1
Canada	7.5	4.2	2.1	1.2
Chile	7.1	2.4	2.0	2.7
Haiti	6.6	0.0	6.5	0.0
Colombia	6.4	4.3	2.1	0.0
Dominican Republic	5.9	2.1	3.7	0.1
Belize	5.8	2.6	3.1	0.1
Panama	5.7	3.4	2.2	0.1
Costa Rica	5.7	0.9	4.7	0.1
Brazil	5.6	3.0	2.3	0.3
Mexico	5.0	4.1	0.9	0.0
Suriname	4.7	3.1	1.6	0.0
Peru	4.0	1.6	2.2	0.2
Jamaica	3.9	1.8	2.1	0.0
Trinidad and Tobago	3.7	1.5	2.1	0.1
Cuba	3.5	1.0	2.3	0.2
Bolivia	3.3	1.7	1.6	0.0
El Salvador	2.5	1.3	1.2	0.0
Honduras	2.4	1.2	1.2	0.0
Nicaragua	2.3	0.5	1.8	0.0
Guatemala	2.0	0.8	1.2	0.0
Ecuador	1.7	0.6	0.9	0.1

Note: 0.0 means consumption <0.1.

Source: World Health Organization. *Global status report on alcohol, 1999*. Geneva: WHO; 1999. (WHO/HSC/SAB/99.11).

TABLE 15. DMFT index and percentage of decrease in 12-year-old children, countries of the Americas, 1980–2001.

Country	1980s	DMFT	1990s	DMFT	Decrease (%)	Compound percentage
<b>North America</b>						
Canada <sup>a</sup>	1982	3.2	1990	1.8	43.8	6.9
United States	1986–1987	1.8	1988–1991	1.4	21.8	7.9
Mexico	1987–1988	4.4 <sup>b</sup>	1997–1998	3.1 <sup>b,c</sup>	29.6	3.5
	1987	4.6 <sup>d,e</sup>	1996	2.5 <sup>e</sup>	45.7	6.5
<b>Central America</b>						
Belize	1989	6.0	1999	0.6	89.5	20.2
El Salvador	1989	5.1	2000	1.3	74.5	11.7
Honduras	1987	7.7	1997	4.0	48.4	6.4
Nicaragua	1983	6.9				
	1988	5.9				
	Late 1980	6.2	1997	2.8	1983–1997: 60.0	6.3
Costa Rica			1992	4.9	1988–1992: 42.2	12.8
	1988	8.4	1999	2.5	1988–1999: 72.5	10.6
Panama	1989	4.2	1997	3.6	13.3	1.8
<b>Andean Area</b>						
Venezuela	1981–1987	3.7	1997	2.1	42.2	4.13
Colombia	1977–1980	4.8	1998	2.3	52.1	3.7
Ecuador	1988	5.0 <sup>f</sup>	1996	2.9	40.5	5.9
Peru	1983–1988	4.8–7.0	1990	3.1 <sup>g</sup>	N.A. <sup>h</sup>	N.A.
Bolivia	1981	7.6	1995	4.6	39.3	3.5
Chile			1992	4.7		
			1996	4.1 <sup>i</sup>	1987–1996: 47.8	7.0
	1987	6.0 <sup>j</sup>	1996	3.1	1992–1996: 12.8	3.4
<b>Southern Cone and Northeast</b>						
Argentina	1987	3.4				
Uruguay	1983	8.5 <sup>k</sup>	1992	4.12		
	1983–1987	5.6–6.0 <sup>l</sup>	1999	2.5	1992–1999: 40.6	7.2
Paraguay	1983	5.9	1999	3.8	35.1	2.7
Brazil	1986	6.7 <sup>m</sup>	1996	3.1	1986–1996: 54.0	7.5
Suriname			1992	2.7		
Guyana	1983	2.7	1995	1.3	51.9	5.9
<b>Caribbean</b>						
Anguilla	1986	7.5	1991	2.5	66.7	19.7
Aruba			1990	2.9 <sup>n</sup>		
Bahamas	1981	1.6	1999–2000	1.6	2.5	0.1
Barbados	1983	4.4	1996	1.4 <sup>n</sup>		
Cuba	1984	3.9	1992	2.9	25.6	3.6
Curaçao			2001	0.8		
Dominica	1989	2.5	1995	2.0	20.0	3.65
Grenada			1991	5.5	1984–1991: –112	–10.2
	1984	2.6 <sup>o</sup>	2000	2.7	1991–2000: 50.9	7.6
Haiti	1983	3.2	2000	1.0 <sup>p</sup>		
Cayman Islands	1989–1990	4.6	1995	1.7	63.0	16.6
Jamaica	1984	6.7	1995	1.1	83.9	15.2



TABLE 15. (continued).

Country	1980s	DMFT	1990s	DMFT	Decrease (%)	Compound percentage
Dominican Republic	1986	6.0	1997	4.4	26.0	2.0
Saint Kitts and Nevis	1979–1980	5.5	1998	2.6 <sup>a</sup>	53.4	3.8
Trinidad and Tobago	1989	4.9	1998	5.2		

<sup>a</sup>Province of Ontario.<sup>b</sup>Mexico City.<sup>c</sup>Study of 60 people between the ages of 12 and 17, randomly selected or chosen from among those receiving dental services.<sup>d</sup>State of Mexico.<sup>e</sup>Data submitted to PAHO's Regional Oral Health Program. Some of these studies are in the process of publication.<sup>f</sup>Included children between the ages of 12 and 14.<sup>g</sup>Population 11 years old.<sup>h</sup>Percentages were not calculated because the age groups differed widely and it was impossible to corroborate the original report(s) or the data-banks.<sup>i</sup>Restricted to the Greater Metropolitan Santiago Area.<sup>j</sup>Includes only six regions of Chile.<sup>k</sup>Population between the ages of 13 and 19.<sup>l</sup>Range of values in three studies reported in 1992.<sup>m</sup>Urban population.<sup>n</sup>Data not published but reported in Adewakun, 1997.<sup>o</sup>Project HOPE, results reported in Adewakun, 1997.<sup>p</sup>The value corresponds to the average DMFS (surfaces). Using linear and curvilinear regression models (see Järvinen, 1983), the DMFT can be expected to be between 0.53 and 1.47.<sup>q</sup>Includes Saint Kitts only.

Source: PAHO/WHO Regional Oral Health Program, October 2001.

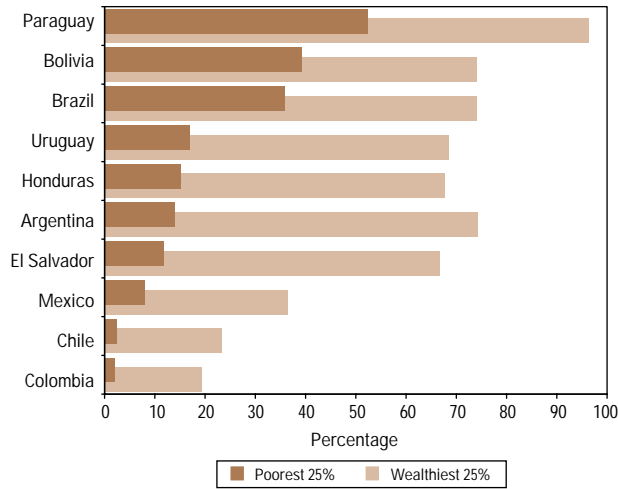
TABLE 16. Severity of dental caries and relative percentage of DMFT components in 12-year-old children, countries of the Americas with information available during the 1990s.

Country	Year or period	N	Severity of DMFT (Percentage of children by DMFT)				Percentages of DMFT in those with DMFT >0		
			0	1≤3	4≤6	≥7	% D/DMFT	% M/DMFT	% F/DMFT
Belize	1999		70.6	24.8	3.7	0.9	87.4	4.3	8.3
Bolivia	1995	389	12.3	30.1	29.0	28.5	90.3	3.6	6.1
Costa Rica <sup>a</sup>	1999	1,349	28.1	39.8	26.2	6.01	33.9	4.6	61.5
Ecuador	1996	500	22.4	41.2	26.2	10.2	84.6	6.6	8.8
United States <sup>b</sup>	1988–1991	176	50.1	32.6	16.3	1.1	27.0	1.3	71.4
Guyana	1995	547	45.0	44.2	9.70	1.1	76.9	22.5	0.64
Honduras	1997	307	11.7	35.8	34.2	18.2	92.1	1.8	6.1
Cayman Islands		154	39.6	44.2	11.7	4.5	50.9	0.5	48.6
Jamaica	1995	362	59.2	29.8	10.2	0.8	72.6	9.9	17.5
Nicaragua	1997	365	20.8	44.4	26.9	8.0	95.9	2.5	1.6
Panama	1997	149	22.1	30.2	30.9	16.8	80.4	10.1	9.5
Paraguay	1999	348	18.4	41.4	24.4	15.8	88.0	7.5	4.6
Dominican Republic	1997	192	13.5	35.0	28.0	24.0	94.0	3.0	3.0
Venezuela	1997	1,055	36.9	38.3	18.4	6.4	75.5	7.5	17.0

<sup>a</sup>Data reported to the Pan American Health Organization's Regional Oral Health Program; being published.<sup>b</sup>Percentages were taken from NHANES III, 1988–1991.

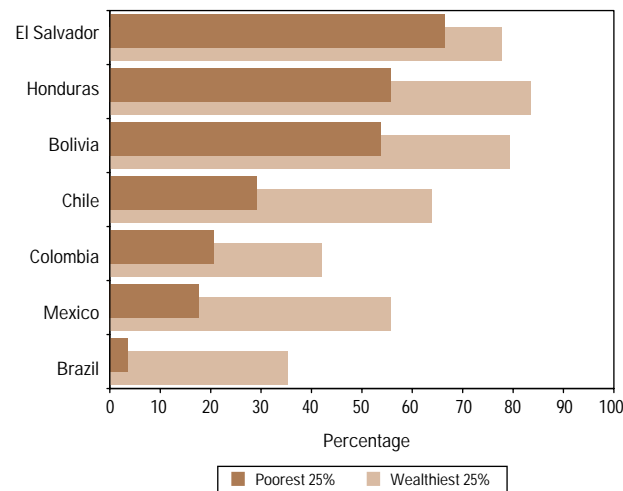
Source: PAHO/WHO Regional Oral Health Program, October 2001.

FIGURE 1. Disparities in access to sewerage services in children under 6 years old, by lowest and highest income quartiles, urban areas, selected countries, 1989–1991 and 1996–1998.



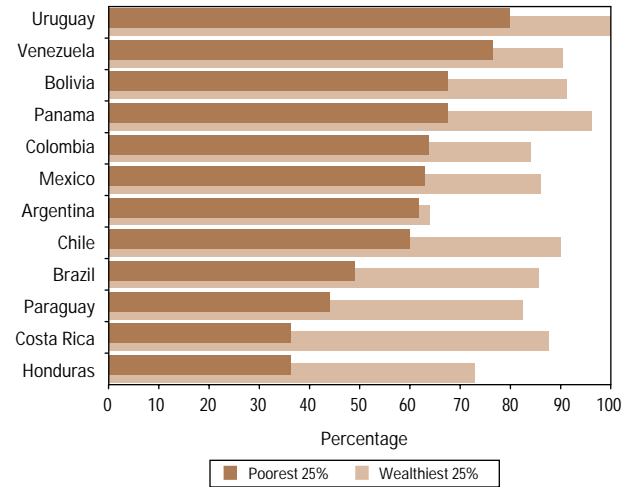
Source: Economic Commission for Latin America and the Caribbean. Social panorama of Latin America 1999–2000.

FIGURE 2. Disparities in access to drinking water in children under 6 years old, by lowest and highest quartiles, urban areas, selected countries, Region of the Americas, 1980–1990 and 1990–1999.



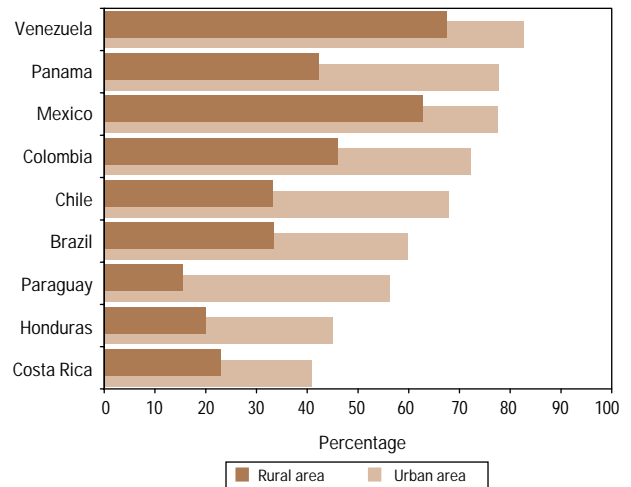
Source: Economic Commission for Latin America and the Caribbean. Social panorama of Latin America 1999–2000.

FIGURE 3. Percentage of children 5 years old who attend preschool in rural areas, by lowest and highest income quartiles, selected countries, Region of the Americas, 1994–1997.



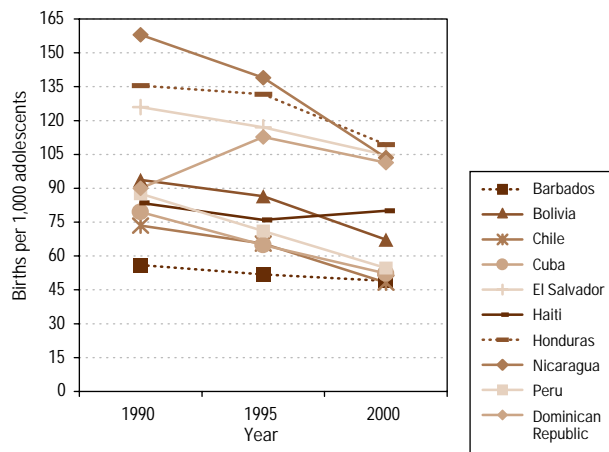
Source: Economic Commission for Latin America and the Caribbean, based on special tabulations of household surveys in the respective countries.

FIGURE 4. Percentage of children 5 years old who attend preschool in urban and rural areas, selected countries, Region of the Americas, 1994–1997.



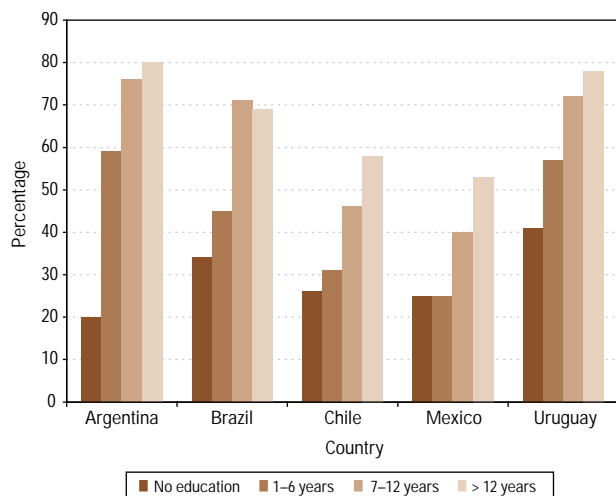
Source: Economic Commission for Latin America and the Caribbean, based on special tabulations of household surveys in the respective countries.

FIGURE 5. Fertility rate trends among adolescents aged 15 to 19 years old, selected countries of the Americas, 1990–2000.



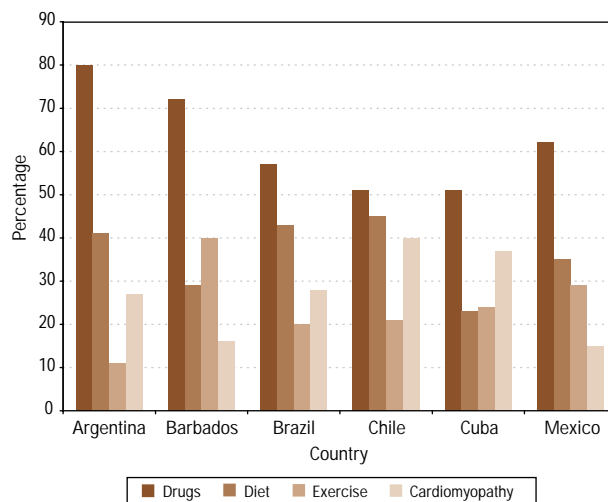
Source: Pan American Health Organization, Special Program for Health Analysis. Regional Core Health Data Initiative. Table generator system. Washington, DC: PAHO; 2001. Available at: [www.paho.org/english/sha/coredata/tabulator/newTabulator.htm](http://www.paho.org/english/sha/coredata/tabulator/newTabulator.htm).

FIGURE 6. Persons 60 years old and older who report good health, by education level, selected countries in Latin America, 2000.



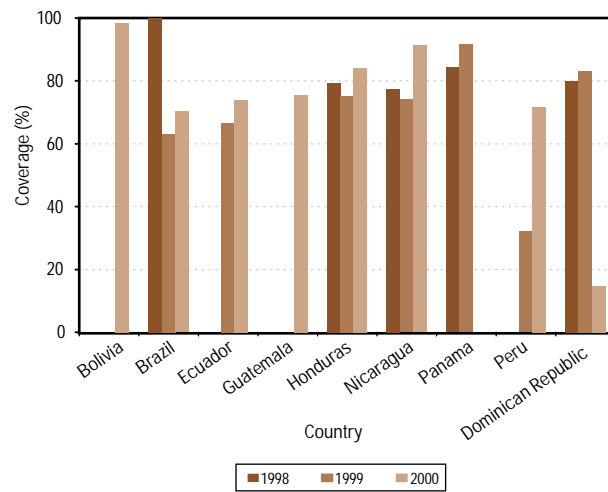
Source: Economic Commission for Latin America and the Caribbean, based on special tabulations of household surveys in the respective countries.

FIGURE 7. Prevalence of the use of exercise, diet, and medication to control hypertension, and prevalence of heart disease among hypertensives in persons 60 years old and older, selected countries, 2000.



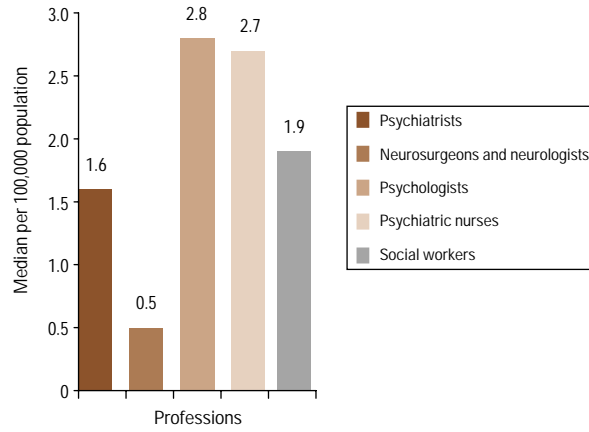
Source: Pan American Health Organization, SABE survey, 2000.

FIGURE 8. Vitamin A supplementation coverage among children 6–11 months of age, selected countries, 1998–2000.



Source: Pan American Health Organization. Promoting Health in the Americas. Annual Report of the Director, 2001. Washington, DC: PAHO; 2001. (Official Document 302).

FIGURE 9. Median number of professionals working in mental health, Region of the Americas, 2001.



Source: World Health Organization. *Atlas. Mental health resources in the world-2001*. Geneva: WHO; 2001.



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# V. THE ENVIRONMENT AND PUBLIC HEALTH

*Without knowledge about hygiene, without knowledge about sanitation, and without the means to use such knowledge, protecting the public's health is nothing but a myth.*

Dr. Aristides A. Moll,  
*Boletín de la Oficina Sanitaria Panamericana, 1929*

The health sector must watch over the physical and social environments and make every effort to ensure that they are safe. It also must guarantee that actions aimed at achieving sustainable human development are adequately evaluated, with due regard for any possible environmental and social repercussions on the population's health, especially that of the most vulnerable groups. To facilitate the health sector's work in this regard, the World Health Organization has proposed the DPSEEA, a model of environmental and health indicators (the acronym stands for "driving force," "pressure," "state," "exposure," "effect on human health," and "action"); the model identifies five cause-and-effect levels for establishing the relationship between environmental conditions and health. Use of DPSEEA will generate the necessary information to launch evidence-based activities designed to improve the relationship between the environment and healthy conditions; more specifically, it states that efforts to control "driving forces" and "pressures" that cause environmental degradation are the best course of action. This approach is the thread running through this chapter's various analytical aspects, which cover a description of the general context of the relationship between health and the environment, including shared aspects of the driving forces; the pressures and actions for the Region's most important environmental conditions during the last decade; and an analysis of the exposure, status, and specific effects of each priority environmental condition.

There are many different priorities in environmental conditions that call for analysis and action in the countries of the Americas—for example, quality of water and sanitation services, adequate solid waste management, housing conditions, short- and long-term consequences of chemical and physical environmental pollution, and working conditions. Table 1 summarizes

the potential relationship between exposure to environmental conditions and the effects on health.

Equity in terms of access to education, work, health, and political rights is essential for achieving sustainable human development, which means improved material conditions to meet the needs of current generations without endangering the possibility of meeting the needs of future generations.

To date, Latin America lacks coherent, integrated development policies that can strike a balance between development, health, and environmental objectives and the need to reduce social inequalities. This affects the overall health/disease process, because urban development is a "driving force" of environmental quality. For example, the demand for water and sanitation services is directly related to urban development, because it determines the extent and speed with which it is necessary to provide drinking water, connections to sewerage systems, and the means to dispose of solid waste. Furthermore, the differences between urban and rural access to these services generate inequalities in terms of exposure to environmental risk factors, particularly in Latin America and the Caribbean where urbanization is heterogeneous.

Other driving forces that are exerting intense pressure on health and the environment in the Americas include globalization, State reforms, privatization of services, job market characteristics, concentration of public and private services in cities, and the rural population's migration to urban areas, with a resulting unchecked urban growth and the creation of poor, marginalized human settlements with serious sanitation deficits. Poverty is, thus, a driving force that has a damaging effect on the population's health conditions. Section I of Agenda 21, which deals with "social and economic dimensions," stresses that eradicating poverty and safeguarding and promoting health are critical for

achieving sustainable human development (1). In addition, rapid and unregulated industrial growth is directly responsible for the environment's biological, physical, and chemical pollution, and is the reason for increases in transportation and energy consumption, as well as a growing generation of waste that is not properly disposed of. This prevailing situation in the Americas, combined with environmental effects attributable to climatic changes observed in recent years, is eroding environmental quality and, in turn, degrading the population's quality of life and health.

Between 1998 and 2000, the countries of the Americas held three fora to set guidelines for the institutional development of environmental health units within ministries of health. They acknowledged the need to set goals aimed at sustainable human development by establishing regulations and priorities to reduce risks associated with environmental conditions, and to promote universal coverage of water, sanitation, solid waste disposal, and other services. Health authorities also must monitor, set policies and standards, seek partners, promote human resource development, and take direct action. As a result of discussions in the health and environment ministerial fora in Central America (1996) and Canada (2001), the countries signed an agreement organizing their activities along five areas: intersectoral action, decentralization, information systems, social participation, and adherence to commitments made at international conferences. Reports from these meetings show that there is considerable interest in learning more about the potential relationship between health and the environment. This is obvious from studies conducted by various governmental and nongovernmental organizations on the population's exposure to environmental risks, as well as from actions taken to strengthen the capability of national health authorities to apply standards and regulations in this regard, including the establishing of systems to monitor environmental health and prevent and control adverse effects on health.

## WATER AND SANITATION

By the end of the second millennium, an evaluation of drinking water and sanitation services in the Region of the Americas was undertaken (Evaluation 2000) (1). The data presented in this section have been taken from that evaluation and correspond to 1998. Databases and national and regional reports produced within the framework of Evaluation 2000, as well as the complementary study of inequalities, are available on the website of PAHO's Pan American Center for Sanitary Engineering and Environmental Sciences ([www.cepis.ops-oms.org](http://www.cepis.ops-oms.org)).

### Drinking Water

In 1998, drinking water coverage in the Region of the Americas reached 90.3% (95.6% urban and 76.3% rural) and

84.6% in Latin America and the Caribbean (93.0% urban and 61.3% rural) had access to drinking water (Table 2).

In Latin America and the Caribbean, 74% of homes (366 million people) have drinking water household connections, supplied by systems that sometimes run intermittently. Although progress has been made in disinfecting water supply systems, many problems remain, such as scarcity of chlorine, insufficient funds, and inadequate operation and maintenance. Despite progress made in water service coverage, a large portion of the population still lives with health risks. In fact, 77 million people (15%) have no access to drinking water services, and an additional 54 million (11%) are served by what are known as "easy access" systems (Table 2).

Significant differences in access to drinking water between urban and rural areas of the countries of the Americas still remain (Table 3). In Latin America and the Caribbean, someone living in a rural area is six times as likely not to have access to drinking water services as someone living in an urban area (40% and 7%, respectively). Gaps in access to drinking water and sanitation also are shown by other quality of service indicators, such as service interruption and water quality monitoring. In Evaluation 2000, 33 countries reported on the continuity of their urban water supply system, and 16 of them reported that their services had interruptions. Central American countries and the Spanish-speaking countries of the Caribbean are the most affected. Interrupted service endangers public health and reflects the insufficient utilization of existing infrastructure. It also helps to deteriorate the image of the service and endangers its economic viability.

The study of inequities, which complements Evaluation 2000,<sup>1</sup> showed that it is the poorest families that spend proportionately more on these services. This is particularly so in urban areas, where the proportion spent on water by the poorest families is between 1.5 and 3.8 times the amount spent by wealthier families; the latter have better water coverage. What is more, urban populations with similar expenditure or income levels to rural populations have better access to water than the latter. In Peru, the poorest urban families have higher levels of household connection than even the rural families with the highest per capita spending.

### Wastewater and Excreta Disposal

In 1998, 86.9% of the Region had access to sanitation (93.6% urban and 69.1% rural) and 79.2% did in Latin America and the Caribbean (89.9% urban and 49.6% rural) (Table 2).

In Latin America and the Caribbean, 241 million people (49%) have household connections to conventional sewerage systems and 152 million (30%) are served by in situ sanitation systems,

<sup>1</sup>This population-wide complementary study was designed to document inequalities in water supply, use, and expenditure. The information was obtained from multi-purpose household surveys conducted between 1995 and 1999. The 11 countries included in the study were Bolivia, Brazil, Chile, Colombia, Ecuador, El Salvador, Jamaica, Nicaragua, Panama, Paraguay, and Peru.

such as septic tanks, and latrines. Despite this progress in sanitation service coverage, 103 million persons (21%) have no wastewater and sewage disposal systems, and only 14% of the wastewater collected by sewers is treated before being discharged. This poses a huge challenge in terms of sanitation and water resource contamination. What is more, urban-rural differentials in access to sanitation in the countries of the Americas are even more marked than differentials in access to water (see Table 3). In Latin America and the Caribbean, a rural resident is five times as likely not to have access to sanitation services as an urban resident (50% and 10%, respectively).

The governments' political support to the corresponding sectoral institutions, the population's awareness of sanitation issues, the methodologies and criteria used to finance wastewater treatment facilities, and the tailoring of environmental policies and appropriate technology and engineering standards for waste disposal are critical sanitation issues in the Region.

### Contamination of Water Resources

In 1998, Latin America and the Caribbean had an estimated annual 10,583 km<sup>3</sup> renewable internal water resources, representing 21,261 m<sup>3</sup> per capita (2). In this subregion, there are numerous water pollution problems. The main causes involve the concentration of human activities—60% of the population lives on 20% of the land that has only 5% of water resources—and the discharge of contaminated solid and liquid waste into rivers, lakes, and oceans. For example, Panama suffers from the cumulative and still growing effect of an agricultural and livestock farming approach that has destroyed much of the country's forests, depleted its water sources and soils, and polluted its rivers, lakes, and oceans.

### Effect of Natural Disasters on Water Services and Sanitation

One of the Region's worst disasters was caused by Hurricane Mitch in Central America in October 1998, which left more than 18,000 dead and missing persons and some two million homeless. The magnitude of the damage provided hard evidence of the devastation that natural disasters can inflict on water and sanitation systems and services, and how they harm health. In effect, about 2,000 water supply and sewerage systems were damaged in Central American cities and rural areas (Table 4). This situation went hand in hand with an increase in notified cases of cholera and leptospirosis, as well as cases of dengue and malaria in some endemic areas.

### Regulation of Water and Sanitation Services

Most of the Region's countries agree on the need to create environmental institutions, redefine the organization and opera-

tions of existing ones, and secure funds to protect the environment. In addition, legislation has been passed on the sustainable use of natural resources, protected areas have been established, and several countries have increased penalties for environmental violations. The countries also have issued regulations on the control of water, air, and noise pollution. Brazil played a leading role in creating environmental institutions (1999), establishing the organization and functions of the Ministry of the Environment and the Legal Amazonia and the Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA). Brazil also created (1999) the Ministry of Health's National Agency for Health Surveillance (ANVISA), which was given regulatory functions and control over different areas, including the environment; in 1997, the Commission on Sustainable Development Policies and Brazilian Agenda 21 (CSDP) also was set up. In Argentina (1999), the National Council for Sustainable Development (CONADESU) was established as a branch of the Secretariat of Natural Resources and Sustainable Development. Cuba (1999) created the Center for Environmental Inspection and Control (CICA), and Guatemala (1999), the Commission of Natural and Renewable Resources and the Environmental Control Unit, which is under the Ministry of Energy and Mines.

Panama created the National Authority for the Environment (1998) and the National Council for Sustainable Development (1999). The Dominican Republic set up the National Institute for Environmental Protection (1998). In Ecuador (1998), regulations governing the organization and functions of the Ministry of the Environment were approved and the structure and operations of the General Directorate of Humanitarian and Environmental Affairs (1998), which acts under the jurisdiction of the Ministry of Foreign Affairs, were amended. In Peru (1997), the National Council for the Environment (CONAMA) and the Regional Environmental Commissions (2000) were established; in Mexico (1999) the Metropolitan Environmental Commission for Sustainable Development was set up. In Nicaragua (1998), the Water Supply and Sanitation Company (ENACAL) was created, as was the Presidential Commission for the Reconstruction and Transformation of Nicaragua which has an environmental committee under it. In Canada, the Environmental Protection Act provides for the creation of a National Advisory Committee with representation from the provinces, territories, and indigenous peoples governments to advise on environmental regulations and emergencies (3).

At least three countries created special environmental funds: Cuba (1999) set up and issued regulations for the National Environmental Fund to expand financing resources and design projects for potential funding; the Guatemalan Environmental Fund (FOGUAMA) (1997) was set up as a branch of the National Commission for the Environment, whose purpose is to invest in different environmental spheres, including health; and in Peru (1997) the National Fund for the Environment (FONAM) was established.



In regards to the sustainable use of natural resources, Peru (2000) issued the Organic Law for the Sustainable Use of Natural Resources; the Dominican Republic (1997) regulated the functions of the Council for Provincial Development, with a view to implementing and controlling development and investment plans and programs. Ecuador (1998) approved regulations for the Law on the National Investment Promotion System, which cover environmental protection and the conservation of natural resources, among others. In Mexico (2000), regulations were issued on the granting of subsidies from the Environmental Institutional Development Program and general guidelines and strategies were established for the environmental development and management of natural resources by administrative entities of the Federal Government. In Canada the Environmental Protection Act also contains provisions applicable to sustainable development.

As part of its sustainable development policies, Barbados (1998) passed the Marine Pollution Control Act for the conservation and management of coastal resources, preservation of water quality, and conservation of beaches. Grenada (1998) issued the Law on Civil Liability for Oil Pollution Damage, in order to apply the provisions of the International Convention on Civil Liability for Oil Pollution Damage. Saint Vincent and the Grenadines (1999) introduced guidelines for developing the Mayreau environmental region through the participation of the Mayreau Environmental Development Organization (4). The United States (2001) enacted the Beaches Environmental Assessment and Coastal Health Act to protect the quality of the waters adjacent to beaches used for recreation, in order to safeguard the public against pathogenic agents and to apply criteria formulated by the Environmental Protection Agency (5).

Several of the Region's countries created protected areas, such as Brazil (1997), Bolivia (2000), Chile (1997), Cuba (1998), Ecuador (1997, 1998), Guatemala (1997), Honduras (1997), Mexico (1997, 1999), Nicaragua (1997), Panama (1997), Peru (1997), and Venezuela (1997, 1999). Peru introduced the National System for National Protected Areas, Bolivia issued regulations for the structure and operations of the National Service for Protected Areas, and Cuba did the same for its National System for Protected Areas. Panama (1997) issued provisions for the administration of the Panama Canal, one of which refers to environmental aspects.

The Region's countries also set standards for promoting environmental health, education, and citizen participation, as well as for the regulation of public-private environmental relations. In terms of environmental health promotion, Nicaragua (1998) passed the Law on Organization, Jurisdictions, and Procedures of the Executive Branch. This legislation reorganizes the responsibilities of the ministries, including those of the Ministry of Health, and stipulates that one of the functions of the Ministry of Health is to promote environment clean-up campaigns. Cuba (1999) created the Environmental Information, Management,

and Education Center. Brazil (1999 and 2000) issued provisions on environmental education, emphasizing the development of individual and community values, and launched the Brazilian Forum on Climate Change to mobilize society, pursuant to international commitments on the matter.

In the area of public-private relations, Colombia (2000) established procedures on selecting and contracting for drinking water supply and sewerage service providers, and Peru (1998) approved rules on the concession of health services negotiated by the municipalities and the private sector. In Costa Rica (1999), the National Council for Sustainable Development was created to coordinate the dialogue between the public and private sectors, and in Ecuador (1999) the principles governing environmental policy were laid down, including obligations and responsibilities of both sectors. In Belize (1997), the rules governing companies that provide health services require that companies be in compliance with environmental measures in force. Antigua and Barbuda (1997) issued regulations, within an environmental protection framework, governing private participation in water use and sand extraction. Saint Vincent and the Grenadines (1997) and Trinidad and Tobago (1999) followed suit, stipulating that the private sector must carry out its activities with due regard for protecting the environment.

In terms of environmental violations, Brazil (1998) prescribed criminal and administrative sanctions for behavior and activities that damage the environment. In Colombia (2000) and Ecuador (2000), provisions on violations to the environment and cultural heritage were added to the Criminal Code, and Cuba (1999) enforced stricter sanctions for infringing environmental provisions. In Canada, the Environmental Protection Act (2000) created new rights for civil society participation, which include strengthening the ability to bring suit for violating the Act's provisions and increasing the power of the courts to settle disputes arising from its application. The Law applies the "polluter pays" principle (3).

Also in relation to the criminal justice system, Mexico (1997, 1998, 1999) regulated inspections in the Federal District, such as inspections (2000) on environmental conservation, water, and sewerage set forth in the General Law on Ecological Balance. Mexico also created specialized offices for dealing with environmental crimes and set the operating bases of the National Service for the Inspection and Surveillance of Environment and Natural Resources of the Federal Prosecutor's Office for Environmental Protection. Honduras (1999) set up the Prosecutor's Office for the Environment and Natural Resources to represent the State in both fields. In Venezuela (2000), the Public Defenders' Office or Office of the Ombudsman was created for the promotion, defense, and inspection of the rights and guarantees set forth in the Constitution, which include rights and guarantees on environmental issues.

Several countries have issued regulations on drinking water and sewerage services, such as Bolivia (2000), Colombia (2000),

Mexico (1997 and 2000), Panama (1997), and Paraguay (2000). In Costa Rica (1997) and Peru (1997) drinking water quality regulations were approved, which in the case of Peru include guidelines on disinfection equipment (1997). Belize (2000), Costa Rica (1997), El Salvador (2000), and Honduras (1997) regulated the disposal and use of wastewater. In Nicaragua (1998), the Drinking Water and Sewerage Act was passed, and in Chile (1998) provisions on wastewater treatment were set. In the United States (2001), the Consolidated Appropriations Act amended the Water Pollution Control Act, so as to regulate the combined discharge of rainwater and sewerage at the municipal level. Many cities in the United States do not have separate systems for discharging rainwater and sewage, and when wastewater treatment plants are overloaded during torrential rains, both effluents are discharged together, polluting the environment (5).

### Potential Effect of Water and Sanitation on Health

Insufficient coverage of drinking water and disinfection of water supply systems, combined with limited sanitary surveillance, constantly lead to health problems that require medical treatment. There is a direct link between the lack of basic sanitation services and the prevalence of water borne diseases and other harmful effects on the population's health. Furthermore, there is an inverse relationship between infant mortality and access to potable water. Figure 1 shows the correlation between these variables in 40 countries and territories in the Region—a strong inverse correlation between water supply coverage and the infant mortality rate can clearly be seen. The regression coefficient suggests that, on average, for each percentage point increase in water supply coverage, one infant death would be avoided for every 1,000 live births.

Poorly managed water resources, including the discharge of wastewater, together with the limitations of the infrastructure for treating water for human consumption, are largely responsible for the deterioration in the quality of the water distributed to users. Evaluation 2000 showed that the disinfection infrastructure in some countries in the Region still has limitations: data provided by six of the countries report disinfection coverage between 20% and 60%. Proper water quality surveillance and control systems are limited in urban areas and virtually nonexistent in rural areas: only 52% of the urban population in the Region of the Americas has effective water quality surveillance systems, and the percentage of the urban population in the Region of the Americas with effective water quality surveillance systems is as low as 24% for Latin America and the Caribbean.

### Water and Sanitation in Sustainable Human Development

The importance of ensuring environmental health was recently stressed again at the First Meeting of Ministers of the

Environment of the Americas, held in Montreal, Canada, in March 2001. Participants acknowledged that the right to live in a dignified, healthy environment requires access to good quality water services and the proper management of excreta, wastewater, and solid waste. Limitations and inequities in these services prevent this right from being exercised. On the occasion of the 2001 World Water Day, the Secretary General of the United Nations declared: "Access to safe water is a fundamental human need and, therefore, a basic human right."

One of the trends observed in the Region is the decentralization of drinking water services and sanitation, which increasingly vests the responsibility for their management, operation, and maintenance in local levels. Another important trend involves the search for comprehensive water management, including the management of the different uses of water resources—water for human consumption, food safety, and the protection of ecosystems—to foster better handling of residual municipal and industrial water, risk options, use of agrochemicals and pesticides, and the availability and quality of water. These trends fall within sectoral reforms intended to improve the quality of services, cut costs, increase revenue, update technology, expand coverage, and foster well-informed and responsible participation by users, with an attitude consistent with the premises of sustainable human development.

### SOLID WASTE

According to the Diagnosis of the Status of Municipal Solid Waste Management in Latin America and the Caribbean, updated by IDB and PAHO in 1998 (6), coverage of solid waste collection services in the urban population exceeds 90% in Chile, Cuba, and Trinidad and Tobago; ranges between 70% and 90% in Antigua, Brazil, Mexico, Peru, Uruguay, and Venezuela; between 50% and 70% in Bolivia, Costa Rica, Dominica, and Grenada; and is below 50% in Haiti, Honduras, and Paraguay.

The huge challenge municipal governments face in dealing with solid waste management is to find a suitable, sanitary, and environmental solution for the collection, transportation, treatment, and final disposal of the 360,000 tons of garbage produced each day in Latin America. This tonnage is the result of 20 years of urbanization, a process that has increased by 70% the size of the population needing adequate solid waste management services.

In large cities, access to garbage collection services averages 89%; in smaller ones, between 50% and 70%.<sup>2</sup> Improper final disposal of waste in open pits, mainly in mid-sized cities, results in the proliferation of rodents, insects, and other vectors that are harmful to the environment and to human health. The harmful

<sup>2</sup>Large cities are metropolises with more than 500,000 inhabitants, medium cities are those with 50,000 to 500,000 inhabitants, and small cities are ones with fewer than 50,000 inhabitants.

environmental consequences of the inadequate solid waste management in Latin America and the Caribbean include pollution of surface water, groundwater, and coastal waters, as well as atmospheric and soil pollution, sound pollution, and an esthetic degradation of the landscape.

There is little information available in Latin America and the Caribbean on municipal solid waste management, including that in hospitals. It has been acknowledged, however, that the treatment of hospital waste frequently is inadequate, incineration is limited and inefficient, and there are no landfills for the safe disposal of hazardous waste. Most countries do not even treat, sort, or recycle hospital waste.

It has been estimated that only 30% of solid waste is taken to sanitary landfills; the rest is thrown in dumps, watercourses, and pig farms. Small towns also face difficulties, in that operating a sanitary landfill is not profitable, considering the amount of garbage produced. With the increase in the population's size, the amount of garbage doubles every 15 to 20 years, and there is less biodegradable waste and more hazardous pollutants. Since the last decade, private participation in operating systems is being encouraged, as one way to solve this problem.

In some countries, many people live off what they collect from garbage dumps. An estimated 100,000 families survive by sorting garbage; this includes some 200,000 to 300,000 people, with children accounting for 10% to 30%. Many people can be seen eating from the dumps (6).

Solid waste sectoral analyses help to identify national projects that the sector is able to carry out (7–12). In general, feasible projects have three types of profile: 1) projects dealing with the sector's reform and institutional modernization, and governmental or private information and human resources projects; 2) infrastructure projects; and 3) sectoral investment plans. Project profiles offer ways to improve deficiencies; thus, their specificity depends on each country's situation. Between 1995 and 1996, solid waste sectoral analyses were undertaken in Colombia, Guatemala, Mexico, and Uruguay. Since 1997, other analyses were completed in Chile, Cuba, El Salvador, Mexico, Nicaragua, Panama, Paraguay, Peru, and Venezuela. In 2001, a process was introduced to conduct sectoral analyses in Ecuador and the Dominican Republic. In addition, a regional evaluation of municipal solid waste management began to be coordinated, which will use the same methodology used in Evaluation 2000 to analyze drinking water and sanitation services. Table 5 presents data obtained from sectoral studies on solid waste conducted since 1995.<sup>3</sup>

Alternative technologies for solid waste management are being successfully applied in Colombia and Peru, using manual sanitary landfills in areas with fewer than 40,000 inhabitants that

produce less than 20 tons of garbage a day. Cuba, El Salvador, Haiti, and Nicaragua also are working with manual landfills; in Bolivia, Colombia, Costa Rica, Ecuador, and Peru there are small firms and microenterprises that employ about 15 people each, which have incorporated as businesses to collect, transport, and dispose of garbage in low-income areas.

Cuba conducted a pilot project for the collection and final disposal of solid waste in three cities with fewer than 20,000 inhabitants, using low-cost technologies such as manual sweeping, collection and transportation using animal- or mechanical-drawn carts, and manual burial of waste. The success achieved of the last modality led Cuban authorities to broaden this practice to the country as a whole, as a definitive solution to the final disposal of waste in similarly sized cities: there are currently 173 manual technology sanitary landfills in use.

Few large cities have developed master plans for solid waste collection, and even fewer have financial plans. There also are few cities that use management indicators to monitor efficiency and take decisions, and many lack human resources, recycling, and community involvement programs. Small cities have no such plans at all, and the few national plans that exist lack priority and funds. Most mid-sized cities, and even more small ones, have no cost structure they can use to establish an accurate rate for services. Nonetheless, some countries are trying to issue regulations dealing with solid waste. Mexico (1997) set guidelines for the handling of office waste produced by the federal government, Jamaica (1998) and Saint Lucia (1997) issued regulations for overall solid waste disposal, Uruguay (1997) and Ecuador (1997) set standards for handling hospital solid waste, and Brazil (1999) regulated the transport, storage, commerce, and final disposal of waste. Peru (2000) enacted the Organic Solid Waste Act, which also regulates the handling of hazardous waste and provides for citizen participation in the process. In Cuba (2000), customs incentives were put in place to encourage the importation of waste processing equipment that reduces environmental pollution. In Belize (2000), the Department of the Environment analyzed a legislative proposal for handling hazardous waste.

The preparation of guidelines on how to draw up solid waste disposal plans for handling municipal solid waste in medium-sized cities and the creation of methodological guidelines for carrying out sectoral analyses of hospital waste and master plans for investment in municipal solid waste, such as those developed in Panama and Venezuela in 2001, also deserve mention.

In Argentina, the State association for the ecological coordination of the metropolitan area (CEAMSE) carries out collection programs for glass, aluminum, and paper in the metropolitan area—Buenos Aires and the city's suburbs—through the participation of public and private education institutions and neighborhood associations in sites where these materials are being recycled. Up to September 2000, 5,037 tons of glass, 1,577 tons of paper, and 29 tons of aluminum had been recycled (<http://www.ceamse.gov.ar/abre-recicla.html>).

<sup>3</sup>For further information on the final disposal of solid waste in some large Latin American cities, the reader can go to Pan American Health Organization. Volume I: *Health in the Americas*, 1998 Edition. Washington, DC; 1998; 253. (Scientific Publication 569).

The Pan-American Network for Waste Management (REPAMAR) is a regional initiative whose aim is to manage waste so as to contribute to sustainable human development from an environmental point of view. Several of the Region's countries participate in the initiative, which is supported by the German Technical Cooperation (GTZ). Within the network's framework, pilot projects were developed to reduce waste produced by the textile industry, tanneries, galvanoplasty, and fisheries, among others. REPAMAR also promoted the training of specialized staff in proper waste management, promoted waste reduction, encouraged the economic appraisal of waste, and fostered the formulation of anti-pollution regulations and policies aimed at regulating waste management.

Other activities in the Region that illustrate efforts to deal with solid waste with society's participation include the "No More Children in Garbage Dumps" campaign launched by "Lixo e Cidadania," a national coalition of institutions. In June 1999 the coalition set out to prevent 13,000 Brazilian children and adolescents from working in garbage dumps; it aims to remove an additional 16,000 children and adolescents from garbage dumps and from street recycling in 2001. The effort also involves giving these children and adolescents opportunities to study and develop physically, mentally, and culturally, and to respect their fundamental right to a happy, healthy life. In June 1999, the 18 institutions that comprised the coalition issued a challenge to all of Brazil's prefects to eradicate child labor involving garbage by the end of 2002. More than 1,700 municipalities heeded the call, and committed themselves to preventing young persons from working in garbage dumps and to incorporate them into society and the economy, while ensuring that garbage is properly treated and disposed of and that areas degraded by garbage are rehabilitated. Today, the coalition comprises 44 institutions; 8 coalitions operate in Alagoas, Ceará, Espírito Santo, Mato Grosso do Sul, Pernambuco, Rio de Janeiro, Rio Grande do Sul, and Roraima, and others are being created. The Federal Government increased its investment in solid waste projects, and rewards municipalities that commit to the program; in addition, recycling cooperatives are spreading across the country and becoming increasingly organized.

Another initiative worthy of mention is the work of ecoclubs. These innovative organizations bring together various community players, particularly young people, to sensitize the population to overall environmental issues. Ecoclubs started in Argentina in 1992, and began with groups of secondary school students who participated in a plan to productively utilize household solid waste. The project was carried out by the Faculty of Agrarian Sciences, the National University of Rosario, the Fundación del Sur, and the Center for Environmental Studies and Action. Ecoclubs originally consisted of 118 local groups, and by December 2000 they numbered 3,500; there are an additional 60 local groups in other countries in the Region, in which 1,500 young people from Bolivia, Brazil, Chile,

Costa Rica, Guatemala, Honduras, Panama, Paraguay, and Uruguay participate. The ecoclubs' achievements include a composting plant in Armstrong municipality, south of Santa Fe, Argentina, which creates internal oxygenation in the composting process with its chimneys; the composting plant in the city of Sunchales, north of the province of Santa Fe, Argentina, located some 5 km from the city's perimeter; the Las Trojas treatment plant in the city of Cañada de Gómez, in the south of the province of Santa Fe, Argentina, which treats organic waste from 60% of the urban area inhabited by some 35,000 people; and the worm farms and compost platform in the city of Marcos Juárez, Argentina, which receives and mixes organic residue with wood shavings and shapes them into blocks with machinery created by municipal staff.

## HOUSING AND HEALTH

Because people spend so much of their time at home, good environmental conditions in homes are as important for guaranteeing good health as is an adequate working environment. It is in dwellings where the provision of water and sanitation services converge, ideally including mechanisms for collecting wastewater and excreta and services for collecting household solid waste.

Substandard housings and surroundings are problems in the Region's countries, particularly in rural areas and impoverished urban areas, where the most vulnerable populations live, and in endemic areas for vector-borne diseases such as Chagas' disease, malaria, dengue, and yellow fever. Those populations also are exposed to gastrointestinal and infectious respiratory diseases.

Data on existing housing stock and housing conditions in Latin America come from census data and, hence, are not frequently updated. The most recent available data were published in Volume I of *Health in the Americas*, 1998 edition (page 220). Table 6 shows the number of available housing stock estimated for 2000 in Latin America and the Caribbean, according to the United Nations Habitat program.

Housing conditions can be considered as residents' agents for health or, conversely, as risk factors, depending on the quality and condition of a dwelling and how they affect its residents. In today's globalized world, poor urban dwellings often are used as places to ply a trade or provide services, especially for informal sector activities. The home is then transformed into a home-and-workshop or a home-and-business, posing new risk factors to occupants. Recent reports available in some countries provide up-to-date information on housing conditions. For instance, around 1998, Bolivia's National Housing Fund estimated that 40% of the population had no access to housing. The Fund also indicated that, despite its efforts to invest funds to build 35,000 homes, it was well below the target of building the necessary 200,000 homes a year to solve the housing deficit in terms of numbers, without counting the half million homes that need quality

improvements. In Costa Rica, housing sector authorities calculated a housing shortfall of 158,000 units in 1990, which rose to 160,000 units in 1994. Nationwide, some 75% of urban dwellings and 60% of rural ones are considered to be good, more than 91% of urban homes and 74% of rural homes have basic services, and overcrowding in rural areas is more than twice as common as in urban areas, 11% and 5%, respectively. In Ecuador the accumulated deficit, both quantitative and qualitative, was calculated at a little over one million housing units in 2000; 27,000 families a year seek alternative work in the informal sector and an estimated 60% of the country's dwellings have been built in that sector.

Since the Inter-American Network of Health in Housing Centers was set up in 1995, centers in 12 countries have joined the network and carry out sustainable housing activities through technical cooperation among countries projects. Centers in Venezuela (1996), Ecuador (1998), Peru (1999), El Salvador, and Haiti (2000) recently have joined the network.

## PESTICIDES AND OTHER POLLUTANTS

### Chemical Risks

Production processes, including extraction of raw materials, product manufacture and consumption, the elimination of household and industrial waste, and the indiscriminate use of pesticides in agricultural and forestry production, are direct and indirect causes of chemical and physical risks to the population. People living in poor sections of large cities are generally the most vulnerable and the most exposed to environmental pollution. Environmental pollution also directly affects agricultural workers and populations living near agricultural lands, and indirectly affects the overall population.

There are many different chemical substances with varying toxicities used in Latin America, which means that great care must be taken in the subregion to prevent contamination by those substances. According to the United Nations Environmental Program (UNEP), Brazil is one of four countries in the world that use most agricultural chemicals. In 1997, 2.33 kg of active ingredient per hectare were used; in the same year, most agricultural chemicals were used in the country's south and southeast; 33% of the total was used in the state of São Paulo. In 1998, 117,000 tons of active ingredients were used, at a cost of US\$ 2.2 billion.

Available data on chemical substances and their effect on health and the environment for Latin America and the Caribbean do not tell the whole story. Without a harmonized system for registering cases, whether in ministries of health or in toxicological information centers, it is difficult to get reliable statistics of cases of occupational poisoning for the subregion. The number of consultations in the Region's 100 toxicological information and advice centers—which operate in most of the countries and whose main function is to provide information and advice on toxic com-

pound problems—reflects the scant information available in the health services. Although this indicator has limitations, records show that between 1998 and 2000, 424,676 cases were seen in 52 centers (14 in Argentina, 32 in Brazil, and 1 center each in Chile, Costa Rica, Cuba, Guatemala, Peru, and Uruguay).

Despite limitations, some progress has been made with such projects as PLAGSALUD in Central America, including setting up surveillance systems for pesticide poisoning and the integration of toxicological information centers into national and regional networks. Brazil, which has the most toxicological centers in the Region, has been able to harmonize the reports of its 32 centers and of the National Information System on Toxicopharmacological Information; report data are published yearly. Similar progress has been made in Argentina through the Argentine Toxicology Network, and in Mexico with the Mexican Toxicological Network. In Colombia, despite the fact that the Cauca and Magdalena river basins are polluted by agrochemical waste, the effects of the pesticides used to eradicate illicit crops in the country's southeastern and southwestern departments have been insufficiently studied.

Chemical waste and hazardous solid waste are mostly produced by mining and petroleum extraction; agricultural activities that rely on agrochemicals; hospitals, health centers, and laboratories; and power plants and the manufacturing industry. Other hazardous chemical substances, mainly associated with inadequate handling of packaging and residues, erode the environment and cause health emergencies. For example, Brazil's Environmental Sanitation Technology Company, a PAHO/WHO Collaborating Center for chemical emergencies, handled 1,415 consultations for chemical accidents; Colombia's Center for Information on the Safety of Chemical Products handled 202 emergency calls related to chemical use and reported 85 emergencies involving the production, transport, and storage of chemicals.

Central America's situation regarding pesticides deserves mention. The isthmus is a predominantly agricultural and forested area spanning 0.5 million km<sup>2</sup> (40% of them arable); its geology, topography, climate, and soil come together to produce an ecological diversity ideal for farming various crops, which are associated with specific plague species and, in turn, specific insecticides, fungicides, nematicides, herbicides, and other pesticides.

Central American countries are some of the leading importers of pesticides: in 2000, the subregion imported some 1.5 kg of pesticides per inhabitant per year, a quantity 2.5 times greater than the world average estimated by WHO. Moreover, pesticide imports in Central America have risen dramatically: between 1992 and 1998, imports tripled, from 15,000 to 41,000 metric tons. Adding to the potential harm to health is the fact that the use of roughly 35% of imported pesticides is restricted in exporting countries. And, although 107 pesticides have been banned in the subregion, the ban does not cover every pesticide in every country. Only six products are banned in all the countries: 2,4,5-trichlorophenoxyacetic acid (2,4,5-T), aldrin, chlordane, diel-

drin, heptachlorine, and toxaphene. This highlights the lack of rigorous regulatory control over pesticide use in the subregion. It is telling that the increase in the volume of pesticide imports was accompanied by a proportional increase in the incidence of pesticide poisonings (Figure 2).

The most widely used pesticides in Central America between 1992 and 1998 were organophosphates, dithiocarbamates, and pyrethroids. The use of organophosphates, the group responsible for most of the pesticide poisonings in the subregion, has tripled, reaching 7,400 metric tons a year in 1998, compared to 2,000 tons per year of dithiocarbamates. The use of pyrethroids has increased since 1996. Other important chemical groups are the bipyridyliums, whose consumption quadrupled to 1,600 tons a year; carbamates, phenoxyacetics, and thiazine and organochlorine derivatives. Pesticides have mainly been used as fungicides (around 15,000 metric tons per year), herbicides (around 14,000 tons per year), and insecticides (10,000 tons per year).

Although other chemical risk factors to the environment have been acknowledged in the Region, such as persistent organic pollutants and mercury (Hg), there are few comprehensive interventions and scant systematic information on these environmental health aspects. DDT deserves mention among persistent organic pollutants released into the environment by human activities. It is thought that there are extensive areas of exposure to residual DDT, especially in Central America, Brazil, and Mexico. It also is known that certain mining activities, particularly panning for gold, are responsible for mercury pollution. Panning for gold is prevalent in the Amazon region and has recently been reported in Bolivia, Brazil, Colombia, Ecuador, Guyana, Nicaragua, Peru, Suriname, and Venezuela (13–16). Between 1997 and 2000, several studies documented chronic mercury poisoning from eating mercury-contaminated fish from riverside villages of the Amazonas region (17, 18), as well as the development of neurotoxicity (19). In Ecuador, mercury poisoning was reported in children working in the pottery industry (20).

### Air Pollution

Air quality in Latin American and Caribbean cities has worsened in the last few years. The main causes of this deterioration are demographic growth, lack of urban planning, an increase in vehicular traffic—especially diesel vehicles and old and poorly maintained ones—as well as the use of old technologies in industries. For example, in the metropolitan area of Santiago, Chile, vehicles, which doubled between 1990 and 1999, are responsible for 30% of emissions of particulate matter with a mass median aerodynamic diameter less than 10 micrometers ( $PM_{10}$ ) (excluding resuspended dust emissions), 92% of carbon monoxide emissions, 71% of oxides of nitrogen emissions, 46% of volatile organic compound emissions, and 15% of sulphur dioxide emissions (21). Concerned over global environmental prob-

lems associated with climate change, the depletion of the ozone layer, and cross-border pollution, the countries of the Americas have adhered to the international agreements and commitments based on Agenda 21, such as the Montreal Protocol (1987) on substances that deplete the ozone layer (22) and the Kyoto Protocol (1997) on the reduction of greenhouse gas emissions (23).

The most common air pollution problems in Latin American and Caribbean urban centers are high concentrations of particulate material and ozone. In small urban centers with large industries, such as foundries, the leading pollution problems are high concentrations of sulphur dioxide and particulate matter, which contains high levels of heavy metals such as cadmium, zinc, and lead. Furthermore, near highways with a heavy amount of automotive traffic, high levels of volatile organic compounds, lead, carbon monoxide, nitrogen oxides, and sulphur dioxide have been measured.

São Paulo, Santiago, and the Valley of Mexico—three cities with serious air quality problems—have been evaluating air pollution for several years. Data on peak hour ozone concentrations between 1995 and 2000 indicate that levels fell by roughly 20% between 1997 and 2000 in São Paulo. Moreover, although levels dropped from 403  $\mu\text{g}/\text{m}^3$  in 1997, to 326  $\mu\text{g}/\text{m}^3$  in 1999, and to 314  $\mu\text{g}/\text{m}^3$  in 2000, for 79 days in 1999 and for 65 days in 2000 levels exceeded Brazil's 160  $\mu\text{g}/\text{m}^3$  standard. In Santiago, maximum ozone concentrations varied from 439  $\mu\text{g}/\text{m}^3$  in 1995, to 306  $\mu\text{g}/\text{m}^3$  in 1996, and to 261  $\mu\text{g}/\text{m}^3$  in 2000; although between 1998 and 2000 peak ozone concentrations decreased by approximately 30%, they still exceeded Chile's 160  $\mu\text{g}/\text{m}^3$  standard for 145 days in 1999 and 151 days in 2000. In the Valley of Mexico, with the exception of measurements taken in 1999, maximum ozone concentrations fell by approximately 20% between 1995 and 2000, but were above the Mexican standard of 216  $\mu\text{g}/\text{m}^3$  for 277 days in 1999 and 323 days in 2000.

Data on the maximum concentrations of  $PM_{10}$  in a 24-hour period for 1995–2000, indicate that in São Paulo, except for measurements taken in 1998, levels ranged between 285  $\mu\text{g}/\text{m}^3$  in 1995 and 220  $\mu\text{g}/\text{m}^3$  in 2000; in Santiago, except for measurements taken in 1999, they ranged between 305  $\mu\text{g}/\text{m}^3$  in 1997 and 215  $\mu\text{g}/\text{m}^3$  in 1999, reaching 260  $\mu\text{g}/\text{m}^3$  in 2000. In the Valley of Mexico, except for measurements taken in 1999, levels rose from 250  $\mu\text{g}/\text{m}^3$  to 379  $\mu\text{g}/\text{m}^3$  in 2000. For the three cities, the maximum concentrations of  $PM_{10}$  in a 24-hour period were well above Brazil's, Chile's, and Mexico's standards of 150  $\mu\text{g}/\text{m}^3$ . The annual average concentrations of  $PM_{10}$  between 1995 and 2000 also were above Brazil's and Mexico's standards of 50  $\mu\text{g}/\text{m}^3$ . In the Valley of Mexico and in São Paulo, the annual averages of  $PM_{10}$  were approximately between 50  $\mu\text{g}/\text{m}^3$  and 80  $\mu\text{g}/\text{m}^3$ , while in Santiago they were between 70  $\mu\text{g}/\text{m}^3$  and 90  $\mu\text{g}/\text{m}^3$ . However, the annual average concentrations of  $PM_{10}$  in Santiago dropped between 1989 and 1999, mainly due to a reduction in the concentration of fine  $PM_{10}$  particles (24).

Air pollution also is a serious problem in other cities of the Region. For example, in 1999, Guadalajara and Monterrey exceeded Mexico's ozone standard for 59 and 12 days, respectively; furthermore, annual average concentrations of  $PM_{10}$  were approximately  $60 \mu\text{g}/\text{m}^3$ . Figure 3 shows the high concentrations of  $PM_{10}$  that have been measured in several Latin American and Caribbean urban centers: in 1998, average annual levels of  $PM_{10}$  in Bogotá, San José, Havana, Quito, El Salvador, Guatemala, Tegucigalpa, Managua, and Panama ranged between  $60 \mu\text{g}/\text{m}^3$  and  $160 \mu\text{g}/\text{m}^3$ . In Lima, annual average concentrations of total suspended particles far exceeded the  $75 \mu\text{g}/\text{m}^3$  standard for total suspended particles set in several Latin American countries (25). For example, between 1996 and 2000, annual concentrations of total suspended particles dropped from  $280 \mu\text{g}/\text{m}^3$  to  $214 \mu\text{g}/\text{m}^3$ . In small urban centers with large industries, sulphur dioxide concentrations far exceeded the European Union guidelines of  $350 \mu\text{g}/\text{m}^3$  per hour. In Ilo, Peru, a large copper foundry emits sulphur dioxide over  $2,000 \mu\text{g}/\text{m}^3$  per hour (26).

Noise and indoor air pollution also pose serious problems in the Region, particularly due to poor housing and work conditions. Residents of large urban centers are increasingly exposed to automotive- and air-traffic noise, as well as risks posed by construction, public works, and neighborhood projects. The main indoor air pollution problems include the presence of tobacco, the use of biomass for cooking and heating, the "sick building syndrome," and the indiscriminate use of chemicals. Surveillance programs are still limited, and basically respond to community complaints. Specific effects of urban noise on health include interference in communication, loss of hearing, sleep disorders, cardiovascular and psychophysiological problems, diminished performance, and discomfort and stress in social interactions. In July 2001, Peru's Ministry of Transport, Housing, and Communication set and published the maximum allowable limits for sound emissions from automotive vehicles in the National Regulation on Vehicles (Supreme Decree N° 034-2001-MTC).

In terms of indoor pollution in Latin America and the Caribbean, exposure to particulate matter inside the home has serious repercussions on the health of the most socioeconomically deprived populations. This group tends to cook mostly with biomass fuels and to heat their homes with open hearths or inefficient clay or metal stoves. Moreover, they usually live in inadequate conditions associated with poverty and in poorly ventilated houses; cultural habits may also play a role. The leading indoor pollutants are  $PM_{10}$  (in particular,  $PM_{2.5}$ ), carbon monoxide, nitrogen oxides, formaldehyde, and polycyclic organic compounds (27).

Efforts to deal with indoor pollution include promoting the use of grills for cooking; these devices have a combustion chamber, and they enable cooking smoke to be dissipated outside the home. In addition, residents are encouraged to switch to biogas or solar energy as alternative fuels. A study conducted in a rural community in Guatemala (28) showed significant differences in the average concentration of fine particulate matter ( $PM_{2.5}$ ) in a

24-hour period between 17 homes that used open-hearth furnaces for cooking and heating ( $868 \mu\text{g}/\text{m}^3$ ) and 26 homes that used grills for cooking ( $152 \mu\text{g}/\text{m}^3$ ). Indoor pollution has yet to be dealt with in a comprehensive and organized manner, or on the right scale, to be able to promote effective changes in housing design in underprivileged areas, use of different technology for building them, reliance on alternative energy sources, or changing the behavior or health habits of residents.

Many sources of exposure to lead have been documented in the Region, such as mines and foundries. In the Americas, lead mines are found in Argentina, Canada, Mexico, Peru, and the United States; these countries, as do five others, also have primary and secondary foundries. Lead in gasoline is another exposure source, especially in urban areas where traffic is heavy. Other sources of lead in the Region are associated with paints, battery recycling, glazed ceramics, and certain contaminated water sources.

Several countries in the Region have studied lead levels in children, which are the most vulnerable group, given that their propensity for putting things in their mouths puts them at higher risk of ingesting lead (29). Among studies reviewed and presented at a meeting of experts organized by CEPIS (Peru, 2001), average blood lead levels ranged from  $0.80 \mu\text{g}/\text{dl}$  to  $40.9 \mu\text{g}/\text{dl}$ , with the highest average values corresponding to the group exposed to glazed ceramics. Although this review does not fully represent the lead problem in children in the Americas, it does point to the need to identify the groups with high lead levels and to develop interventions to reduce exposure to lead and its adverse effects. Table 7 shows the results of several prevalence studies in the Region's countries designed to determine lead levels in blood (30). Between 1988 and 1998 in Mexico City, annual concentrations of lead in the air dropped from around  $2 \mu\text{g}/\text{m}^3$  to less than  $0.5 \mu\text{g}/\text{m}^3$ . In Panama in 1999, lead levels in the air exceeded the United States Environmental Protection Agency's recommendation of  $1.45 \mu\text{g}/\text{cm}^3$  by 250%. In a sample of 20 children under 12 years old in that country's San Miguelito area, an urban area with high pollution levels, the average lead level in blood was  $21.43 \text{ mg}/\text{dl}$ , which is significantly higher than the  $10 \text{ mg}/\text{dl}$  allowed by WHO.

In 2000, all the Region's countries had lead elimination programs, and 15 had totally eliminated lead. However, according to data from the Pan American Center for Human Ecology and Health (ECO) and the Pan American Center for Sanitary Engineering and Environmental Sciences (CEPIS), 22 countries from the Americas still have no legislation dealing with lead in the air, and only seven have air quality regulations on lead content. Moreover, 11 countries have already introduced national regulations on indoor air quality; there are cities in 13 countries where air quality sampling activities have been put in place and in 14 countries emission inventories have been produced, although they are not updated on a regular basis, nor is the impact of the measures for controlling environmental pollution systematically evaluated (31).

### Air Monitoring Systems

Several Latin American and Caribbean cities are setting up systems to monitor indoor air quality. Results of a survey on the status of Latin American and Caribbean programs dealing with air quality and health, which CEPIS conducted in 1999, showed that cities in 13 countries monitored the most common air pollutants (total suspended particles,  $PM_{10}$ , lead, sulphur dioxide, carbon monoxide, nitrogen oxides, ozone), but only in four countries had cities set up a program that would protect air quality and ensure the quality of data.

The cities that have the most experience in monitoring air quality in Latin America are Mexico City, Santiago, and São Paulo. In Mexico City, the monitoring system has continually measured air quality since 1986. The system has three networks: the Automatic Network, with 32 stations that record concentrations of ozone, nitrogen dioxide, carbon monoxide, sulfur dioxide, and  $PM_{10}$ ; the Manual Network, with 13 stations that register total suspended particles,  $PM_{10}$ , and lead; and the Atmospheric Deposits Network, with 16 stations that collect information on rainwater characteristics. Currently, the monitoring system falls under the Federal District Government. The information gathered is disseminated every hour to the media, and a metropolitan air quality index is used to facilitate the population's interpretation of the information.

In Santiago, the air quality monitoring system is integrated by the Automatic Atmospheric Pollution and Meteorological Variables Monitoring Network, which began operations in 1988 and now has eight stations; it falls under the Metropolitan Environmental Health Service. The network measures carbon monoxide, ozone, sulphur dioxide, nitrogen oxides,  $PM_{10}$ , and particulate matters under 2.5 microns in diameter ( $PM_{2.5}$ ). Data from the stations is automatically transferred to a central station that estimates air quality indices from gases and particulate matter. Santiago also has a Surveillance Network, a manual network that gathers data from total suspended particulate matter, nitrogen dioxide, and sedimentary dust every four days.

São Paulo's monitoring system consists of an automatic network that has been operating since 1981 and has 23 stations in São Paulo's Metropolitan Region and 6 in the interior of the state. The stations measure  $PM_{10}$ , sulphur dioxide, nitrogen oxides, ozone, carbon monoxide, and non-methane hydrocarbons. There also is a manual network of 8 stations that measure sulphur dioxide and soot, 11 stations that measure suspended particles, and 1 station that measures  $PM_{2.5}$ ; every station takes measurements every six days. The institution responsible for the monitoring system is the Environmental Sanitation Technology Company (CETESB).

In Central America, the Pure Air Program was introduced in 1993, and is financed by the Swiss Agency for Development and Cooperation (SDC) and implemented by the Swiss Foundation for Technical Cooperation (Swisscontact). As part of the program, the Air Monitoring project promoted the introduction of air quality sampling systems in stations in Guatemala, Managua,

Panama, San José, San Salvador, and Tegucigalpa. The stations use passive methods to measure nitrogen dioxide and ozone; gravimetric methods for measuring total suspended particulates and  $PM_{10}$ ; and automatic methods for measuring carbon monoxide. Stations also analyze lead content in collected particle samples. A total of 35 stations are in operation: 7 each in Guatemala and Tegucigalpa, 6 each in Managua and San José, 5 in San Salvador, and 4 in Panama.

Since December 1998, the Clean Air Initiative for Latin American cities has promoted action plans to improve air quality in the subregion's large urban centers and has fostered the creation of knowledge sharing networks among the countries of the Region that can organize workshops, distance education courses, and information sharing through the Internet. The initiative's Steering Committee is composed of members of local governments, private sector companies, international development and technical cooperation agencies, foundations, nongovernmental organizations, and academic institutions. Buenos Aires, Mexico City, Lima-Callao, Rio de Janeiro, Santiago, and São Paulo participate in the initiative. Lima and Rio de Janeiro are setting up automatic monitoring networks. In Lima, one of the five priorities of the action plan developed by the initiative's Management Committee includes setting up an air quality monitoring network. The network began with five automatic stations that measure carbon monoxide, nitrogen dioxide, ozone, sulphur dioxide,  $PM_{10}$ , and  $PM_{2.5}$ ; it will expand to 10 additional stations that will measure pollutants of concern in the area.

Other Latin American cities also have monitoring networks. Bogotá has a network run by the Technical Administrative Department of the Environment of the Santafé de Bogotá Mayor's Office, made up of 10 automatic stations that measure sulphur dioxide, nitrogen oxides, carbon monoxide, ozone, total suspended particles, and  $PM_{10}$ . Montevideo has a network operated by the Municipal Administration, which is composed of four manual stations that measure sulphur dioxide, nitrogen dioxide, carbon monoxide, total suspended particles, and soot. Havana has a network operated by the Center for Atmospheric Research and the Ministry of Public Health, which is composed of three manual stations that measure sulphur dioxide, nitrogen dioxide, and  $PM_{10}$ .

### Environmental Protection and Development in Regard to Pesticides and other Contaminants

The Central American ministers of health unanimously agreed, in a historic decision issued during the 16th RESSCAD (Tegucigalpa, September 2000), to restrict the use of the 12 pesticides responsible for most poisonings and deaths in the subregion (paraquat, monochrotophos, endosulphan, aluminum phosphide, chlorpyrifos, carbofuran, methylparathion, terbuphos, methomyl, methamidophos, ethoprophos, and aldicarb) and, in cooperation with each country's ministries of agriculture and of



the environment, to work toward banning the use of 107 pesticides that are still used in the Region, although there is a worldwide ban on their use. In 2000, the Central American countries had more than 150 local intersectoral pesticide commissions in place. These commissions have since been funded, and produce information on the methods and consequences of pesticide use. In many of these countries, such as Belize, Costa Rica, and Guatemala, commissions also provide local instruction and training and certify pesticide users.

These efforts have had remarkable success. For example, 30,000 agents have been trained in Guatemala (1998–2000); Honduras published a compendium of legislation on pesticide (2000); and Nicaragua banned the sale of 61 pesticides, with a consequent reduction in annual per capita use from 3.4 kg between 1980 and 1989 to 1.3 kg in 1999.

In September 2000, Mexico's and Central America's steering and operating committees of the comprehensive action program to gradually eliminate DDT and reduce its long-term exposure met together for the first time in Mexico. This high priority program is part of an effort to eradicate persistent organic pollutants worldwide and has been one of the first funded by the Global Environment Facility (GEF). Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama, and Mexico participate, and the program has been accepted by GEF, which has already released a portion of the requested funds. The US\$ 12 million project will last some three years. WHO, UNEP, and FAO also have offered to back the program.

In recent years considerable importance has been given to the creation and strengthening of toxicology networks, as a way to support environmental protection and development efforts. Recently created national toxicology networks are joining the Latin American and Caribbean Toxicology Network, which already includes toxicological centers and specialists from 21 countries. The network's objectives include increasing the sharing of information, harmonizing poisoning reports so that action can be based on evidence, standardizing laboratory techniques, and establishing treatment protocols for poisoning cases. The networks currently in operation are: Brazil's National Information System on Poisoning and Pharmacology, created in 1980; Argentina's Toxicology Network; Chile's Toxicological and Warning Network; Venezuela's Integrated Toxicology System; and Mexico's Toxicology Network. In addition, a toxicology section has been developed in BIREME's Virtual Health and Environment Library, which has facilitated users' access to bibliographic databases, directories of institutions and societies, journals, and full text documents (books and articles).

### **Regulating Pesticides and other Pollutants**

The most important features of the environmental policies carried out through sectoral legislation include environmental impact assessments and the handling of pesticides and other

hazardous substances. Brazil (1997), Peru (1997), Mexico (1997), and Costa Rica (1999) issued regulations on the environmental impact of infrastructure construction projects. Costa Rica included its regulations in the 1973 General Health Act and Mexico did the same for the Federal District (1997).

Argentina (1997), Cuba (2000), Ecuador (2000), and Guatemala (1999) consider the potential environmental impact in construction projects involving the transport of petroleum and its by-products; chemical, petrochemical, and nuclear power plants; and the production of carburated alcohol, respectively. Costa Rica (1998) also conducts environmental impact assessments in solid waste disposal projects. In Peru (1999), one set of regulations sets the parameters for conducting environmental impact assessments, and another establishes principles for ensuring the community's participation in the corresponding studies. Mexico (1997) established procedures so that businesses that work in the federal sphere can obtain an environmental permit. In Barbados (1998), the Coastal Zone Management Act laid down standards for conducting environmental impact assessments in projects liable to affect water quality and the conservation of coastal resources.

Several countries have issued provisions on the use of pesticides and for handling hazardous waste. Costa Rica (1998) regulates the use of persistent organic pollutants, Guatemala (1997) approved the compulsory COGUANOR regulations on the use of chemical fungicides in agriculture, and Peru (2000) issued new provisions for the registration and control of pesticides used in agriculture. Panama (1997) issued regulations for the law on pesticide and fertilizer control and regulated their use. In Saint Kitts and Nevis (1999), regulations covered such issues as the importation, manufacture, and transport of pesticides and other toxic substances and the creation of the Toxic Chemicals Control Board, whose members include nongovernmental organizations.

Nicaragua (1998) enacted the Basic Law for the Regulation and Control of Pesticides and Toxic, Hazardous, and other Similar Substances and passed its by-laws; the law covers the transportation of those substances. El Salvador issued provisions on environmental management and the international transport of hazardous waste; Ecuador (1998) created the National System for Handling Hazardous Chemicals and set up a committee to administer it. Costa Rica (1998) issued regulations on the maximum allowable levels of pesticide residue in vegetables and Brazil (2000) set standards on the surveillance and control of toxic substances used in agriculture and established shared functions in the ministries of health, of the environment, and of agriculture. Peru (2000) also amended its regulations on the registration and control of chemical pesticides for agricultural use. Uruguay (1997) issued a provision on chemical pollutants in containers or equipment that come in contact with food.

Costa Rica (1998) issued regulations for the registration and control of hazardous products and Panama (1998) applied similar regulations to hazardous waste. Paraguay (1997) banned the importation, storage, and use of hazardous or toxic industrial

waste, and Uruguay (1999) banned these substances' entry into the country. Canada (2000) established mechanisms in its Environmental Protection Act to identify the most hazardous substances with a view to banning them, and to promote efforts to prevent pollution. The Law also requires that industries provide information prior to manufacturing or importing new toxic substances and regulates the movement of hazardous waste. In Canada, hazardous waste regulation falls under provincial law, so the legal framework varies considerably from province to province. The Canadian Council of Ministers of Environment, led by the federal government and with provincial representation, issued guidelines for the treatment, storage, and final disposal of toxic substances (3).

In Peru (1997), regulations were approved governing the transport of hydrocarbons by pipeline; in Venezuela, legislation sets procedures for handling solid and semi-solid hazardous waste. In Guatemala (1997), the Sale of Hydrocarbons Act also contains environmental protection provisions; in Mexico (1999 and 2000), provisions were issued on the packaging and transport of flammable hazardous substances and waste. In Nicaragua (1998), regulations were issued on various aspects of hydrocarbon production, including environmental protection regulations. In regard to regulating oil production in the United States, the Chemical Safety Information, Site Security, and Fuels Regulatory Relief Act amended the Clean Air Act, in an endeavor to control information disseminated by the Environmental Protection Agency on the qualification of substances that, if accidentally released, could cause death or serious environmental damage when used as fuels, unless the combustion or explosion caused by them has adverse effects on health other than those caused by heat or the impact of the exposure (5).

As a way to add efficiency to the system of protection against hazardous substances or waste, some countries issued provisions on administrative matters and on sanctions. Argentina (1997) introduced the possibility of conducting preliminary investigations in the event of non-compliance. In Costa Rica (1999), amendments to the Criminal Code covered actions related to hazardous or toxic waste and substances that can seriously harm the public's health or the environment; Peru (1997) did likewise in terms of the illegal entry of hazardous substances into the country.

El Salvador (2000), Guatemala (1997), Honduras (2000), Mexico (1998 and 1999), Nicaragua (1997), and Venezuela (1998) issued regulations to control automobile emissions, and Argentina (1997), Ecuador (1997), and Jamaica (1997) regulated automobile emissions and noise. In Jamaica, provisions were included in the general regulations of the Road Traffic Act.

International policies mainly have sought mechanisms to implement Agenda 21, adopted at the 1992 United Nations Conference on Environment and Development, and have emphasized chemical safety and the rational environmental management of chemical substances. To that end, the Intergovernmental Forum on Chemical Safety (IFCS) was established within the framework of

the International Conference on Chemical Safety held in Stockholm, Sweden, in 1994. The Forum is designed to provide guidance on policy, emphasizing regional and subregional cooperation, for the management of chemical products and the prevention of pollution; it stresses the control of 12 persistent organic pollutants<sup>4</sup> whose importation, sale, and use must be banned, pursuant to the Agenda's precautionary principle. The Forum also must promote the adoption of the Globally Harmonized System for the Classification and Labeling of Chemicals (GHS) and the Convention on Persistent Organic Pollutants.<sup>5</sup>

In the subregional arena, the North American Commission for Environmental Cooperation, comprised of Canada, the United States, and Mexico, deals with chemical safety aspects. The Commission functions within the framework of the North American Agreement on Environmental Cooperation, a parallel agreement to the North American Free Trade Agreement (NAFTA). The Commission's Council on the Rational Management of Chemical Substances passed Resolution 95-05, designed to strengthen the fulfillment of commitments the States Parties have made on the rational management of chemical substances pursuant to Agenda 21 provisions and in response to recommendations of the Intergovernmental Forum on Chemical Substances. The Resolution created a working group on the sound management of chemicals to foster cooperation with the Commission, through regulatory and non-regulatory measures, in implementing decisions and commitments arising therefrom, with emphasis on Agenda 21.

Also with regard to chemical safety, MERCOSUR's executive body, the Common Market Group, issued several resolutions on the handling of chemicals, such as MERCOSUR's technical regulations on household disinfectants (pesticides) (1996). The Common Market Group also approved the MERCOSUR instructions for the control of highway transport of hazardous products (1997) and the MERCOSUR Framework Agreement on the Environment (2001), which promotes the compliance of MERCOSUR Member States with environmental international agreements to which they are a party, including Agenda 21's principles. Member States also committed themselves to further analyze the subregion's environmental problems, working with pertinent national bodies and civil society, and to harmonize environmental legislation and promote legal and institutional guidelines aimed at controlling and mitigating environmental consequences, especially in border areas. The Common Market Council approved (1997) the Fines and Sanctions System of the Agreement on the Transport of Hazardous Products issued at the

<sup>4</sup>Pesticides: DDT, aldrin, chlordane, dieldrin, endrin, heptachlorine, hexachlorobenzene, mirex, and toxaphene. Industrial chemicals: polychlorinated biphenyls (PCBs). Undesirable industrial by-products: polychlorinated dibenzodioxins and polychlorinated dibenzofurans (dioxins, furans), PCBs, HCBs, and DDT.

<sup>5</sup>Adopted during the Conference of Plenipotentiaries of the Stockholm Convention on Persistent Organic Pollutants (May 22 and 23, 2001, Stockholm, Sweden).

1994 MERCOSUR, and signed the Complement to the General Plan on Reciprocal Cooperation for Regional Safety on Illicit Environmental Activities entered into among MERCOSUR, Bolivia, and Chile (2000).

The Andean Community Commission approved Decision 436 (1998), Andean Standards for the Registration and Control of Chemical Pesticides for Agricultural Use, which aims at establishing harmonized procedures and requirements for their proper use, control, and management and at minimizing health and environmental damage. Within the Caribbean Community (CARICOM), “Program 8: Sustainable Development” was approved, establishing a sustainable development policy for the subregion and launching several projects, including providing support for the Working Group of the Secretariat for Sustainable Development to incorporate social and environmental factors in the CARICOM Secretariat’s policies.

## THE WORK ENVIRONMENT AND OCCUPATIONAL HEALTH SERVICES

Economic globalization, regional integration processes, liberalization, adjustment and privatization, and social policy reforms have accentuated changes in the labor profile and the working population, as well as in the nature of work risks and occupational morbidity and mortality. Legislative policies, programs, and mechanisms have evolved very differently from country to country and even within countries, which has led to inequities. Unfortunately, those changes have eroded the living and health conditions of the working population, have maintained or deepened poverty levels in the most of the Region’s countries, and have created even greater inequities. Furthermore, Latin America and the Caribbean’s 3.8% increase in GDP in 2000 (32) failed to raise the standard of living or improve the health indicators of most of the working population.

The factors leading to this situation include inequities in access to productive jobs and the erosion of social protection, poor job creation in the economy’s modern sector, a reduction of the State’s role as employer, stagnation of real salaries and overall income, and a higher proportion of employment in the informal sector. The structure of formal sector employment has experienced considerable privatization, with 95 out of every 100 job vacancies being offered in the private sector. Outsourcing has also increased: 83 out of every 100 new jobs created in the 1990s were in the service sector (trade, transportation, financial companies, and community and personal services) and the contribution job creation in goods producing sectors has diminished (33). In tandem with these trends, years of working life have extended at both ends—the numbers and proportion of working children and senior citizens are increasing.

The Region also suffers from the fact that it does not have enough experts, safety teams, monitoring teams, or inspectors,

and the enforcement of labor laws is less effective than in the more advanced countries (34). Despite the extent of the problem (35), not enough funds are allocated for health and occupational safety research in the Region; only an estimated 5% of occupational research projects are undertaken in developing countries (36).

### Employment in the Region

The labor force in Latin America and the Caribbean is one of the fastest growing in the world. In 1980, the economically active population consisted of 112 million workers; by 2000 it had almost doubled, to approximately 217 million (35). According to ECLAC, the economically active population is expected to reach 270 million workers in 2010, due to the annual incorporation of 5.3 million people into the workforce; the growth in the working age population will account for 80% of the increase in the regional economically active population between 2000 and 2010 (37). In contrast, the economically active population in North America for 2000 nears 150 million workers (16 million in Canada and 134 million in the United States).

Unemployment and underemployment are prevalent in Latin America. In 2000, the unemployment rate reached 8.7% (25); in other words, 19 million jobless persons (compared to 8.1% in 1999 and 4.0% in 1980). An estimated 20% to 40% of the population is underemployed, earning less than the cost of the basic food basket (38). This situation directly affects already high poverty levels and is detrimental to health.

As more and more jobs are taken in the informal sector, the quality of employment deteriorates. Data show an increase in employment in the informal sector—from 42.8% of the total working population in 1990 to 46.4% in 1999—with informal sector employment concentrated in urban areas. Regionwide, 84 out of every 100 new urban jobs are estimated to belong to the informal sector (39). In 1998, the informal sector accounted for 58.6% of the working population in Ecuador, 57.9% in Honduras, 57.0% in Bolivia, 53.7% in Peru, 49.7% in Brazil, 49.6% in Mexico, 49.3% in Argentina and Venezuela, 49.0% in Colombia, 45.4% in Costa Rica, 41.2% in Uruguay, 38.5% in Panama, and 37.5% in Chile.

In the Region, the number of hours worked per worker has stood at around 1,800 hours a year, and legal regulations set the working week at 44 to 48 hours. Latin American countries tend to reflect working patterns in the United States (1,966 hours per worker, per year) and Japan (1,889 hours a year). In Peru, however, the figure is in excess of 2,000 hours a year, while in Chile, Colombia, Costa Rica, Ecuador, and Nicaragua it is around 1,900 hours a year. No country in the Region comes close to the European average of 1,500 hours a year (33).

A longer working week implies longer exposure to potential risks than the typical 40-hour working week of the countries that developed those standards. Consequently, occupational exposure levels in Latin America and the Caribbean may well exceed safe levels (35).

### Trade Unions

The number of non-agricultural union members has fallen in the Region. Between 1985 and 1995, the percentage of non-agricultural workers belonging to unions dropped from 48% to 25% in Argentina, from 54% to 31% in Mexico, and from 26% to 15% in Venezuela. In the United States, the proportion of the workforce that belongs to trade unions also has diminished in the economy's leading sectors, with the exception of government. For example, the number of union members fell from 20.1% in 1983 to 13.5% in 2001 (40). Generally speaking, this decline can be attributed to systematic factors such as the shift from manufacturing to services jobs and from large factories to small shops. Given the current and historical importance of the role of unions in championing labor standards, the reduction in union membership may be detrimental for workers' health.

### Data Registration

There is very little information on occupational accidents and diseases in the Region. In Latin America and the Caribbean, only 1% to 5% of cases of occupational diseases were reported. One of the most serious problems in workers' health is that the under-diagnosis, under-registration, and under-reporting of labor morbidity and mortality do not give an accurate picture of traditional occupational health problems nor of newly emerging health problems associated with the use of new technologies, and even less so those associated with work. Moreover, they do not reflect the problems of workers not covered by social security, of working children, farm workers, or the unemployed.

A large proportion of Latin America's economically active population works in sectors that are not legally registered, and so there are few or no statistics on them. Under-registration of accidents and diseases also is rampant in companies and sectors that are required to report them (35). It is difficult to make comparisons among countries, because the information does not come from orderly national registration and reporting systems. In most countries, statistics refer only to the number of accidents for which compensation was paid out; in some, data refer to all accidents reported. And in some, data cover occupational accidents and diseases associated with travel between the worker's home and workplace.

Overall, inconsistencies between countries are more evident in the registration of non-fatal occupational accidents. These accidents will not be recorded if the registration system applies a narrow definition of what constitutes an occupational accident. Some reporting systems set a worker's loss of 24 hours of work or more as a standard for reporting an accident. Under-registration is aggravated by the difficulty of attributing occupational causes to several chronic diseases (35).

Shortcomings of systems for recording occupational diseases in the Region are exacerbated if exposure to occupational risks also is considered. Currently, there is enough knowledge about the

consequences to workers' health from exposure to various physical, chemical, biological, and psychosocial risks in the workplace and there is much exposure to such risks in Latin America; yet, judging by the working conditions described, there are no comprehensive occupational surveillance systems available for those occupational risks. On the rare occasions when epidemiological surveillance systems have been put in place, results have been extraordinary. For example, Costa Rica's province of Limón reported 1% of the country's cases of pesticide poisoning in 1992; after a surveillance system was established in 1996, as part of that sub-region's PLAGSALUD project, the province reported 52% of the country's occupational poisonings. Similarly, after a surveillance system on acute pesticide poisoning was established in the country's health services in 1994, the number of reported cases rose from 344 in 1995 to 563 in 1996. More recently, Chile's Ministry of Health, with support from other entities and advice from PAHO/WHO's Collaborating Center at Mount Sinai Medical Center and Queens College in New York (USA), set up an epidemiological surveillance system for fatal occupational accidents.

### Occupational Accidents and Diseases

According to the ILO and WHO, inadequate occupational safety conditions cause 250 million accidents and 160 million new cases of occupational diseases a year worldwide. If respiratory and cardiovascular diseases, cancer, hearing loss, musculoskeletal injuries, reproductive problems, and mental and neurological disorders are included, the number of work-related deaths reaches 1.2 million. Some 335,000 of those deaths were due to accidents at work, 12,000 of them in children and 100,000 due to asbestos poisoning. Fatal accidents in service activities have clearly risen, as a result of a shift of risky activities to contracting companies.

In less industrialized countries, the risk of having an accident or contracting a work-related disease is between 10 and 20 times higher than in more industrialized countries. In Latin America and the Caribbean, occupational risks are responsible for the loss of some 3.7 million disability adjusted life years (DALYs) (35). Occupational accidents and diseases harm persons and society at large, and also take a very high economic toll.

#### Fatal Accidents

Fatal accidents occur in connection with activities that are considered high risk, such as mining, construction, fisheries, and electrical work. Workers in these high-risk sectors are twice as

<sup>9</sup>The number of fatal and non-fatal occupational injuries and occupational diseases for all workers in Latin America and the Caribbean is calculated using the methodology suggested by Takala (1999), in which the fatality rate calculated for the insured population is applied to the entire workforce (202 million in 1998). This will probably give rise to a lower calculation than the real rate, because the fatality rate of the uninsured population is probably higher than that of the insured population.

likely to have accidents than other workers. For example, in Peru the average work accident mortality rate during the 1980s was estimated at 166 per 100,000 workers in the mining sector; between 1993 and 1996, the rate increased from 143 to 247 per 100,000 workers.

The average rate of occupational accidents, estimated using data from countries that include work-related traffic and occupational accidents in their statistics, is 13.5 per 100,000 workers, reaching 33 accidents per 100,000 workers in El Salvador in 1998. This translates into roughly 27,270 fatal occupational accidents a year in the Region.<sup>6</sup> This figure is more than three times higher than the 7,500 non-fatal accidents reported in official statistics of the Region's safety systems (35). If this data is compared to the average occupational fatality rate in wealthy countries (5.3 per 100,000 workers), the risk of having an occupational accident in Latin America and the Caribbean around 1998 was more than double. Therefore, if Latin American and Caribbean workers were exposed to the same risk of death from occupational diseases or accidents as workers in rich countries, 16,500 workers' deaths could have been prevented (35).

#### *Non-fatal Accidents*

In Latin America and the Caribbean, an estimated 20 to 27 million occupational accidents each year are responsible for three or more lost days of work (35). In the United States, there has been a notable drop in non-fatal accidents in every sector of the economy. The average rate of non-fatal accidents in that country in 1990 was 7.6 per 100,000 workers, dropping to 6.1 per 100,000 workers in 1998. In agriculture, hunting, forestry, and fisheries, the average drop between 1990 and 1998 was 30%; in the mining and building sectors it was 32%.

In Costa Rica, compensation was paid out for 124,290 cases of non-fatal occupational accidents in 1990; in 1996, the figure increased slightly to 127,619, followed by a drop to 120,195 in 1999. In Brazil, non-fatal accidents have steadily declined: the average rate of non-fatal accidents was 3,024 per 100,000 workers in 1990 and 1,427 in 1998. In absolute numbers, those rates translate into 688,210 non-fatal accidents in 1990 and 344,383 in 1998. El Salvador has experienced a steady drop in non-fatal accidents: 6,644 in 1990, 6,416 in 1996, and 4,629 in 1999. Non-fatal accidents have fluctuated in the Netherlands Antilles: in 1996, the number reported was 3,250, falling to 2,133 in 1997, and rising again to 2,569 in 1999.

### **The Most Vulnerable and Susceptible Population Groups**

The occupational risk profile is tied to differences in geography and in the availability of natural resources that, in turn, affect the nature and composition of economic activities. For example, primary resource extraction plays a relatively important role in the Region's economies, due to the abundance of such primary

materials as minerals. Geography, too, may favor the cultivation of specific products that may entail considerable occupational risks. High altitude, tropical climates, and geographical isolation may exacerbate the risk of contracting a given disease and the disease burden of certain conditions, thereby affecting some occupational risks.

#### *Working Women*

Over the last two decades, South America experienced the greatest increase in the percentage of working women, with figures rising from 26% to 45% between 1980 and 1997 (41). Between 1960 and 1990, the number of economically active women in Latin America rose from 18 million to 57 million, mostly women of childbearing age. According to the ILO, in Latin America average wages for women are 36% lower than for men (33). In industrial and service sectors, women's wages were, on average, 81% of men's wages in 1997. Colombia was the most equitable country in this regard, with women's wages being 95% of men's; Nicaragua was the least equitable, with women's wages being 67% of men's. Also in 1997, women in the manufacturing sector of Brazil earned only 54% of what men made; in the United States in 1998, women's wages were 76.3% of men's wages (42). Lastly, women experienced higher unemployment and inactivity rates (43). Unemployment among women (21%) doubles that of males (10.5%).

In the United States between 1993 and 1996, women sustained less than 10% of work-related accidents and about 30% of non-fatal accidents and diseases that required time off work. Of the 32,000 work-related deaths that occurred during that period, only 8% were in women, who accounted for almost 50% of the labor force. Women were more likely than men to be victims of violence in the workplace, however. Although women were victims of only one-third of the nearly 2 million incidents of violence reported by the United States Department of Justice in 1998, women accounted for 65% of the nearly 23,000 assault injuries reported (40). Women also accounted for 64% of all injuries due to repetitive movement that required time off of work, which were reported to the government in 1998. Women also accounted for 71% of cases of carpal tunnel syndrome reported in 1998.

#### *Working Children and Youths*

Work performed by children under 15 years old in any category (wage-earners, freelancers, unpaid family workers, etc.) has increased since the 1980s and the trend is likely to hold (44). ILO estimates that there are 250 million children between 5 and 14 years old who work in developing countries (140 million boys and 110 million girls) (45); 120 million work full time (46) and the rest work and go to school. Of these child laborers, 80 million are between 10 and 14 years old (20% of the world's children in that age group); they work in the worst possible conditions, including prostitution, pornography, forced recruitment in armed conflicts, and illicit or dangerous activities.

There are some 4 million child laborers in the United States and about 20 million in Latin America, mainly children between the ages of 10 and 14 working in domestic settings.<sup>7</sup> In Haiti, an estimated 250,000 children do domestic work, and in Argentina, the Ministry of Labor estimates the number of child workers under 15 years of age at around 500,000.<sup>8</sup> This figure reaches 150,000 in Lima, Peru, and about 7.5 million child laborers live in Mexico and Central America.

Other noteworthy facts are the greater proportion of working boys (60%) than girls (40%), and the fact that there are more child laborers in rural (55%) than in urban (45%) areas. As for working conditions, wage-earners represent about 60% to 70% of urban child laborers and about 50% of all child workers; most (90%) work in the economy's informal sector.

In most cases, the working day for child laborers exceeds the limit stipulated by law. The average working week is 45 hours, and even those who attend school work about 35 hours a week. Income also is very low: 90% of child laborers aged 10–14 years old earned the minimum wage or less, and about 20% earn less than what an adult with seven years of schooling would earn. Young people as a whole are paid only 44% of what adults earn. In Central America, wages of under-age workers who earn wages (59%) are one-fourth to one-half of an adult's minimum wage. Most child and adolescent laborers live in rural areas, and their proportion is higher in indigenous populations.

A high percentage of 10–14-year-olds are wage-earners, including those who do domestic work. Overall, the youngest ones are unpaid family workers. Although the average income of child and adolescent workers is fairly low, their contribution to family income may be significant, particularly in extremely poor homes, and especially in households headed by women. Their work often enables them to study and to supplement an adult's work. Most girls between 8 and 12 years old do domestic work, which is not considered in official surveys and statistics.

The consequences of child labor are countless, and clearly reveal that it has severe consequences on children's health and physical development (44). Children who work, in addition to suffering from overall poverty-related problems such as malnutrition, anemia, fatigue, and greater exposure to epidemics, run additional risks as a result of poor health conditions in the workplace. High-risk jobs in the Region include Brazil's coal production, Colombia's and Peru's gold and coal mining, Guatemala's and Colombia's fireworks manufacture, and Ecuador's bootblacks' exposure to solvents (20, 35).

The physical effects of child labor vary in intensity and degree from one child to another. Younger children are exposed to catastrophic accidents, in addition to the gradual erosion of their

health. For example, children who work in paint factories constantly inhale toxic gases, and vegetable and fruit pickers risk contamination from pesticides and other chemicals, compounded by the physically exhausting nature of the work (46).

There are several efforts under way in the Region to put an end to child labor. In Chile, five commissions were appointed to draw up the basic elements of a national plan of action on child labor. In Brazil, the Federal Government announced a US\$ 500 million program to free 866,000 children from the worst forms of child labor by 2002. El Salvador launched a program to eliminate the worst forms of child labor in a set period. In 1997, Nicaragua's National Commission for the Promotion and Defense of Children's Rights presented draft legislation, which was approved by the National Assembly on March 22, 1998 and was included in Law 287, which is the law on children and adolescents. Articles 73 and 74 of Chapter 1, Title III of Law 287 ban children and adolescents under 14 years of age from working in any job, and state that adolescents must not work in unhealthy locations where their lives could be endangered, such as in mines and garbage dumps.

#### *Working Seniors*

The aging population, social security reforms, growth in the service sector, and increases in poverty or lack of financial security have caused a rise in the number of senior citizens in the labor force. In the United States, workers aged 55 and over are less likely than young workers to have serious enough accidents to make them take time off work. However, when they do have a serious accident, they need twice as long as younger workers to recover.

#### **Cost of Occupational Accidents and Diseases**

Total economic losses due to occupational accidents and diseases represent between 4% and 5% of the world's GNP and between 9% to 12% of Latin America and the Caribbean's GNP, significantly taxing economic development. Consequently, improving working conditions makes sense not only in terms of health and moral considerations, but also as an economic investment. In fact, evidence is mounting that shows that a healthy labor force, working under safe conditions, makes for higher productivity and economic growth, helps reduce poverty, and contributes towards development.

In Costa Rica, the direct costs to care for and compensate victims of occupational accidents and diseases, and the administrative costs involved, amounted to US\$ 47.9 million in 1995. This represents almost US\$ 70 per insured worker and 3.3% of the per capita GNP. In Chile, the direct costs in 1996 reached US\$ 122.5 million, representing about \$33.80 or 0.9% of GNP per insured person. In Mexico, a 1999 study found that agrochemical poisonings in Yucatán cost the area's economy US\$ 2.7 million a year, which represents 2% of the value of agricultural production; the state medical system pays 30% of this cost (47). Although

<sup>7</sup>Unfortunately, most countries only have information on children aged 10 to 14 years; some only have information for 12–14-year-olds. There is virtually no information on child laborers under 10 years old.

<sup>8</sup>Half of child laborers belong to the poorest 20% of the population, and 70% have dropped out of school (Diario La Nación, Buenos Aires, 30 July 2001).

Mexican workers or survivors receive social security benefits because of those accidents, those benefits may not have fully covered workers' costs from loss of income and extraordinary expenses for drugs, nor compensated non-monetary costs such as the inability to help with household activities and suffering. ILO and WHO developed some approximations on the global burden of occupational accidents, which attempt to include the above-mentioned costs. Both organizations claim that the cost of occupational accidents might account for up to 10% of developing countries' GNP (35).

In the United States, direct costs were estimated at US\$ 65 billion and indirect costs at \$171 billion<sup>9</sup> in 1992. Accidents cost US\$ 145 billion and diseases, US\$ 26 billion (48). In 1996, the National Security Council put the cost of fatal and non-fatal occupational accidents at \$121 billion, in loss of salaries and productivity, administrative expenses, health care, and other costs (49); costs increased to US\$ 127.7 billion in 1999 (50). A recent study by the National Academy of Sciences showed that companies lose around US\$ 50 billion a year in time lost as a result of diseases, medical care, and loss of productivity from injuries to workers due to repetitive movements.

### Social Coverage

Social coverage and occupational health are closely linked, because workers require medical and social care so that they can cope with old age, inability to work, childbearing and childrearing, and unemployment (51). Most Latin American countries have some kind of social security system, but coverage levels vary between countries such as Brazil, Chile, Colombia, Costa Rica, and Uruguay, where coverage exceeds 70%, and countries such as Ecuador, Peru, and Venezuela, where it is below 50% (52). According to ILO, coverage varies from more than 60% of workers in Chile, Costa Rica, and Panama, to levels as low as 10% to 20% of wage-earners in El Salvador, Honduras, Nicaragua, and Paraguay. ILO also indicated that between 1990 and 1998, the percentage of urban wage-earners who are formally affiliated to some kind of social security system dropped from 67% to 62% throughout Latin America.

In 1908, Canada became the first country in the Region to approve occupational health legislation to safeguard workers against occupational risks. Between 1911 and 1952, El Salvador and Peru (1911); Argentina (1915); Colombia, Cuba, Chile, and Panama (1916); Brazil (1919); Ecuador (1921); Venezuela (1923); Bolivia and Costa Rica (1924); Paraguay (1927); Mexico (1931); Nicaragua and the Dominican Republic (1932); Guatemala (1947); and Honduras (1952) enacted similar laws.

<sup>9</sup>Compared to the costs for other serious diseases, the costs for occupational accidents and diseases are higher than those for cancer (US\$ 170.7 million), circulatory diseases (US\$ 164.3 million), Alzheimer's disease (US\$ 67.3 million), and AIDS (US\$ 33 million).

The major differences in coverage have to do with whether informal-sector workers are included or not. Only an average of 26% of domestic workers and persons working in microenterprises are covered; in other words, formal-sector workers account for one-third of the coverage (52). In Mexico, informal-sector workers pay a symbolic annual fee and are entitled to social security health coverage, but the difficulty in spreading information on the system, as well as several administrative setbacks, have limited the number of persons who benefit from this potentially beneficial system (51).

Most of the countries have social security legislation, though not all the systems provide the universal coverage stipulated in Articles 22 and 25 of the Universal Declaration of Human Rights. In fact, only Brazil, Canada, Costa Rica, and Cuba have social security institutions that truly provide universal coverage. In Argentina, Chile, and Uruguay social coverage was pursued through other modalities derived from former mutual funds that were tailored to various demands. In the rest of the countries, its development could be classified as limited to average.

In recent years, growing importance has been afforded to the development of employment services for the unemployed, by improving the dissemination of information on vacancies, facilitating worker mobility, organizing training programs, and providing work subsidies for the unemployed. Argentina, Barbados, Brazil, Mexico, Peru, and Uruguay are among the countries that adopted this active job market policy in the 1990s (51).

### Public Policies for Workers' Health

In 1999, Latin American and Caribbean countries approved the Regional Workers' Health Plan. The plan encompasses activities in several key areas, including the quality of work environments, the regulatory policy framework, promotion of workers' health, and comprehensive health services. One of its central goals is strengthening institutional capacity to improve work environments and working conditions through prevention, promotion, health care, and rehabilitation. Within the plan, a mechanism was designed to harmonize occupational health legislation in Central America, which will be presented to the International Labor Organization, the North American Free Trade Association's Labor Cooperation Commission, and the ministries of labor.

Within that framework, Belize updated its 1996–2000 National Workers' Health Plan, and revised its environmental health legislation; Cuba launched a primary health care strategy for workers in the Cienfuegos manufacturing sector, which covers 16 industrial centers. Haiti completed an evaluation of its Workers' Health Plan and Uruguay held a national workshop on occupational health coordination, diagnosis, and strategies (October 2000), in which the technical, political, trade union, business, and community issues were considered. In Ecuador, an occupational primary health care project was developed with interinstitutional participation in 2000; the project will receive

funds from FASBASE, a project designed to strengthen and expand basic health services in the country that is, in turn, funded by the World Bank within the framework of the country's health sector reform. In 2000, Mexico incorporated occupational health promotion into the Global Health in Work Strategy and mobilized many professionals from various disciplines to adopt a preventive approach for workers' health.

### Occupational Health Services

An estimated 5% to 10% of workers in developing countries and 20% to 50% of workers in industrialized countries (with some exceptions) have access to adequate occupational health services. Furthermore, existing services have pursued a curative, rather than a preventive or promotional, approach. The prevailing trend in the countries, including those in Latin America, is to establish systems based on collective responsibility and organized as social security systems. Insurance could be earmarked for work risks or it could be part of the country's overall social welfare system.

At the V Pan American Conference, held in Santiago, Chile, in 1923, ILO proposed that the countries of the Americas introduce social security to protect workers. Particularly those countries with trade unions had already begun to set up mechanisms to protect workers. Priorities discussed were the length of the work day, environmental conditions and safety at work, and accident protection. Specific legislation was approved in nearly every country, through which centralized institutions were set up to manage occupational risks.

Despite the fact that the care of occupational diseases was little known at that time and resources were very limited, this was not presented as the first objective. Although the situation has since improved, occupational diseases continue to be the ones least often reported today and the records lack sub-diagnosis and sub-notification. Occupational diseases are normally only considered once they have caused disabilities that involve compensation.

### Regulating Occupational Health

Over the last four years, legislation on the environment and health has responded to several determining factors shared by most of the Region's countries. It is noteworthy that several countries have made amendments in this regard to their constitutions or general health codes and laws. Ecuador's 1998 Constitution recognizes the right to work, to have the State protect work and to promote healthy working environments within the framework of the right to health. It also protects the population's right to live in a healthy and ecologically balanced environment that ensures sustainable development, and bans the manufacture, importation, ownership, use, and introduction into the country of nuclear and toxic waste or other harmful substances. According to Venezuela's 1999 Constitution, one of the State's basic obligations

is to guarantee safe and hygienic conditions for workers and the right to an adequate, pollution-free work environment. It also states that environmental and sociocultural impact studies must be conducted on activities liable to cause damage to ecosystems, and that the entry of toxic, hazardous, and other harmful waste into the country is banned. An amendment to Mexico's Constitution also states that persons have a right to a healthy environment (1999). In its body of laws, Ecuador included a provision acknowledging that the right to a healthy environment is a human right (1998).

Guatemala (1997) enacted a new Health Code, and Peru and the Dominican Republic (2001) passed a General Health Act, which included provisions on environmental and occupational health. El Salvador (1998) passed the General Environment Act, a law that includes provisions on pollution, environmental policies, and citizen participation. Venezuela (1999) passed the Environment and Natural Resources Act, and Canada (2000) enacted its Environmental Protection Act. Ecuador (1997) issued a new Labor Code; Venezuela (1999), the Labor Act Regulations; and Mexico (1997), the Federal Regulations on Occupational Health. Antigua and Barbuda (1998) and Guatemala (1998) amended their labor codes. In Canada (2000), the Canada Labor Code, a federal law was extensively revised to cover issues that have arisen from technological advances (3).

Occupational health legislation is approached from different angles. Safety and hygiene conditions in the workplace were reviewed in Cuba (1999), Ecuador (1998), Guatemala (1998), through labor code reforms), Guyana (2000), Cayman Islands (2000), Mexico (1997 and 2000), Uruguay (2000), and Venezuela (2000). In Brazil (1998), occupational health was reviewed in regard to work in ports, and in Argentina (1997) in terms of the construction industry. In Mexico (1997 and 1998), the provisions on the work environment were extended to mining and quarry work and *maquiladora* operations. In Venezuela (1999), the occupational health of miners was considered, emphasizing the risks from handling mercury.

Working conditions associated with chemical handling, transport, and storage were reviewed in Costa Rica (2000), Ecuador (1998), Mexico (2000), Nicaragua (1998), Peru (1999), and Venezuela (1997). Argentina (1998), Bolivia (1997), Cuba (1998), Guatemala (1998), and Venezuela (1998) issued radiological safety standards applicable to workers' health, and Cuba (1999) issued standards on work aspects associated with biological safety.

Some countries issued provisions to prevent occupational risks or created commissions to advise on workers' health issues. Argentina (1997) established the Preventive Program to Improve Health and Safety in the Work Environment and the National Registry of Work Disabilities (1997); Venezuela (1999) specified clinical and analytical criteria on exposure to pollutants; and Mexico (2000) established the minimum requirements for a system to identify and communicate the hazards and risks of hazardous chemicals in the workplace. Venezuela (1999) formulated



standards and procedures to detect mercury poisoning in exposed workers.

The United States (1997) passed the Birth Defects Prevention Act to enhance the National Institute for Occupational Safety's capability to study the relationship between exposure in the work environment and birth defects. Also in the United States (1998), the Correction Officer Health and Safety Act requires that persons sent to prison must be tested for diseases transmitted by organic fluids with which staff may come in contact. The Needlestick Safety and Prevention Act requires that the Occupational Safety and Health Act set new standards to safeguard workers against pathogens transmitted by blood (5). In Guatemala (2000), the National Council on Occupational Health, Hygiene, and Safety was created to encourage the development of worker health and safety policies and foster their dissemination, and in Guyana (1997) the Occupational Health and Safety Authority (1999) and the National Advisory Council on Occupational Health and Safety were created. The Authority has been charged with conducting inspections to certify compliance with the Occupational Safety and Health Act from which it originated.

Several legislative efforts have dealt with workers' rights, either in general or targeting special groups. Peru (1997), for example, regulated various aspects of the length of the workday. In Canada (2000), updates to the Labor Code included changes in procedures related to the right to refuse to do dangerous jobs and offering better protection for pregnant and nursing mothers, to enable them to leave jobs that might harm their fetus or children without suffering financial hardships or labor problems. Reforms to the Code also expanded the role of workplace health and safety committees, enabling them to hear and deal with complaints, and established policy and work safety committees in large companies (3). Argentina (1997) issued regulations for the evidence and trial system dealing with employers' noncompliance with provisions of the Occupational Risk Law.

Brazil (1999), Honduras (2000), Panama (1999), and Saint Lucia (1999) issued edicts on women's right to work and nondiscrimination in the workplace. Honduras and Panama included such provisions into broad regulations on providing for equal opportunities for women. Chile (1998) passed legislation protecting maternity in the workplace, and Antigua and Barbuda (1998) and Trinidad and Tobago (1998) legislated on aspects related to maternity leave. Some countries, such as Brazil (2000), Chile (2000), and Guyana (1999), provided for under-age workers. Panama (1999) established the Committee for the Eradication of Child Labor and the Protection of Under-age Workers; Ecuador (1997) established the National Committee for the Gradual Eradication of Child Labor.

Various organizations created for that purpose also considered occupational health issues beyond a purely national scope. Within the framework of the North American Agreement on Labor Cooperation (NAALC)—a parallel agreement to NAFTA—the North American Commission for Labor Cooperation was

created to work on implementing the 11 labor principles established in the agreement. In MERCOSUR, the Internal Rules of Procedure of MERCOSUR's Labor Commission (2000) were issued, with a view to setting the framework for the Commission's work. The Commission is designed to foster the application of MERCOSUR's Andean Social and Labor Declaration. The Andean Integration System established the Rules of Procedure of the Andean Consultative Labor Council (1998), an institution designed to ensure the involvement of workers in the integration process. CARICOM's Declaration of Labor and Industrial Relations Principles was issued, which includes a mandate for the States Parties to formulate policies on occupational health and safety and to issue necessary legislation for that purpose.

## CONCLUSIONS AND PRIORITIES

Agenda 21's Chapter 6 states that health ultimately hinges on a government's capability to control the interaction among physical, spiritual, biological, economic, and social factors, and that, without a healthy population, balanced development will not be attainable. In this regard, the Region's countries have developed programs and activities to help implement the Agenda in the health sphere. This experience, along with an analysis of the Region's health and environment situation as presented in this chapter, implies that water and sanitation, solid waste, air pollution, health in housing, occupational and chemical risks, natural disasters, and environmental world changes are priorities.

There are many different effects of environmental conditions on health, such as acute respiratory infections and diarrheal infections, vector-borne diseases (Chagas' disease, dengue, and malaria), chemical poisoning (from pesticides, persistent organic pollutants such as DDT, and lead), mental disorders, cancer, chronic respiratory diseases, and injuries or disability caused by accidents.

The Region's main achievements in the field of environment and public health over the last four years include better access to drinking water and sanitation services and improvements in solid waste collection, handling, and disposal. There is growing concern over health in housing; some countries have launched programs to minimize major problems, and efforts are under way to better integrate necessary activities into the work of the Inter-American Network of Health in Housing Centers.

Although there is considerable under-registration of poisoning cases, reports to ministries of health have increased. Progress includes the establishment of restrictions or bans on the use of various chemical pollutants, mainly pesticides; efforts to ban the use of DDT; activities of local intersectoral commissions on pesticide control; development of an air quality information system; increases in the number of toxicology services; and setting up and strengthening of toxicology networks.

The healthy municipalities movement and the environmental primary care (EPC) strategy are linked and promoted together in the Region's countries. EPC is already known internationally, nationally, and locally. A municipal network of EPC has been organized through the creation of the Latin American Network of Municipalities for EPC; the network facilitated the exchange of experiences between young people from various countries to promote the creation of ecoclubs.

In terms of legislation, new constitutions, constitutional amendments, laws, regulations, and health codes were enacted, incorporating environmental protection that covered the work environment and the right of individuals to an ecologically balanced environment. More specifically, legislation was passed to strengthen drinking water and sanitation services, improve water quality and expand coverage, manage the environmental impact of chemical product use, prevent accidents during the transport of chemical substances, prevent birth defects, create environmental institutions and define new functions for existing institutions, establish protected geographical areas, set sanctions for environmental crimes, and create special funds for environmental conservation.

More than 75% of Latin American and Caribbean countries have participated in and ratified the most important agreements issued at environmental conferences on sustainable development. Of the 36 Latin American and Caribbean countries, 26 prepared national reports for the United Nations Conference on Environment and Development (UNCED), 16 formulated national environmental plans, 4 have plans governing land use, 9 have a national strategy on biological diversity, and 4 have a national strategy on sustainable development. In addition, Argentina, Barbados, Bolivia, Brazil, Costa Rica, Cuba, Chile, Dominica, Grenada, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Paraguay, the Dominican Republic, and Saint Lucia have set up national councils for sustainable development.

Finally, it is hoped that the development models in use in the Region's countries will ensure the sustainability and rational use of natural resources, as well as the development of new, non-polluting technologies that will guarantee the conservation of natural resources for future generations. Furthermore, the countries must guarantee social justice and equity by searching for an equitable distribution of goods and resources, and must launch efforts to mitigate poverty, hunger, and malnutrition. Rapid globalization requires that countries work together for this common cause, which is critical for the healthy life of present and future generations.

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TABLE 1. Potential effect of exposure to environmental factors on health.

Effects on health	Environmental factors							Global environmental changes
	Water and sanitation	Solid waste	Air pollution	Health in housing	Occupational risks	Chemical risks	Natural disasters	
Acute respiratory infections			x	x	x	x		
Diarrheal diseases	x	x		x		x	x	
Vector-borne diseases (malaria, dengue, Chagas' disease)	x	x		x		x	x	x
Chemical poisoning (pesticides, POPs such as DDT, and lead)	x	x	x	x	x	x		x
Mental disorders				x	x		x	
Cancer	x		x	x	x	x		x
Chronic respiratory diseases			x	x	x	x		x
Injuries and disabilities caused by accidents				x	x			x

Source: Adapted from Pan American Health Organization. *Health and the Environment in Sustainable Development*. Washington, DC: PAHO; 2000. (Scientific Publication 572).

TABLE 2. Access to drinking water and sanitation services, Region of the Americas and Latin America and the Caribbean, 1998.

Region			Drinking water			Sanitation		
			Household connection	Easy access	No service	Household connection	In situ connection	No service
Americas Region	Urban	Population <sup>a</sup>	526.2	22.9	25.6	428.6	109.0	37.1
		Access <sup>b</sup>	91.6	4.0	4.5	74.6	19.0	6.5
	Rural	Population <sup>a</sup>	128.6	34.9	51.0	37.6	110.7	66.2
		Access <sup>b</sup>	60.0	16.3	23.8	17.5	51.6	30.9
	Total	Population <sup>a</sup>	654.8	57.8	76.6	466.2	219.7	103.3
		Access <sup>b</sup>	83.0	7.3	9.7	59.1	27.8	13.1
Latin America and the Caribbean	Urban	Population <sup>a</sup>	316.6	22.9	25.6	229.6	98.4	37.1
		Access <sup>b</sup>	86.7	6.3	7.0	62.9	27.0	10.2
	Rural	Population <sup>a</sup>	49.5	31.0	50.9	11.7	53.5	66.2
		Access <sup>b</sup>	37.7	23.6	38.8	8.9	40.7	50.4
	Total	Population <sup>a</sup>	366.1	53.9	76.5	241.3	151.9	103.3
		Access <sup>b</sup>	73.7	10.9	15.4	48.6	30.6	20.8

<sup>a</sup>Population in millions.

<sup>b</sup>Coverage in percentages.

Source: PAHO, Evaluation 2000.

TABLE 3. Access (%) to drinking water and sanitation services, by country, Region of the Americas, 1998.

Country	Drinking water (%)			Sanitation (%)		
	Total	Urban	Rural	Total	Urban	Rural
Anguilla	60	60	—	99	99	—
Antigua and Barbuda	93	95	89	97	98	94
Argentina	78	85	30	84	88	48
Aruba	100	100	—	—	—	—
Bahamas	97	98	86	100	100	100
Barbados	100	100	—	99	99	—
Belize	91	100	82	48	71	25
Bolivia	73	93	44	63	82	35
Brazil	89	96	65	85	94	53
Canada	100	100	99	100	100	99
Chile	94	99	66	94	93	94
Colombia	91	98	73	83	97	51
Costa Rica	95	99	91	93	89	97
Cuba	93	98	76	94	97	84
Dominica	93	100	90	78	86	75
Dominican Republic	88	96	73	89	96	79
Ecuador	70	81	51	58	70	37
El Salvador	59	92	25	68	86	50
French Guiana	84	—	71	79	84	57
Grenada	93	98	93	97	96	97
Guadeloupe	98	98	—	64	64	—
Guatemala	80	99	70	79	95	71
Guyana	93	98	91	85	97	81
Haiti	46	49	44	26	46	16
Honduras	81	94	70	70	94	49
Jamaica	80	98	59	90	90	91
Mexico	86	94	64	72	87	32
Montserrat	100	100	—	96	96	—
Nicaragua	66	95	33	76	93	56
Panama	87	88	86	93	99	86
Paraguay	44	70	13	67	85	46
Peru	75	87	51	74	89	39
Puerto Rico	100	100	100	100	100	100
Saint Kitts and Nevis	98	98	—	96	96	—
Saint Lucia	98	98	—	89	89	—
Saint Vincent and the Grenadines	93	—	93	96	96	96
Suriname	86	98	58	86	99	56
Trinidad and Tobago	86	86	—	97	97	—
Turks and Caicos	100	100	100	97	98	94
United States of America	100	100	100	100	100	100
Uruguay	98	98	93	94	95	84
Venezuela	83	84	70	69	71	47
Virgin Islands (UK)	98	98	—	98	98	—

Source: PAHO, Evaluation 2000.

TABLE 4. Assessment of units damaged by Hurricane Mitch in Central America, by country, 1998.

Damage	El Salvador	Guatemala	Honduras	Nicaragua	Total
Water systems	155	60	1,683	79	1,977
Sewerage systems	14	2	...	9	25
Wells	7,622	...	...	...	7,622
Latrines	9,193	2,500	85,000	37,000	133,693

Source: MASICA La Revista—Edición Especial. San José, February 1999.

TABLE 5. Coverage of solid waste collection and final disposal services, selected cities in Latin America, 1995–2001.

City and year <sup>a</sup>	Population in millions	Per capita production (kg/person/day)	Garbage produced (tons/day)	Collection coverage (%)	Final disposal coverage (%) <sup>b</sup>			Type of service (own or outsourced)	No. of employees
					Good	Average	Poor		
Asunción (2001)	0.54	1.00	3,115	92	—	20	80	56% municipal 37% private 9% mixed	475
Caracas (2000) (1990)	3.6	1.10	4,000	80	—	8	>50	Mixed	—
Chile (1998)	14.6	0.73	9,720	90	85	—	—	90% private contract	—
Guatemala <sup>c</sup> (1995)	2.15	0.54	1,480	81 (56% home)	—	—	100	55% private	—
Havana (1997)	2.18	0.65	1,132	90	—	—	100	Own	5,448
Lima <sup>c</sup> (1998)	6.9 (forecast)	0.55	3,694	80	2 good landfills	Dump	>50	Mixed	5,159
Managua (1997)	1.09	0.66	666	77	—	Open dump	>50	Partial, controlled by microenterprise	293
Mexico, DF (1998) (1995)	9.30	1.29	12,005	—	3	13	84	Mixed	5,180
Panama <sup>c</sup> (2000)	0.70	1.41	1,330	85	—	100	—	40% private	2,042
Santiago (1998)	5.20	0.91	4,722	100	85	—	—	Mixed	—
San Salvador (1998)	0.44	0.75	4,678	87	—	100	—	50% private	1,032

<sup>a</sup> Year in which the sectoral study on solid residue was conducted.

<sup>b</sup> Good=sanitary landfill; average=controlled landfill; poor=open pit dump.

<sup>c</sup> Metropolitan area.

Source: Sectoral analyses of solid waste for each country carried out between 1995 and 2001.

TABLE 6. Estimated number of housing units, Latin America and the Caribbean, 2000.

Country	Estimated housing units (in thousands)
Argentina	10,557
Bahamas	70
Barbados	85
Belize	48
Bolivia	1,616
Brazil	45,228
Canada	12,690
Chile	4,133
Colombia	8,776
Costa Rica	1,026
Cuba	4,053
Dominican Republic	2,090
Ecuador	3,107
El Salvador	1,677
Guadeloupe	140
Guatemala	1,791
Guyana	182
Haiti	1,583
Honduras	1,187
Jamaica	506
Martinique	127
Mexico	22,970
Netherlands Antilles	68
Nicaragua	833
Panama	707
Paraguay	1,165
Peru	5,650
Puerto Rico	1,177
Suriname	104
Trinidad and Tobago	296
United States	107,296
Uruguay	1,023
Venezuela	5,288
Total	247,249

*Source:* Adapted from the United Nations Human Settlements Programme (UN-Habitat), Global Urban Observatory and Statistics Section, Household Projections Project.

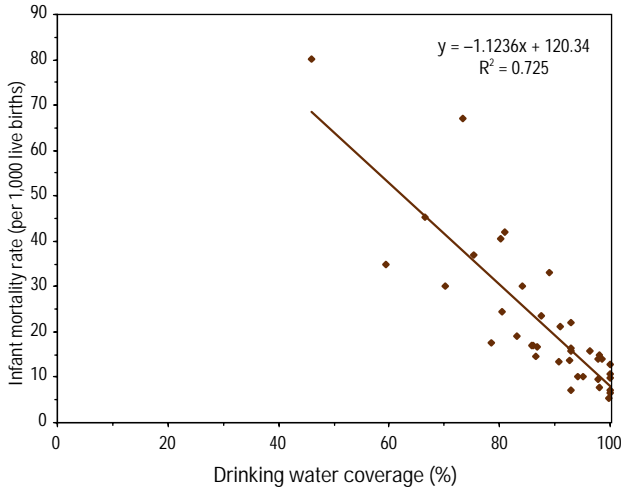
TABLE 7. Results of prevalence studies to determine blood lead levels, selected countries of the Americas, 1998–2000.

Country	Year(s)	Number	Age group	Blood lead levels Average (DE) µg/dl	Percentage with levels >10 µg/dl	Range of values	Source of emission
Argentina	1999	172	6 months to 9 years	7.7 <sup>a</sup> ±1.1	26.7	Nd <sup>b</sup> –30	Non-specific
Argentina	2001	203	3 months to 13 years	5.2±0.5	6.5	...	...
Chile	2000	486	<7 years	8.7±(...)	47	...	Lead storage site
Costa Rica	2001	61	3 to 11 years	0.80±0.75	...	...	...
Ecuador	1998	185	<15 years	40.9±(...)	97.1	6.2–128.22	Glazed pottery
Mexico	2001	367	1 to 6 years	6.0 <sup>a</sup>	19.7	Nd–35.3	Foundry
Peru	1998–1999	2,510	6 to 9 years	9.9±9.2	29.1	0.5–65.0	Automobile emissions and mineral concentrate
Uruguay	2001	1,180	<15 years	...	70	...	Soils contaminated by foundry slag in landfills

<sup>a</sup>Geometric mean.<sup>b</sup>Not detected.

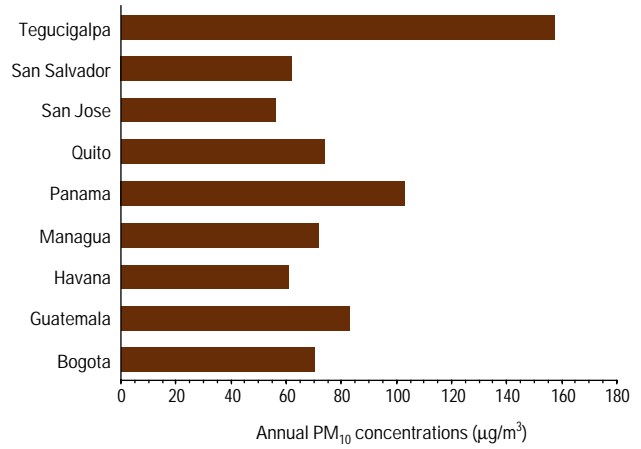


FIGURE 1. Correlation between drinking water coverage and the infant mortality rate, Region of the Americas, 1998.



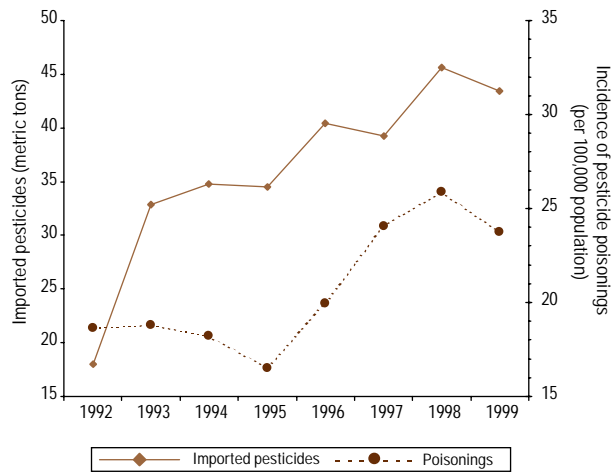
Source: Pan American Health Organization, 2001 Basic Indicators, Washington, DC; 2001.

FIGURE 3. Annual concentration of airborne particulate matter with a mass median aerodynamic diameter less than 10 micrometers (PM<sub>10</sub>), selected Latin American cities, 1998.



Source: Korc M, Farias EF, Cerda R. El proceso de fijación de normas de calidad del aire. Centro Panamericano de Ingeniería Sanitaria y Ciencias del Ambiente (CEPIS). Organización Panamericana de la Salud: Lima; 2000.

FIGURE 2. Volume of imported pesticides and incidence of pesticide poisoning, Central American Isthmus, 1992–1999.



Source: Proyecto Plaguicidas y Salud en el Istmo Centroamericano (PLAGSALUD). OPS/MASICA, 2001.

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# VI. DISEASE PREVENTION

*The countries that had been able to free themselves from serious diseases, thanks to their active efforts in health, fearful of new possible invasions from outside their borders...were forced to seek ways to defend themselves collectively and internationally...*

Dr. Mario G. Lebreo,  
Delegate of the Republic of Cuba and President of the Conference  
Seventh Pan American Sanitary Conference, Havana, Cuba, 1924

## EMERGING AND RE-EMERGING DISEASES

The risk to public health posed by infectious diseases is constantly changing due to shifts in the physical and social environment and in the etiological agents themselves. Noteworthy among the latter changes is the development of resistance to the available antimicrobials. According to the definition of the United States Institute of Medicine (1992), emerging infections are new diseases or diseases not previously recognized as such. Re-emerging diseases are those that have reappeared after their incidence had decreased to a significant extent.

Although infectious diseases have defined etiological agents, their origin, evolution, and outcome depend on a complex interaction among various biological, social, and economic factors. While they are important everywhere, their incidence is increasing in areas characterized by poverty and its associated factors, such as malnutrition, lack of running water and latrines, illiteracy, and overcrowding.

The international spread of infectious diseases is not a new phenomenon. However, recent developments—large population movements due to tourism, migration, or disasters; the growth of international trade in food and biological products; the social and environmental changes associated with urbanization, deforestation, and climatic shifts; changes in methods of preparing and distributing food; and alterations in consumer habits—have been linked to the emergence and re-emergence of pathogens. The appearance of new pathogens in any country is cause for concern all over the world.

Despite advances in their control, infectious diseases, especially the emerging and re-emerging diseases, still constitute a serious threat to the population. In the last two decades, acquired immunodeficiency syndrome (AIDS), Ebola hemorrhagic fever, and han-

tavirus pulmonary syndrome, among others, have provided a clear reminder of the threat from infectious disease. Another reason for concern is the possible intentional spread of infectious agents. In the United States this threat was demonstrated in October and November 2001, when 23 cases of illness caused by the intentional spread of *Bacillus anthracis* were discovered.

The magnitude of the problem of emerging and re-emerging diseases is illustrated in this section through a description of the current situation of selected diseases that cause very severe illness and a review of resistance to antimicrobials.

### Resistance to Antimicrobials

The discovery of antibiotics gave rise to the assumption that infectious diseases would become a thing of the past. Unfortunately, this assumption was proved incorrect, in part because the drugs used to treat certain infectious diseases lost their effectiveness. Resistance to antimicrobials became increasingly evident in the 1960s, and now many pathogens are resistant to several of these drugs. This development is clinically, epidemiologically, and socioeconomically important because the treatment of infections caused by resistant microorganisms can be particularly difficult and costly. Many kinds of bacteria that are common in the community and in hospitals, including *Streptococcus pneumoniae*, *Staphylococcus*, *Enterococcus*, *Pseudomonas*, and *Acinetobacter*, are resistant to one or more antibiotics. This situation entails serious repercussions for the population's health.

The excessive or inappropriate use of drugs is probably the most important factor in the development of resistance. In many countries, antibiotics can be purchased without a prescription even though that practice is prohibited by law; in others, their sale is unrestricted, which promotes their widespread and inap-

appropriate use. Moreover, broad use of antimicrobials in hospitals has led to the appearance of microorganisms resistant to one or more drugs. Infections acquired in the hospital are not only difficult to treat, but delay the patient's release and significantly increase the cost of care. Adding to the problem, veterinary use of antibiotics for mass prophylaxis and to promote growth is even more extensive than their use in humans to control existing or potential infections.

Prevention of the development of resistance to antibiotics and interventions intended to delay its appearance depend on actions by the ministries of health and agriculture, health professionals, and the community. Systematic surveillance of resistance to antibiotics carried out by the health personnel in a given geographic area provides important information on the situation and raises the alarm concerning the appearance or increase of resistance.

In 1995, as a result of the regional alert regarding emerging and re-emerging diseases, including those exacerbated by resistance to antibiotics, the Pan American Health Organization (PAHO) strengthened its activities in this area. One expression of its action was to implement a network to monitor the susceptibility to antibiotics of *Salmonella*, *Shigella*, and *Vibrio cholerae*, important etiological agents of diarrhea that may require treatment with antimicrobials.

#### *Antimicrobial Surveillance in the Region of the Americas, 1996–2000*

The surveillance network monitoring pathogens' resistance to antibiotics used in the treatment of diarrheal diseases began operation in 1996 with the participation of eight countries: Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico, Peru, and Venezuela. With good reason, the participating countries concluded that to increase confidence in the results obtained, stronger quality control of the internal practices of each laboratory and a system for periodic performance evaluation were needed (1).

The National Laboratory for Enteric Pathogens in Canada agreed to organize the system, which was subsequently joined by laboratories in five Caribbean countries: Bahamas, Barbados, Jamaica, Saint Lucia, and Trinidad and Tobago. As of late 2001, surveillance was being conducted in 21 countries of the Region. In addition to the countries already mentioned, Bolivia, Cuba, Ecuador, El Salvador, Guatemala, Nicaragua, Paraguay, and Uruguay are also participating.

The promotion of surveillance activities and the results of these activities should serve as a basis for the countries' implementation of actions to prevent the appearance of resistance to antimicrobials. To succeed, this effort will require access to information on policies and practices in the different countries; analysis and dissemination of that information, demonstrating the risk of the appearance of resistance and its economic impact; alliances among the different sectors in order to disseminate knowledge and encourage implementation of appropriate pre-

ventive practices; and, finally, measures to facilitate the rational use of antibiotics.

To establish a baseline for use in subsequent analysis and to learn more about the resistance patterns of *Salmonella*, *Shigella*, and *Vibrio cholerae* to different antimicrobial drugs, PAHO sought the cooperation of the member countries in obtaining national information and invited them to join a program to monitor the resistance of enteropathogenic agents to antimicrobials (1). The information obtained for *Salmonella* and *Shigella* is presented in Tables 1 and 2. The data on the resistance of *V. cholerae* is discussed in the section on cholera. The data pertain to 21 countries of the Americas and cover the period between 1996 and 2000. The available information is insufficient to analyze and explain national and regional trends, but it provides a starting point for understanding local patterns of resistance. Another limitation of the data is the size of the numerators, since they correspond to small, nonrandom samples; moreover, the population constituting the denominators is not known. As information on resistance expands and improves, so will knowledge of the population in which it exists and, in turn, epidemiological analysis of the problem.

PAHO is also promoting the surveillance and containment of resistance of *Mycobacterium tuberculosis* and *Plasmodium falciparum*. Additional information is found in the sections on tuberculosis and malaria.

#### **Anthrax**

Historically, anthrax has not been considered an emerging threat in the Region of the Americas, but in 2001 an unusually high number of cases was recorded in the United States (22 cases, including 10 confirmed cases of pulmonary anthrax, with four deaths). There were also 12 cases (seven confirmed and five presumptive) of cutaneous anthrax, with no deaths. Investigation revealed that the infections were caused by the intentional release of *Bacillus anthracis* via the mail system along the entire East Coast. As a consequence, several Central and South American countries investigated reports of suspected cases of anthrax related to bioterrorism, but none were confirmed outside the United States.

#### **Cholera**

##### *Situation and Trends*

The seventh cholera pandemic came to the Region of the Americas in 1991. The first cases appeared on the northern coast of Peru, and from there the disease spread very quickly to the interior of that country and to neighboring countries. The most seriously affected populations were those in periurban and rural areas, where access to basic services, such as drinking water supply and sewerage systems, was very limited. The epidemic eventually spread to almost all the countries of the Region. Table 3

shows the number of cholera cases reported by country from 1991 to 2000.

In the year the epidemic started, the countries most seriously affected were Peru, with 322,562 cases (incidence rate of 1,495.5 per 100,000 population) and Ecuador, with 46,284 cases (450.9 per 100,000). In the following year (1992), the epidemic had spread to almost all Latin American countries. In 1993 the total number of cholera cases in the Americas decreased, but while the number of cases dropped in some countries (such as Colombia, Ecuador, and Peru), in others (such as Brazil and Guatemala) it increased. Guatemala had more than 30,000 cases, for a rate of 325.7 per 100,000 population, higher than the rate in Peru and the rest of the Central American countries.

The declining trend in the number of cholera cases observed up until 1997 in the Region of the Americas was reversed in 1998, when 3.2 times more cases were recorded than in the previous year. Of these, 73.1% were in Peru, although Ecuador, Guatemala, Honduras, and Nicaragua also showed a considerable increase with respect to 1997. The increase may have had different triggers in different places: the El Niño phenomenon in Peru and Ecuador (two of the most seriously affected countries) and Hurricane Mitch in Central America had negative effects on the precarious health, drinking water, and sewerage systems.

In the period 1991–2000, 1,275,230 cases were reported throughout the Region (Table 3); 82.1% were in Peru, Ecuador, Brazil, Bolivia, and Colombia, and 16.5% were in Guatemala, Nicaragua, El Salvador, Honduras, and Mexico. Cases were reported from all the Latin American countries except Uruguay. Although the relationship between reported cases, symptomatic cases, and asymptomatic infections in the Region is not known, it is estimated that the reported cases represent just 10% of people who were infected (2). However, since the coverage and sensitivity of the surveillance systems affect the number of cases reported, and given the problems in these systems in the countries of the Region, reported cases probably represent less than 10% of infections.

Since the start of the epidemic, fatality has remained constant and has been fairly low (approximately 1.0% for the Region, although in Bolivia the case-fatality rate was 2.5% in 1993). However, when outbreaks occur in poor, rural populations with limited access to medical care, fatality in those areas is much higher than in the country as a whole. In Peru, for example, in the first three years of the epidemic the case-fatality rate ranged from 0.12% to 4.46%, and the relationship between rural residence and fatal outcome was directly proportional (correlation coefficient = 0.71, Figure 1). A similar situation was observed in the last outbreak in Nicaragua in 1998, when 63% of all the deaths recorded (22 of 35) occurred in two local comprehensive health care systems (SILAIS) with a rural population of approximately 70% (Nueva Segovia and the Atlántica Norte Autonomous Region, with case-fatality rates of 4.1% and 5.8%, respectively).

When analyzing the available data, it is important to bear in mind that the countries use different case definitions, which

makes it difficult to compare their numbers, although a clear relationship exists between case numbers and precarious living conditions, and therefore health conditions, in the countries with the most cases (Table 4).

#### *Cholera and Economic and Social Inequalities*

The relationship between poverty and morbidity and mortality from communicable diseases is very well known. The countries with low per capita gross national products (GNP)—a reflection of their limited economic resources—have a higher probability of extensive cholera outbreaks. For example, the countries with per capita GNP over US\$ 3,000 have not had annual incidence rates above 50 cases per 100,000 population, while the majority of the countries with per capita GNP under US\$ 2,000 had an incidence rate greater than 200 cases per 100,000 in some year of the epidemic (Figure 2). These health differentials and inequalities are also apparent in the concentration index for the relationship between the number of cholera cases reported for the entire epidemic and the per capita GNP of the countries with indigenous cases, which equals 0.62. Also, 85% of all reported cases in the period occurred in the countries with per capita GNP below US\$ 3,000, although they account for just 25% of the total population of countries with indigenous cases. These analyses indicate an important inequality among countries with different income levels with respect to the distribution of cases of this disease.

There is a direct relationship between lack of access to drinking water and the probability of significant outbreaks of cholera. Countries in which more than 80% of the population has access to drinking water have not had annual incidence rates greater than 100 per 100,000 population in the epidemic's 10 year history, while countries in which less than 80% has access to this service have had incidence rates in excess of 200 per 100,000 in at least one year of the epidemic.

#### *Challenges*

A problem that complicates the cholera situation in the Americas is the emergence of antimicrobial-resistant strains of *V. cholerae*. The resistance of this microorganism appeared almost simultaneously with the 1991 cholera outbreak in Peru. That year, 36% and 9% of series of 42 and 11 samples, respectively, from Guayaquil, Ecuador, were multi-drug resistant (3). In Chile a strain of *V. cholerae* was reported that was resistant to tetracycline, chloramphenicol, and trimethoprim-sulfamethoxazole. In Guatemala, 47% of the strains studied in 1993 showed resistance to furazolidone, sulfisoxazole, and streptomycin, while all the strains isolated in 1991 had been sensitive to the antibiotics evaluated (4). Similarly, 27% of the strains of *V. cholerae* evaluated in Honduras were resistant to ampicillin, cephalothin, chloramphenicol, doxycycline, gentamycin, kanamycin, tetracycline, and trimethoprim-sulfamethoxazole (5). In Nicaragua, analysis of 120 strains isolated in 1993 indicated that all were sensitive to the antibiotics evaluated, including ampicillin and

trimethoprim-sulfamethoxazole. The first resistant strains recovered from two Nicaraguan patients were isolated in 1995 in Costa Rica. In that year, a study of 143 strains showed that 11% were resistant to ampicillin, 27% to trimethoprim-sulfamethoxazole, and 29% to both (6). In the same country in 1999, a series of 77 samples from the regional surveillance system monitoring the resistance of certain enteropathogenic strains to antimicrobials showed 100% of those strains to be resistant to ampicillin, trimethoprim-sulfamethoxazole, and chloramphenicol (7).

Increased resistance of *V. cholerae* has also been found in Venezuela: in 1999, 100% of the strains in a series of 23 samples were resistant to ampicillin and 95% to trimethoprim-sulfamethoxazole (7). In other countries, including Argentina, Brazil, Colombia, Mexico, and Peru, varying levels of resistance have also been found to ampicillin, trimethoprim-sulfamethoxazole, tetracycline, and chloramphenicol.

The noteworthy reduction in cholera cases reported in the Region does not indicate that a solution is at hand, since risk factors associated with the disease still exist in the majority of the countries, particularly among the poorest populations on the peripheries of large cities and in rural areas. Moreover, the presence of asymptomatic infections and mild cases could result in the disease becoming endemic in certain countries, with a precarious stability that could easily be disturbed in crises such as natural disasters (the El Niño phenomenon, for example), social conflicts, or large migrations. This situation is aggravated by the resistance of *V. cholerae* to the most commonly used antibiotics and the risk of introduction of *V. cholerae* O139 from Asia.

### Hantavirus Pulmonary Syndrome

This syndrome was first described in North America in 1993, but surveillance systems and some epidemiological studies have shown the importance of this disease to public health in Central and South America as well.

#### *Hantavirus and Its Reservoirs*

The genus *Hantavirus* belongs to the family Bunyaviridae. In Europe and Asia this group of viruses causes a disease known as hemorrhagic fever with renal syndrome, while in the Americas they are the causal agents of hantavirus pulmonary syndrome. The reservoirs of these viruses in Europe and Asia are rodents of the family Muridae, subfamily Arvicolinae (Old World rodents), and in the Americas, rodents of the family Muridae, subfamily Sigmodontinae (New World rodents).

The viruses in circulation vary from country to country. The Oran, Lechiguana, Hu39694, and Andes viruses have been identified in Argentina; the Andes virus in Chile; the Río Mamore virus in Bolivia; the Laguna Negra virus in Paraguay; the Sin Nombre, New York, Bayou, and Black Creek Canal viruses in the United States; and the new varieties Choclo and Calabazo in Panama. While Peru has not reported cases of hantavirus pul-

monary syndrome, a variety of hantavirus related to the Río Mamore variety, described in Bolivia as a cause of the syndrome, has been found in the rodent *Oligoryzomys microtis* in the city of Iquitos in the Amazon forest (8). Just as the viruses in circulation are varied, so are the reservoirs that maintain them: *Oligoryzomys longicaudatus* in Argentina and Chile; *Calomys laucha* in Paraguay; *Bolomys lasiurus*, *Oligoryzomys nigripes*, and *Akodon* sp. in Brazil; *Oligoryzomys flavescens* and *Zygodontomys brevicauda* in Panama; and *Peromyscus maniculatus* and *Sigmodon hispidus* in the United States.

#### *Situation and Trends*

To mid-2001, 1,106 cases of this disease had been reported in the Region of the Americas, coming from Argentina, Bolivia, Brazil, Canada, Chile, Panama, Paraguay, the United States, and Uruguay (Table 5).

The first cases of this syndrome were identified in the United States in 1993; as of April 2001, 251 cases had been diagnosed in that country, all from 31 states in the middle and western part of the country. Brazil also identified its first cases in 1993, in the *município* of Juquitiba, state of São Paulo (9). By May 2001, cases had been identified in the states of São Paulo, Santa Catarina, Minas Gerais, Rio Grande do Sul, Paraná, Mato Grosso, Pará, Goiás, Maranhão, and Bahia. Most of them occurred in Paraná (26.7%), São Paulo (23.3%), Rio Grande do Sul (17.8%), and Mato Grosso (15.6%). In 1994, Canada identified its first case; subsequently, an average of five cases per year have been reported from four of its provinces: Alberta (17 cases), British Columbia (6 cases), Manitoba (2 cases), and Saskatchewan (5 cases), all in the western half of the country. In 1995, 15 cases were confirmed in Paraguay. Between 1996 and 1999, there were 4 to 5 cases per year in that country, and in the years 2000 and 2001, 15 and 26 cases, respectively, all from the Paraguayan Central Chaco (departments of Boquerón and Presidente Hayes). In September 1995, the first case was diagnosed in Chile, although retrospective serological studies point to the existence of cases since 1993. The cases reported come from the Metropolitan Region of Santiago (4 cases) and Health Regions V (1 case), VI (3 cases), VII (9 cases), VIII (42 cases), IX (35 cases), X (50 cases), and XI (26 cases).

In 1997, the first cases in Argentina, Bolivia, and Uruguay were identified. In Argentina, the cases come from three regions: in the north (provinces of Jujuy and Salta), some 147 cases were diagnosed; in the central area (provinces of Santa Fe, Entre Ríos, and Buenos Aires), 104 cases; and in the south (provinces of Neuquén, Río Negro, and Chubut), 31 cases. The first case of infection from Bolivia was diagnosed in Santiago de Chile; between 1998 and 2000, four additional cases were identified in the regions of Villamontes, Okinawa (80 kilometers north of the city of Santa Cruz), and Bermejo, near the border with Argentina. The 23 cases identified in Uruguay come from the departments of Canelones and Montevideo in the southern part of the country.

The latest country in the Region to identify cases was Panama. In December 1999, a death in the province of Los Santos that had been attributed to atypical pneumonia was diagnosed as hantavirus pulmonary syndrome. With cases continuing to occur, on 12 March 2000 Panamanian health authorities adopted a series of prevention and control measures. One of these was the establishment of an investigative committee that included specialists from the Panamanian Ministry of Health (Gorgas Memorial Institute for Health Studies and the Department of Surveillance), the Social Security Fund, local authorities, the U.S. Centers for Disease Control and Prevention, and the Pan American Health Organization. This committee was tasked with assessing the extent of the problem and its possible repercussions on the population's health, strengthening the surveillance system and laboratory diagnostic capacity, supporting seroprevalence studies of hantavirus antibodies, and identifying reservoirs of the virus. By March 2001, 28 cases of hantavirus pulmonary syndrome had been reported from four provinces: 21 from Los Santos, 4 from Coclé, 2 from Herrera, and 1 from Panamá.

The disease has primarily affected males (60% of cases in the United States, 83% in Uruguay, and 78% in Paraguay) between the ages of 10 and 75, with a median age of approximately 38 (37 in the United States and 39 in Canada), living in rural areas and working in agricultural activities (78% in Canada, 44% in Chile, 83% in Paraguay, and 68% in Uruguay). Case-fatality rates from hantavirus pulmonary syndrome vary widely among the countries, with percentages of 51.9% in Brazil, 44.0% in Chile, 38.0% in the United States and Canada, 24.3% in Argentina, 21.4% in Panama, and 20.0% in Paraguay. These differences seem to be related to the viral variety causing the disease and the patient's immunological response to infection (10–12). In South America, several studies have demonstrated the existence of mild and asymptomatic hantavirus infections (13, 14) and have shown high prevalence of hantavirus antibodies to strains other than the Sin Nombre virus in rural populations (15) and urban populations at low socioeconomic levels (16). The Sin Nombre virus is the cause of the serious infections in North America, although mild forms of infection by this virus have also been described in the United States (17).

#### *Challenges for Control*

An important problem for public health is the possibility of person-to-person transmission of hantavirus. Between September and December 1996, there was an outbreak of hantavirus pulmonary syndrome in the province of Río Negro, Argentina, affecting at least 18 people. Four of the 18 cases involved physicians who lived in the region but had not been in any rural area before contracting the disease. The epidemiological, molecular, and ecological data confirmed person-to-person transmission (18–20). The etiological agent in this outbreak was the Andes virus which, according to a clinical study carried out on 25

patients, causes symptoms similar to those produced by the Sin Nombre virus, but with a higher level of renal compromise (21).

The wide dissemination of hantavirus and its reservoirs, the high fatality rate, and the increase in the number of cases reported—the result of better recognition of the disease by clinicians and more sensitive surveillance systems—point to the need to continue strengthening national and regional surveillance systems and the diagnostic capacity of national laboratories. Improved training is needed for health professionals in the early identification of suspected cases in order to reduce death rates, as is the implementation of preventive health measures in the community in order to decrease incidence. Since this disease is related to the increase in contact between humans and rodents in rural areas, rural dwellers should be provided with strategies that will improve the conditions in their homes and surrounding areas in order to reduce the entry of wild rodents into houses. In addition, strategies should be proposed for improving grain storage systems, since access to grain is one of the principal reasons why rodents enter homes. Person-to-person transmission should be investigated in more depth through controlled studies in order to identify associated risk factors, so that testable preventive measures may be designed.

#### **Hemolytic Uremic Syndrome**

Hemolytic uremic syndrome is a disease characterized by microangiopathic hemolytic anemia associated with thrombocytopenia and acute renal insufficiency. It can be caused by verotoxin-producing *Escherichia coli*, *Shigella dysenteriae* type 1, Coxsackievirus, Echovirus, and rotavirus. More than 90% of cases are associated with infection by *E. coli* O157:H7, although other serotypes of *E. coli* also are known to produce the verotoxin (O25:H11, O121, O145, O113, ECEHO111:H8, O48:H21). This infection is associated with the ingestion of contaminated and insufficiently cooked food, especially meat. Person-to-person transmission, especially among families and in child-care facilities, is also an important means of acquiring the infection. Other routes are the consumption of contaminated cow's milk and water.

Between 2% and 7% of *E. coli* O157:H7 infections lead to hemolytic uremic syndrome, particularly in children under 5 years of age. Approximately 10% of these patients require dialysis for an extended period of time, and 8% experience other complications throughout their lives, such as high blood pressure, convulsions, and paralysis. In addition, approximately one-third of people with hemolytic uremic syndrome present renal abnormalities for many years.

In the United States, where an estimated 73,000 cases and 61 deaths from infection by *E. coli* O157:H7 occur each year, this syndrome is the principal cause of renal insufficiency in children. The majority of cases are caused by *E. coli* O157:H7.

After its identification in the United States in 1982, during an outbreak of acute bloody diarrhea stemming from the ingestion

of contaminated hamburger, the disease was diagnosed in some Latin American countries. In Argentina since 1995, between 250 and 350 cases per year have been diagnosed in the city of Buenos Aires and the provinces of Buenos Aires, Entre Ríos, Santa Fe, Córdoba, Salta, Tucumán, Mendoza, Neuquén, and Chubut. In Bolivia between 1986 and 2001, a sentinel hospital surveillance system detected 40 cases in La Paz and 11 in Santa Cruz. In Brazil, retrospective studies indicate that since 1976 several serotypes of Shiga toxin-producing *Escherichia coli* (STEC) have caused cases of diarrhea in São Paulo; in 1990, a strain of O157:H7 was isolated in a patient infected with human immunodeficiency virus (HIV). Uruguay has recorded 25 cases of hemolytic uremic syndrome, 14 of which required dialysis.

The high percentage of patients with hemolytic uremic syndrome who require dialysis for an extended period (10% of the total) and who will probably require a kidney transplant, as well as the high percentage of deaths (5% of cases), spurred several Latin American countries (Brazil, Bolivia, Argentina) to establish surveillance systems for this disease that are capable of identifying the risk factors associated with it in order to implement appropriate preventive measures.

### West Nile Fever

This disease is caused by the West Nile virus, a flavivirus taxonomically related to the Japanese encephalitis serocomplex. It is transmitted by a mosquito, principally species of *Culex*, such as *C. pipiens*, *C. salinarius*, and *C. restuans*, and its enzootic cycle involves the vector and birds, which serve as the reservoir. In general, the West Nile virus causes an asymptomatic infection or a mild febrile illness in humans. The most serious cases produce meningoencephalitis-like symptoms characterized by headache, high fever, stiff neck, stupor, disorientation, coma, tremor, convulsions, muscular weakness, paralysis, and, very rarely, death.

The West Nile virus was first isolated in Uganda and has been responsible for outbreaks in Algeria, Egypt, India, Israel, the Czech Republic, the Democratic Republic of the Congo, South Africa, Romania, and Russia. In the Region of the Americas, the first recorded outbreak of encephalitis due to the West Nile virus occurred in the New York City metropolitan area in the late summer of 1999. During this outbreak, 62 cases and 7 deaths were reported. In addition to the cases in humans, there were concurrent epidemics in birds and horses. The principal bird family involved was Corvidae, especially the American Crow, Blue Jay, and Fish Crow species. On that occasion, the virus was found in four states (Connecticut, Maryland, New Jersey, and New York) (22). In 2000, greater epizootic activity was recorded in birds and mosquitoes in 12 states (Connecticut, Delaware, Maryland, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Pennsylvania, Rhode Island, Vermont, and Virginia) and the District of Columbia. Seven of these jurisdictions reported severe cases of infection by the West Nile virus in humans, horses, and other mam-

mals. A total of 18 cases were reported in 2000 (14 from New York and 4 from New Jersey), with one death. The average age of the patients was 62 (range from 36 to 87); 12 were men.

In 1999, as part of the investigation of the outbreak in New York City, a seroprevalence study of 677 residents of the Borough of Queens was carried out. It revealed that 19 people (2.8%), 7 men and 12 women, had antibodies against the West Nile virus and that seropositivity increased with age. Of the seropositive individuals, 30% acknowledged having had a febrile illness in the past three months, in contrast to 11% of the seronegative individuals ( $P < 0.5$ ).

Because birds that may carry the virus pass through many different areas during their migration from breeding grounds in the north to wintering areas in the southeastern United States, Mexico, Central America, the Caribbean Islands, and South America, it is necessary to set up systems to monitor this disease in animals, and especially to test dead birds. These systems could operate as an early warning for the implementation of prevention and control measures before the occurrence of cases in humans. For these measures to be successful, broad community participation is needed, as is improvement of the diagnostic capacity of laboratories in the countries where the commonly implicated bird species migrate or live.

## CHRONIC COMMUNICABLE DISEASES

### Tuberculosis

In recent decades, certain factors have contributed to aggravating the problem of tuberculosis in the Region of the Americas. In some countries, this situation is associated with an increase in the number of people living in poverty, which has accentuated social inequalities, and with a consequent reduction in access to health services, growth of the population living in marginal urban areas, and rise in migration in search of a better quality of life. When these factors are added to the abandonment of disease control activities, the weakening of programs, and the decline in their effectiveness, it is not surprising that in some countries the resistance of *Mycobacterium tuberculosis* to different antituberculosis drugs is a serious threat to efforts to control and eliminate tuberculosis as a public health problem. The emergence of the human immunodeficiency virus pandemic is exacerbating this situation.

Since 1993, when the World Health Organization declared that tuberculosis should be considered a worldwide emergency, this disease became a health priority for some countries of the Region. The budget for control activities began to increase in 1998, and since then, with few exceptions, drugs and supplies to guarantee treatment of all reported cases of tuberculosis have been regularly available. In 1998, 19 of the 25 countries of the Region with more than 1 million inhabitants had adopted the DOTS strategy (directly observed treatment—short course).

Between 1998 and 2000, five more countries initiated the strategy in pilot areas. An additional result of applying the DOTS strategy has been the support national tuberculosis programs have received from outside sources. As of late 2000, 14 countries were receiving support with two-, three-, and five-year projects (Argentina, Bolivia, Brazil, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Mexico, Nicaragua, Panama, Peru, and Venezuela).

### *Risk Situations*

Tuberculosis affects society's poorest and most vulnerable individuals. Some 95% of cases and 98% of deaths from this cause occur in the countries with low and moderate income levels. The negative impact of tuberculosis on a country's economy stems from the fact that cases are concentrated in the most productive age groups. Moreover, even patients with access to health care services lose an average of three to four months of work. Between 20% and 30% of tuberculosis patients' family income must be invested in expenses related to the disease, and approximately 15 years of economic support to the family is lost due to premature death (23).

The principal limitations on control of tuberculosis in the Region are mainly related to the lack of political will on the part of some governments to give priority to controlling tuberculosis and co-infection with HIV/AIDS and tuberculosis, especially in the countries with a high prevalence of both diseases. Moreover, even though in the year 2000 the resistance of *Mycobacterium tuberculosis* to multiple antituberculosis drugs was not a serious health problem in the Americas, it may become a threat for countries that have neglected control programs in prior years.

### *Tuberculosis Morbidity, Mortality, Fatality*

In 1999, according to reports to PAHO/WHO, 6% of the world's cases of tuberculosis were found in the Region of the Americas. Approximately 50% of those cases are reported by two countries: Brazil (33%) and Peru (17%). Until 2000, Peru was one of the 22 countries in the world with the greatest tuberculosis burden.

During the 1990s, an average of 250,000 cases of all forms of tuberculosis were reported each year in the Region. This stable trend also exists in the number of new patients with positive cultures. Approximately one-third of tuberculosis cases are not diagnosed or reported to the surveillance systems; therefore, it is estimated that the actual number of new cases each year is about 400,000. In 1999, the regional incidence rate was 29 per 100,000 population (238,082 cases) for all forms of tuberculosis and 17 per 100,000 (137,675 cases) for new positive pulmonary cases. The distribution of new bacilliferous cases by age group reveals that for both sexes the youngest groups (ages 15 to 55) are the most affected, except in some countries with low prevalence. Between 1998 and 1999 there was a decrease of 5.4% in the regional total of tuberculosis cases reported; however, the number of bacilliferous or positive smear cases (positive for alcohol-

acid-fast bacilli) increased 9% (Table 6). Countries with a high prevalence of tuberculosis, such as Bolivia, Brazil, Ecuador, Guatemala, Honduras, Mexico, and Panama, reported substantial declines in the total number of cases.

In the countries with effective tuberculosis programs, such as Canada, Chile, Cuba, Nicaragua, Peru, the United States, and Uruguay, the decline in the number of cases reported is reliable. However, in other countries the reduction noted between 1998 and 1999 may not be real, but rather may be due to reduced efforts to find individuals with respiratory symptoms, deficiencies in the systems for recording and reporting cases, and problems in the laboratory network.

Estimates of tuberculosis rates based on the countries' annual reports to PAHO permit them to be grouped according to four different epidemiological situations (Table 7). These groups can be used as a framework for establishing tuberculosis control priorities. The six countries in the first group, with an estimated incidence greater than 85 per 100,000 inhabitants, together with Brazil and Mexico (which were added due to their tuberculosis burden and their population size), are the eight countries assigned highest priority for control of the disease in the Region.

Analysis of the distribution of the incidence of bacilliferous tuberculosis by age group shows that all age groups are affected, which reflects a high level of transmission of *M. tuberculosis*. A high percentage of affected individuals are between the ages of 15 and 54—that is, they are economically active individuals in the same age group in which HIV infection is increasing the clinical and epidemiological severity of tuberculosis. The male/female ratio remains around 1.5:1.

In 1960, 53,486 tuberculosis deaths were recorded in the Region (11.8 per 100,000 population), and in 1995, 22,116 tuberculosis deaths were recorded (rate of 3.1). In other words, in 35 years there was a decline in mortality of approximately 59%. In all countries, mortality has been decreasing to a greater or lesser degree; however, if under-recording, estimated at 25%, is taken into consideration, the more recent total could be approximately 30,000 deaths. Since 1970, many countries have enjoyed a regular supply of drugs and have been using shortened therapeutic plans of recognized efficacy, which is an important factor in the declining mortality trend.

### *Tubercular Meningitis and BCG*

Vaccination with BCG has been included in the Expanded Program on Immunization in the Americas since 1977–1978. The efficacy among those vaccinated is estimated at 60%–80%, the immunity it affords is probably prolonged, and the disease is on the decline in the Region (24). For these reasons, it is recommended that the countries administer BCG to newborns and children under 1 year. Coverage of the population under 1 year of age has increased steadily in the Region in recent years, which has helped decrease the number of cases of tubercular meningitis in children under 5. In 1998, the lowest levels of coverage were



in Venezuela (80%), Colombia (82%), and Paraguay (83%). In that year, the highest specific incidence rates for tubercular meningitis in children under 5 were reported in Panama (2.9 per 100,000 children in that age group), the Dominican Republic (2.6), Bolivia (1.5), Paraguay (1.2), and Honduras (0.97), countries in which BCG coverage was 99%, 86%, 99%, 83%, and 93%, respectively.

#### *HIV/AIDS and Tuberculosis*

The HIV/AIDS pandemic and HIV/tuberculosis co-infection favor the increase in cases of tuberculosis and limit the possibility of controlling the disease. The prevalence in the Region of HIV/AIDS in individuals between the ages of 15 and 49 is estimated to be 0.56% in North America, 0.57% in Latin America, and 2.0% in the Caribbean (25). Accurate information on the prevalence of co-infection with HIV and tuberculosis is not available. It is estimated that 5% of the cases of tuberculosis reported each year occur in patients with HIV. This percentage could reach 10% or more in countries or cities with a generalized HIV epidemic and a base population with high prevalence of tuberculosis infection.

The national tuberculosis programs in Cuba and Uruguay carry out systematic surveillance for HIV/tuberculosis co-infection among new cases of tuberculosis and have found prevalences of 1.4% and 1.3%, respectively (24). According to the national survey carried out in Nicaragua, HIV prevalence in tuberculosis patients was 0.8% in 1999, and in a similar survey carried out in Bolivia in 2001 the rate was 0.5%. In that same year, a national study was under way in Honduras. Information on the rest of the countries is incomplete, since it comes from specific surveys in some cities, hospitals, or health centers. In several countries there are legal limitations on obtaining or updating information about the actual situation of HIV and tuberculosis prevalence, while in others the methodology used to obtain this information has not been the most appropriate. Therefore, it is recommended that the countries use the protocol developed and endorsed by WHO for studies of HIV and tuberculosis prevalence.

#### *Resistance to Antituberculosis Drugs*

Historically, systematic surveillance of drug resistance has been conducted in Canada, Chile, Cuba, the United States, and Uruguay. Data on resistance to antituberculosis drugs are available from national surveys carried out between 1994 and 2000 in 14 countries: Argentina, Bolivia, Brazil, Canada, Chile, Colombia, Cuba, the Dominican Republic, Nicaragua, Peru, Puerto Rico, the United States, Uruguay, and Venezuela (Table 8). It is expected that by the end of the 2002–2003 period surveillance studies will have been carried out in seven more countries (El Salvador, Ecuador, Guatemala, Honduras, Mexico, Paraguay, and Panama), and the surveys in Argentina and the Dominican Republic will have been repeated. It should be noted that the data from Canada

presented in Table 8 refer to the combined resistance of new and previously treated cases.

#### *Regional and Worldwide Response*

In 1998, PAHO and the countries organized the StopTB Americas initiative, with the following main objectives: (1) achieving worldwide goals for the control of tuberculosis in 2005, (2) reducing deaths from and prevalence of tuberculosis by 50% by 2010, (3) implementing an effective strategy for confronting the challenges that are emerging in connection with multi-drug resistance and HIV/TB co-infection, and (4) developing new tools that make it possible to eliminate tuberculosis as a health problem.

The current challenge consists of expanding DOTS coverage to 100% of the 25 countries with populations exceeding a million, which represent 98% of the tuberculosis case burden in the Region. This goal should be achieved in 24 countries by the end of 2003 and in the entire Region, including Brazil, by 2005. It is necessary to seek the involvement of new partners, including ones from outside the health sector, to expand efforts to control tuberculosis.

#### *Implementation of the DOTS Strategy in the Region*

This strategy has the following components: (1) political commitment by the national governments to ensuring that tuberculosis control is a health priority; (2) guarantee of compliance with annual needs for antituberculosis drugs and other related supplies; (3) short-course treatment supervised by health personnel or a trained individual; (4) availability of a network performing diagnostic cultures under systematic quality control; and (5) existence of an adequate system for recording and reporting cases of tuberculosis.

Prior to 1996, 10 countries were already applying the DOTS strategy. Three more adopted it that year, three in 1997, three in 1998, four in 1999, and one (Paraguay) in 2000, making 24 countries in all. In 2001, the National Tuberculosis Program of Guyana began organizing pilot areas for use of the recommended intervention.

The results of applying the strategy in the Region of the Americas can be evaluated with certain indicators that measure the effectiveness of control activities. One of the most important indicators is analysis of the results of treatment in cohorts of baciliferous patients. This indicator highlights the gap between the countries of the Region that implement the strategy appropriately (cure rate of 83%) and those that have not yet implemented it appropriately (43% cure rate). Table 9 shows that in 12 countries the strategy is in an expansion stage. These countries require closer technical cooperation and advice to achieve the goal of full coverage with the DOTS strategy and to meet the objectives for 2005.

#### **Leprosy**

In 1999, only Brazil, with a leprosy prevalence rate of 3.57 per 10,000 population, and Paraguay, with a rate of 1.22 per 10,000,

had not achieved the goal established by WHO at the 44th World Health Assembly (Geneva, 1991) of eliminating leprosy as a health problem, defined as less than 1 case per 10,000 population in Latin America (Table 10). Official data from Haiti for recent years are somewhat inconsistent, which may be due to failure to adopt operational definitions associated with the elimination effort (for example, definitions of case, cure, and discharge). The leprosy problem is very limited in the English-speaking Caribbean, including Guyana and Suriname. Chile is not considered an endemic area for leprosy.

The countries of the Region have achieved excellent results in decreasing the burden of the disease with the massive introduction of multi-drug therapy. This success was accomplished through national elimination plans based on stratification of the problem and in accordance with the Regional Plan of Action for the Elimination of Leprosy in the Americas promoted by PAHO in 1992. In fact, in the period from 1992 to 1999, the prevalence of leprosy declined by 80% (from 369,846 to 72,605 cases), corresponding to a drop in the rate from 8.1 per 10,000 population in 1992 to 1.5 per 10,000 in 1999. In Latin America, the number of countries that have not eliminated leprosy fell from 14 in 1992 to 2 in 1999. For the same period, it is estimated that coverage with multi-drug therapy regimens increased from 23% to approximately 80%–90% in the countries of the Region; however, official data are not available for all the states in Brazil.

At the Third Regional Conference on the Elimination of Leprosy from the Americas, held in Venezuela in 1999, PAHO proposed a Regional Plan for Consolidation of Leprosy Elimination, which sets out a strategy for follow-up of the regional elimination effort at the national and subnational levels. It calls for adapting specific programs and national health systems to the new epidemiological situations and emphasizing subregional initiatives and cooperation among countries in priority areas.

The current leprosy picture is a mosaic of countries or regions with very different prevalence rates of the disease. In Brazil and Paraguay, for example, it remains a public health problem; in Argentina, Colombia, Cuba, Mexico, and Venezuela the situation is less serious; in Uruguay and the countries of Central America and the English-speaking Caribbean, it is considered residual.

Analysis from an exclusively national standpoint, however, is insufficient for assessing the important challenges the Region must still confront with regard to this disease. A survey conducted in 1999 by PAHO in the Latin American countries that had achieved a national prevalence rate corresponding to leprosy elimination found that an estimated 40 million people were living in departments, provinces, or states in which the disease had still not been eliminated (26). Of the 191 territorial units in eight countries surveyed, 37 (19%) had not achieved satisfactory levels of prevalence to progress to elimination.

Hidden pockets of prevalence in countries or areas where leprosy is considered eliminated must be addressed. These pockets are the result of the low effectiveness of the strategies for timely de-

tection of all existing cases by the health services. In just the Latin American countries that have already eliminated leprosy at the national level, it is estimated that 7,000 cases that have occurred in the last five years have not yet been detected by the health services. This figure could be as high as 25,000 if the countries that have not yet achieved the elimination rate were included—especially Brazil, which has states with high prevalence (27).

The active search for as-yet unknown active cases of leprosy and patients who abandon multi-drug therapy in areas that are difficult to reach is continuing with support from PAHO/WHO, through special projects such as the Special Action Program for Elimination of Leprosy. Support for specific community mobilization efforts to search for hidden cases is being provided through leprosy elimination campaigns.

PAHO supports the monitoring of leprosy elimination through a standardized activity known as Surveillance of Leprosy Elimination. This practice provides information on, among other things, the economic impact of leprosy, access to multi-drug therapy for the patient and his or her family, the quality of direct care provided to the patient, and the consistency of statistical information available at the local and central levels. This type of activity has already been carried out in Argentina, Colombia, Mexico, Paraguay, Venezuela, and several states in Brazil.

With implementation of the Regional Plan for Consolidation of Leprosy Elimination in the Americas 2000–2005, the Region will be embarking on a new stage in the elimination of this disease, aimed at preventing its re-emergence.

## VECTOR-BORNE DISEASES

### Dengue and Dengue Hemorrhagic Fever

Dengue is a growing public health problem. Some 2,500 million people worldwide are at risk of contracting the disease and more than 100 countries have reported epidemics of dengue fever and dengue hemorrhagic fever. Each year, there are an estimated 50 million cases of dengue fever and 250,000 cases of dengue hemorrhagic fever, with more than 500,000 hospitalizations and more than 20,000 deaths. Of dengue hemorrhagic fever cases, 95% occur in children under 15 years old. A dengue epidemic not only burdens public health systems, but causes absenteeism from work and schools, and loss of income. In some instances, the press and some social groups may constrain the government's ability to control the situation, leading to the government's loss of credibility. Economic studies carried out in the 1970s and 1980s after Puerto Rico's and Cuba's epidemics show that a dengue epidemic can cost more than US\$ 100 million in medical services, absenteeism, control measures, and health personnel salaries (28).

Dengue fever and dengue hemorrhagic fever are caused by four virus serotypes: dengue 1 through 4. Infection with one serotype confers immunity to that virus, but not to the others. In fact, a subsequent infection by another virus serotype has a

higher likelihood of resulting in dengue hemorrhagic fever. The mosquito *Aedes aegypti* is the vector that maintains dengue's urban transmission cycle. By 1962, eighteen mainland countries and several Caribbean-island nations had eliminated this vector. Over time, however, eradication programs failed to marshal sufficient political support, and budgetary constraints resulted in inadequate management and limited availability of health personnel. Gains made in controlling the vector were further eroded by *Aedes aegypti*'s resistance to chlorinated insecticides and rising cost of materials, equipment, and wages. Moreover, water supply and solid waste management problems greatly contributed to the increase of vector densities, as they encouraged the population to store water in receptacles that added to the number of breeding sites. Finally, Latin America's and the Caribbean's rapid population growth and urbanization, as well as better transportation and increased travel, also have facilitated the dissemination of dengue viruses. By mid-2001, every country in the Americas except Canada and mainland Chile had been reinfested.

### Dengue

The introduction of dengue serotype 1 in Costa Rica was associated with severe outbreaks in 1993 and subsequent years. After more than a decade of absence since last isolated in Puerto Rico, serotype 3 was detected in Panama and Nicaragua in 1994, and was associated with a nationwide epidemic of dengue and dengue hemorrhagic fever in the latter country. In 1995, it spread to other Central American countries and to Mexico, causing many dengue epidemics. The appearance of serotype 3 in Mexico coincided with an increase in the number of dengue hemorrhagic fever cases, although only serotype 1 and, more commonly, serotype 2 were isolated from those patients. It should be noted that this serotype 3 strain belongs to the genotype that has caused major epidemics of dengue hemorrhagic fever in Sri Lanka and India. As of August 1997, serotype 3 had not been isolated outside Central America and Mexico, but in late 2000 and the first months of 2001 it was detected in Venezuela and Brazil.

The number of cases gradually increased since 1981, and the epidemic peaked in 1998, with a total of 741,794 reported cases, including 12,396 cases of dengue hemorrhagic fever and 151 deaths. Brazil reported more than 70% of the dengue cases, with an incidence of more than 320 cases per 100,000 population, but other countries in the Region reported higher incidences than Brazil. Several countries experienced epidemics in 2000 and early 2001: Ecuador in February 2000; Cuba, Costa Rica, El Salvador, and Guatemala from June to September 2000; Brazil and Peru from January to March 2001; and Paraguay in 1999 and 2000. The estimated number of cases was in the hundreds of thousands, although the reporting of cases was less than accurate. This situation led to a state of emergency being declared in several countries (Table 11).

In 2000, Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua reported dengue epidemics. These epidemics probably were due to an elevated density of *Aedes aegypti* populations, as well as to various other factors that have helped to deteriorate many of the Region's dengue programs. In a few instances, particularly in El Salvador, the introduction of a new dengue serotype meant that many susceptible persons could become affected.

### Dengue Hemorrhagic Fever

In 1981, Cuba reported the first major outbreak of dengue hemorrhagic fever in the Americas. Prior to this, suspected cases of dengue hemorrhagic fever or fatal dengue cases had been reported only by Curaçao, Honduras, Jamaica, Puerto Rico, and Venezuela, but only a few of them fulfilled WHO's criteria for diagnosis of dengue hemorrhagic fever/dengue shock syndrome and most were not laboratory-confirmed. During Cuba's epidemic, 344,203 cases of dengue were reported, of which 10,312 were classified as severe (WHO grades II–IV) and 158 were fatal. There were 116,143 patients hospitalized, most of them during a three-month period.

Between 1981 and 2000, more than 82,412 cases of dengue hemorrhagic fever and 1,135 deaths were reported by 25 countries in the Americas; 40,747 (49%) of the reports originated from Venezuela. Excluding Colombia, Cuba, and Venezuela, the number of reported cases by country during the period varied from 1 to 1,456. Nicaragua and Mexico reported more than 1,000 cases each, most of them during 1992–1998. Ecuador and Peru are the latest countries to report dengue hemorrhagic fever. By the beginning of 2001, most of the Region's countries had reported this form of the disease (Table 12).

In 1998, Venezuela and Colombia reported 10,894 cases of dengue hemorrhagic fever, accounting for 88% of dengue hemorrhagic fever cases reported that year in the Region. The case-fatality rate for dengue hemorrhagic fever was 0.59% in Venezuela and 1.22% in Colombia. These two countries were unable to eradicate *Aedes aegypti*, and thus have a longer history of continued dengue transmission with multiple serotypes.

In 1997, dengue/dengue hemorrhagic fever re-emerged in Cuba after 16 years of absence, affecting the municipality of Santiago de Cuba. Cuban health authorities reported 2,946 cases of dengue, 205 cases of dengue hemorrhagic fever, and 12 deaths, all among adults; they also declared that the epidemic had been brought under control and that no dengue transmission was occurring in Cuba.

The epidemics in Cuba and Brazil (in 1990–1991 and 1994) were both clearly associated with dengue serotype 2 virus. In both countries, serotype 1 had been introduced four years prior to the epidemic. Cuba suffered a major epidemic, but only relatively small outbreaks were observed in Brazil. Ecuador and Peru experienced a similar sequence of dengue infections with these serotypes: the first eight cases of dengue hemorrhagic fever were reported from Ecuador in 2000, and Peru began witnessing a

dengue/dengue hemorrhagic fever epidemic in the northernmost states early in 2001.

A distinct epidemiologic pattern was observed in Venezuela in 1989–1990 and in French Guiana in 1990–1991, countries where dengue had been endemic for more than 20 years before the emergence of their first dengue hemorrhagic fever epidemic. Dengue serotype 2 was predominant in both countries; it was the only serotype found in the tissues of fatal cases in Venezuela.

Overall, the case fatality rate of dengue hemorrhagic fever in the Americas is 1.38%, but it varies markedly from country to country. For example, the case fatality rate in 2000 ranged from 21.4% in Guatemala, to 0.63% in Nicaragua, and to 0.23% in Venezuela, a variation that could be explained by such factors as reporting criteria, viral strain, case management, and host genetic factors. Because case identification, reporting, and treatment are poor when dengue hemorrhagic fever first enters a country, the case fatality rate tends to be high. Once it has become established and is well identified and properly treated, the case fatality rate drops considerably.

#### *Prevention and Control*

Because a safe, efficacious, and inexpensive dengue vaccine would greatly contribute to control dengue in developing countries, its development has been the goal of scientific groups and specialized agencies such as the National Institutes of Health in the United States of America and WHO. Attenuated, inactivated, or subunit vaccines; infectious clone derived vaccines; antigen vectored systems; and nucleic acid vaccines are currently being tested against dengue and other flaviviruses.

At this point, however, vector control is the only approach for combating dengue and dengue hemorrhagic fever. Efforts to control *Aedes albopictus*, in particular, must enlist the community's participation and should be based on behavioral change and source reduction. Strong intra- and intersectoral activities and health education programs in formal education settings also are needed. Most of the programs that rely solely on chemical control, frequently consist of emergency responses rather than sustained actions, and commonly lack financial resources (29).

The frequent outbreaks of dengue fever and the increase of dengue hemorrhagic fever cases in several countries demonstrate that current emergency response programs are only having a limited effect. In 1999, a blueprint for the next generation of dengue control programs was developed, which will complement the 1997 hemispheric plan. The blueprint sets the stage for strengthening the implementation of social communication and community participation interventions, and focuses on behavioral change.

Case reporting must include clinical cases (i.e., probable cases), laboratory-confirmed cases, cases of dengue hemorrhagic fever, and deaths due to dengue hemorrhagic fever/dengue shock syndrome. Some countries do not report probable cases and report only laboratory-confirmed cases, which gives a misleading

impression. Reporting of clinical cases is a litmus test for the effectiveness of surveillance efforts. The laboratory confirms the presence of the virus and helps determine the virus serotype that is circulating and the severity of the situation.

To remove the threat of dengue it will be necessary to strengthen existing dengue programs in the Region, in order to incorporate new strategies. These include firm political and financial support with effective intersectoral coordination; selective vector control with an effective social communications program based on behavioral change and community participation; active dengue surveillance based on a strong health information system; preparedness for outbreaks and epidemics; training and capacity-building at all levels; putting in place evaluation tools that periodically measure the effectiveness of the vector control interventions; patient care within and outside the formal health sector, including disease recognition and proper response (including initial care in the home and knowledge of basic treatment measures); and adequate political leadership, particularly during epidemics.

#### **Malaria**

The highest number of cases of malaria reported in the Region since records have been kept was 1.3 million in 1995. Since then the situation has stabilized, and in the year 2000 some 1.14 million cases were reported. Although only provisional information is available on Belize, French Guiana, and Haiti, the number of cases reported in 2000 was the lowest since 1998.

Brazil accounted for 53.6% of the 1.14 million cases reported in 2000, followed by Colombia (9.5%), Ecuador (8.7%), Peru (6.1%), Guatemala (4.7%), Honduras (3.1%), Bolivia (2.8%), Venezuela (2.6%), Guyana (2.1%), and Suriname (1.2%). In that same year, the nine South American countries that contain portions of the Amazon forest (Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname, and Venezuela) reported 86.8% of all malaria cases in the Region.

In 2000, approximately 283 million people, or 57% of the Region's population, lived in the 21 countries where this disease is transmitted, and approximately 86 million lived in areas with high (more than 10 cases per 1,000 population) or moderate (1 to 10 cases per 1,000) transmission risk. Some 93.5% of the cases occurred in those areas. In the Central American subregion (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama) and Mexico in the same year, approximately 89 million people lived in areas with conditions conducive to malaria transmission. Of this population, 35.3% lived in high-risk areas, 28.9% lived in moderate-risk areas, and 35.7% lived in low-risk areas (less than 1 case per 1,000 population). Approximately 3.5 million blood slides were examined in those countries in 2000, and 125,000 cases of malaria were detected. The distribution of cases by country was as follows: Mexico, 7,390; Belize, 1,486; Costa Rica, 1,879; El Salvador, 745; Guatemala, 53,311; Honduras,

35,122; Nicaragua, 24,014; and Panama, 1,036. Three of the eight countries (Honduras, Guatemala, and Nicaragua) accounted for 90.0% of the cases.

The annual parasite index for the population in moderate- and high-risk areas was 12.36 per 1,000. The countries with the highest indices were Suriname, Guyana, and French Guiana, followed by Brazil, Venezuela, and Ecuador (Table 13). In the Region of the Americas, the predominant malarial parasite is *Plasmodium vivax*. In the high- and moderate-risk areas, it was the cause of 73.7% of cases in 1999 and 82.4% in 2000. In almost all the other cases, the etiological agent was *P. falciparum*, and in a very small number of cases, *P. malariae*.

In Brazil, the percentage of cases caused by *P. vivax* increased from 75.5% in 1997 to 81.4% in 2000. In Mexico and the Central American countries, the percentage remained steady at 97.0% during that period, while in the Andean Area (Bolivia, Colombia, Ecuador, Peru, and Venezuela) this parasite was responsible for 70.5% of the cases in 1997 and 71.5% in 2000. In French Guiana, Guyana, and Suriname, 36.5% of malaria cases were caused by *P. vivax* in 1997 and 35.0% in 2000. In Haiti and the Dominican Republic, the only Caribbean countries where the disease is transmitted, *P. falciparum* is responsible for essentially all cases. Although the data for Haiti are incomplete, it is known that transmission occurs in the border area of these two countries. Data from the Dominican Republic show a reduction of transmission and the presence of cases imported from Haiti. In Argentina and Paraguay, *P. vivax* is responsible for all cases. The number of cases in Argentina declined slightly from 592 in 1997 to 439 in 2000, while in Paraguay the number of cases increased from 567 to 6,853 in the same period.

Mortality from malaria in the Region is associated with pathogenesis by *P. falciparum*. Preliminary data for 2000 indicate that there were 301 deaths from this disease (Table 13).

#### *Quantification and Description of the Response*

From 1992, when the global strategy for malaria control was adopted, to 2000, the 21 countries of the Americas with active malaria transmission applied the four technical elements of this strategy with varying degrees of intensity. These elements are: (1) early diagnosis and timely treatment; (2) planning and implementation of selected preventive measures; (3) detection, containment, and prevention of epidemics; and (4) strengthening of the local health teams' ability to evaluate the disease situation and conduct basic and applied research, particularly on the ecological, social, and economic factors that influence malaria's transmission and impact.

Early diagnosis and timely treatment are fostered through expansion of the health sector's operating capacity at the local and national levels. Such efforts are reflected in the increased number of blood tests performed each year. The number surpassed 10

million in the year 2000, the most in the Region in the last 25 years. The number of cases exceeded one million for the first time in 1987 and peaked in 1995. That same year saw the highest incidence rate of the disease in malarious areas and the highest percentage of positive slide results in recent years (Table 14).

In 1998, in order to significantly reduce the burden of malaria in the world, the Director-General of the World Health Organization launched the "Roll Back Malaria" initiative in worldwide association with other organizations, including the United Nations system, the World Bank, the national governments of countries where the disease is endemic, bilateral cooperation organizations, nongovernmental organizations, and civil society. The key elements of the initiative reinforce those of the global strategy for malaria control; they stress effective management, early diagnosis, and timely treatment, and they underscore the importance of multiple methods of prevention, operational research, effective coordination among various groups and organizations in the fight against the disease, and a dynamic worldwide alliance of all stakeholders.

In October 1999, this initiative was implemented in the Americas at a meeting in Lima, Peru, of the nine South American countries that contain tropical rain forest habitat (Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname, and Venezuela). The countries agreed to strengthen activities to control the disease and prepared work plans. At a second meeting, held in 2000, the work plans were re-examined, areas of research and development were defined, indicators for monitoring the work plans' progress were chosen, and joint activities on matters of shared epidemiological interest were planned.

In Mesoamerica, which includes Central America, Mexico, Haiti, and the Dominican Republic, the initiative was implemented in November 2000 with an assessment of the current situation and preparation of national and joint work plans.

One of the principal benefits that has derived from implementing the global strategy for malaria control in the Region, especially early diagnosis and timely treatment, is the pronounced reduction in the number of deaths caused by *P. falciparum*. In 1994, when *P. falciparum* accounted for 24.0% of the cases, the countries reported 816 deaths from malaria, while in 2000, when this parasite accounted for 26.1% of the cases, some 277 deaths were reported; of these, 267 were in Amazon forest countries (Table 13).

The availability of first-line antimalarial drugs increased between 1996 and 1999. Despite the decreased mortality from *P. falciparum* that may be associated with the wider availability of these drugs, studies carried out mainly in the Amazon forest countries showed varying levels of resistance of the parasite to the most important drugs, and even a reduction of its sensitivity to some second-line antimalarial drugs. Although resistance to chloroquine and sulfadoxine/pyrimethamine has been reported for some decades, it has been highly variable among the coun-

tries of the Region. During the 1990s and in 2000, in-vivo studies of the efficacy of antimalarial drugs demonstrated the resistance of *P. falciparum* to chloroquine at various sites in Brazil, Colombia, Peru, and Venezuela, but in the same places this parasite was less resistant to sulfadoxine/pyrimethamine. In Colombia, the microorganism is sensitive to amodiaquine, while in Peru it has shown sensitivity to the combination of sulfadoxine/pyrimethamine and artesunate, as well as mefloquine plus artesunate in different areas of the country. Studies carried out in Venezuela in 1999 and in Brazil in 2000 showed the parasite to be sensitive to the combination of quinine and tetracycline. No resistance was found in two in-vivo studies of chloroquine's effectiveness against *P. vivax* carried out in the state of Bolívar, Venezuela, in 1999 and 2000, nor in a study in Porto Velho, Brazil, in 2000. However, another study conducted in Manaus, Amazonas, found 3% resistance among 331 participants.

Increased coverage of and access to diagnosis do not guarantee greater access to treatment, because cost recovery programs mandate that patients are responsible for purchasing the drugs. While the spread of resistant strains could be associated with the displacement of populations that lack easy access to timely diagnostic services and immediate treatment, paradoxically, the development of resistance could be related to greater access to drugs, since they are often used indiscriminately or inappropriately (incomplete treatment), which favors the selection of resistant strains.

The deconcentration and decentralization of malaria control programs in the majority of the countries has increased the participation of public and private health services in the diagnosis and treatment of the disease, which in turn has reduced the population's dependence on malaria control programs for service delivery. In fact, between 1997 and 2000, malaria programs reduced their active search for cases, a function which they had performed historically. In 1997, the programs examined 2,706,084 slides, of which 0.94% were positive, compared with 1,294,765 slides in 2000, of which 1.85% were positive. The higher positive rate can be interpreted as the result of a more focused search for cases. By way of comparison, in 1997 the health services performed 3,513,171 blood tests, with 13.73% positive results, while in 2000 the number of blood tests increased to 3,634,695, with 7.06% positive. These figures would indicate that the health services have intensified the search for cases of malaria in patients who present with fever (Table 15). With the deconcentration and decentralization of malaria control programs and their increased integration into or cooperation with local health services, most of the countries have made efforts to increase intersectoral activity and promote community participation in the control of vector-borne diseases, including malaria.

Another element of the global strategy for malaria control is the focused use of insecticides. Although DDT use has been declining since 1996, many countries have replaced it with a large number of other insecticides, especially pyrethroids. Since effective control alternatives have not been found for anopheline

malaria vectors, and since the majority of the countries have been faced with outbreaks of dengue fever—another mosquito-borne disease—these insecticides may have been used broadly to control both diseases.

In 1993, the countries reported that the funds available for malaria control in the national budgets and from other sources exceeded US\$ 185.4 million. The figure declined to US\$ 85.7 million in 1996, but thereafter remained relatively stable, amounting to US\$ 91.2 million in 1999. In 2000, with the launching of the "Roll Back Malaria" initiative, the funds available rose slightly (Table 16).

### *Challenges and Prospects*

The reduction in mortality related to *P. falciparum* notwithstanding, malaria remains an important public health problem in the Americas due to an increase in transmission of *P. vivax*, which is more difficult to control because of the characteristics of its life cycle in humans. Moreover, investments aimed at combating this disease have decreased in recent years. It is important to point out that efforts to control the disease should not be confined to the health sector, since many types of factors play fundamental roles in its transmission. In addition to the "Roll Back Malaria" initiative, which is attempting to build political support and ensure better use of available resources, it is imperative that investments be made in health to control the disease.

As part of the aforementioned initiative, the countries of the Region have identified the need to conduct operational research and establish a network for surveillance of resistance to anti-malarial drugs. They have also indicated the need to carry out joint activities in areas of shared epidemiological interest, improve entomological surveillance, and intensify efforts to reduce the density of vectors by using alternatives to insecticides.

The countries that are most affected by malaria not only have the lowest gross domestic products in the Region, but also the largest inequities in family income, education, access to health services, environmental quality, and housing. The indigenous people of the Amazon forest, as well as people who come to that area seeking work, are less protected against the disease and have inadequate access to health services. The responsibility for improving this situation belongs not just to the health sector but to other sectors as well, including the mining and environmental sectors, indigenous tribes, and the educational system at the national and local levels. The large national and international consortia, cooperation agencies, and financial institutions have expressed their intention to support the worldwide "Roll Back Malaria" initiative.

Although efforts to eradicate malaria have been abandoned, the indicators used to monitor and evaluate the level of control of malaria are the same that were used when that strategy was in place. Indicators must be established which are in keeping with the current objectives of the global strategy for malaria control and which take into consideration social, economic, and other factors.

### American Trypanosomiasis (Chagas' Disease)

It is estimated that there are at least 10 to 12 million people in Central and South America infected with *Trypanosoma cruzi*. The geographical distribution of human infection extends from the north of Mexico to the south of Argentina and Chile. The only Spanish-speaking countries in the Western Hemisphere where human *T. cruzi* infections have not been found are Cuba and the Dominican Republic. It is estimated that approximately 50 million people live in areas where there is risk of acquiring the infection. Estimates of the prevalence of *T. cruzi* infection vary from 1.2% of the population in Uruguay, to 22.0% of the population in Bolivia (30). Infection rates have decreased in a few countries, such as Brazil, where prevalence decreased from 4.3% in 1976–1980 to 1.5% in 1995 (31).

Vectoral transmission exists wherever poor living conditions allow for intimate contact between the insect vectors and the human host. The most important vectors are *Triatoma infestans* in Argentina, Bolivia, Brazil, Chile, Paraguay, Peru, and Uruguay; *Triatoma dimidiata* in Ecuador, Mexico, and the Central American countries; *Rhodnius pallescens* in Panama; and *Rhodnius prolixus* in Colombia, Mexico, Venezuela, and Central America.

Blood transfusions are another mode of transmission. Table 16 shows the number of blood donations, percentage screened for *T. cruzi*, and prevalence of *T. cruzi* found in most countries of the Region.

#### Control and Elimination Activities

**The Southern Cone.** National control programs against the vector were initiated in the 1960s in Argentina and Brazil, and since the 1980s in Chile and Uruguay.

In 1991, the ministries of health of Argentina, Bolivia, Brazil, Chile, Paraguay, and Uruguay launched the Southern Cone Initiative. Coordinated by the Pan American Health Organization, the initiative aims to mobilize resources, monitor control operations, and assess the epidemiological impact of activities designed to eliminate Chagas' disease. The strategies for reaching that goal were to eliminate *T. infestans* from the homes and the peridomestic environment in endemic and probably endemic areas; to reduce and eliminate home infestations by other triatomid species present in the same areas occupied by *T. infestans*; and to reduce and eliminate transmission through blood transfusions by screening blood donors and discarding infected units (32).

The first two strategies were implemented by chemically treating houses with residual insecticides at six-month intervals; the two initial attack cycles with insecticide are meant to cover all infested localities. As the success in eliminating the vector was based on not finding the insect after spraying with insecticide, the need to set up an entomological surveillance system was stressed from onset of operations. The community's participation in surveillance activities and the support of the local health

services also were deemed essential to guarantee that activities would be sustainable and results attainable. Requirements for certifying the elimination of *T. infestans*, as well as the indicators, information system, and methodology to be used for entomological and epidemiological surveillance were agreed upon by the six countries and are now in use in all the countries (32).

Since 1992, government funds were made available in Argentina, Brazil, Chile, and Uruguay, and vector control was initiated in Paraguay; more than US\$ 300 million were invested in Chagas' disease control by these countries, and most of the funds went to Argentina and Brazil. Brazil and Bolivia also used funding provided by the World Bank and the Inter-American Development Bank, respectively.

By 1994, only eight provinces in Argentina showed infestation rates higher than 10%, and only two provinces had rates that exceeded 20%. Also between 1992–1994, the seroprevalence rate among men joining the military decreased from 5.8% to 1.2%. After 1994, the national house infestation rate was 4%, but there were still pockets in several provinces such as Cordoba, Chaco, Formosa, and San Luis where infestation rates were higher. Due to a shortage of workers in the control program, spraying activities were partially transferred to the community in the early 1990s (32). Although this was credited with a rapid increase in the spraying coverage, there is no evidence that the strategy would be able to eliminate *T. infestans* from households. In any case, current data indicate that vectoral transmission has already been interrupted in four provinces.

In Brazil, there was an overall reduction in the area of distribution of *T. infestans* from 1979 to 1999, combined with a 71% reduction in the house infestation rate. During the 1990s there were more than 2,000 workers in charge of spraying activities. Seroepidemiological surveys carried out from 1994 to 1998 showed that the incidence of positive reactions in samples of individuals aged 7 to 14 years old was less than 0.5% in nine states, indicating a reduction of 96.0% since the 1979–1980 survey. Intradomestic capture of insects by field workers decreased from 84,334 *T. infestans* in 1983 to 1,800 in 1993, 1,080 in 1997, and 295 in 2000. Prior to the control program, about 300 *T. infestans* could have been found in one single home. The 2000 figure represents an average house infestation rate far below the minimum threshold necessary to ensure interruption of transmission of the parasite (32).

A 1995 cost-benefit analysis of Brazil's program showed that most of the US\$ 500 million spent from 1975 to 1995 was for vector control. During that time, the infected population decreased, from almost 5 million to less than 2 million. While 387,000 persons died from Chagas' disease during that period, 17,000 in 1995 alone, the infection of 277,000 persons with *T. cruzi* was prevented. The savings resulting from the vector control program (hospitalization, early retirement, disability, and death) exceeded US\$ 800 million, using the government payment schedule, and topped US\$ 3 billion, using the private sector payment schedule.

For each US\$ 1 spent in vector control, there were US\$ 2.01 in savings (31).

Chile experienced a 90% reduction in house infestation rates between 1982 and 1993. Seroprevalence rates among children under 15 years old decreased from 20.3% to 4.2% from 1986 to 1992. In later years, further reductions were observed in house infestation rates and in the seroprevalence of children; the infection rate in children in the endemic area is now under 1%.

Uruguay experienced a 99% reduction in house infestation rates and the rate of positive serology in children under 12 years old decreased from 5.2% in 1985 to under 0.5% in 1999. An international commission of experts declared that vectorial transmission of *T. cruzi* was interrupted in Uruguay in 1997, in Chile in 1999, and in six of Brazil's nine states where *T. infestans* was considered to be present in the year 2000.

Bolivia and Paraguay also saw progress. In Bolivia, more than 90,000 houses were sprayed for the first time in 1999, and a similar number in 2000. Another 89,000 households were sprayed for a second time in 2000. In Paraguay, the geographical distribution of *T. infestans* is now well known, and 19,000 houses were sprayed in two endemic departments in 2000 (32).

All blood bank donors are screened for *T. cruzi* in Argentina, Paraguay, and Uruguay. Brazil screens 100% of donors from the public sector, but the percentage screened by the private sector laboratory is unknown. Chile mandates screening for *T. cruzi* for an endemic area, which covers 65%–75% of the blood donors from the country. Bolivia screens fewer than 65% of blood donors (33) (Table 17).

**Central America.** *T. cruzi* infection rates vary from 0.35% in Belize to 10.6% in Panama. Studies on the geographical distribution of *R. prolixus* and *T. dimidiata*, the principal vectors in this subregion, and on the serological prevalence for *T. cruzi* in children, were carried out in Central America in 1998–2000 (30). *T. cruzi* vectorial transmission was found in children in Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua. As *R. prolixus* from Guatemala, Honduras, and Nicaragua is found only in houses and in the peridomestic area, attempts are being made to eliminate that vector in the same way as is done with *T. infestans* (34). Recent surveys suggest that *R. prolixus* has already disappeared from El Salvador. Progress has been significant in Guatemala, Honduras, and Nicaragua, where vector control interventions, mainly in areas infested with *R. prolixus*, are being implemented (34). More than 50,000 houses were sprayed from 1998–2000. Funding is being provided by local governments, Taiwan, Japan (in Guatemala), and NGOs (especially in Honduras). Screening for *T. cruzi* is done in 100% of blood donors in El Salvador and Honduras, 98% in Guatemala, 75% in Nicaragua, and under 10% in Costa Rica and Panama (33).

**Andean Area.** In Venezuela, the states of Lara, Barinas, and Portuguesa are the only ones in which seroprevalence rates for *T.*

*cruzi* exceed 1.1%. The main vector is *R. prolixus*, which exists in 71.1% of the country, and *T. dimidiata* is a secondary vector. *R. prolixus* invades houses from the sylvatic environment; therefore, the vector cannot be eliminated by spraying. Vector control activities initiated in 1966 were based on improving or replacing housing, as well as spraying; hundreds of thousands of houses have been built. Health education has been another component of the program. In addition, 100% of donors are routinely screened for *T. cruzi*.

In Colombia, it has been estimated that about 5% of the population is infected and that close to 20% is at risk. *R. prolixus* is the main vector of *T. cruzi*. Control activities began in 1997; 25,000 households have been sprayed with pyrethroid insecticides and 512 have been structurally improved. Compulsory screening for blood donors began in 1995, and by now 100% are screened for *T. cruzi*.

In Ecuador, it is estimated that there are slightly more than 30,000 individuals infected. The main endemic areas are the provinces of El Oro, Guayas, and Manabi along the central and northern Pacific coast. The northern Amazon region, including the provinces of Sucumbios, Napo, and Orellana, also is part of the endemic region. *T. dimidiata* and *R. prolixus* are the most important vectors. There is no vector control program in place, but 100% of blood donors are screened.

In Peru, there is no real estimate of the prevalence of human infection by *T. cruzi*. *T. infestans* is found in the departments of Arequipa, Moquegua, and Tacna. Vector control activities are focal; screening for *T. cruzi* in blood donors is mandatory nationwide and there is 100% coverage.

**North America.** In Mexico, it is estimated that there are 150,000 individuals infected with *T. cruzi* and *T. dimidiata*, and *R. prolixus* are the main vectors. There is no organized vector control program and screening for *T. cruzi* covers only 15% of blood donors (33). In the United States of America, the possibility of human infection by *T. cruzi* through vector transmission is remote. However, the increasing number of immigrants from Latin America makes transfusion-transmitted *T. cruzi* a real possibility. In fact, five such cases were reported in Canada and the United States in immunosuppressed patients who received blood products from Latin American donors.

### *The Challenge*

Elimination of *T. infestans* has progressed well in the Southern Cone countries. The main problem now facing Brazil, Chile, and Uruguay is how to maintain the commitment at all levels of government in the context of decentralization, when *T. infestans* is hard to find. Argentina's stagnant economy is a drawback that may curtail government commitment to elimination strategies. In Bolivia, on the other hand, support from the Inter-American Development Bank will facilitate vector control activities, and Paraguay is negotiating a loan for that purpose from the same in-



stitution. In Central America, control activities in Guatemala have the support of the Japan International Cooperation Agency, in addition to national funding. Activities in Honduras and Nicaragua have support from multilateral and bilateral agencies. Costa Rica, Mexico, and Panama still need to commit resources for prevention and control of the two main routes of transmission of *T. cruzi*—vectoral and by blood transfusion. Ecuador and Peru must implement vector control activities commensurate with their epidemiological situation.

### Lymphatic Filariasis

Lymphatic filariasis is the second greatest cause of disability worldwide. It affects over 120 million people in 80 countries; it is disfiguring and painful, and destroys a person's ability to work and lead a normal life. Lymphatic filariasis is a parasitic infection acquired in childhood, but the worst clinical problems (elephantiasis and genital damage) are seen in adults during their most productive years, thus imposing a significant social and economic burden. Lymphatic filariasis typically affects the poorest people in the world's poorest countries. Most of the cases are concentrated in and around urban and periurban slums.

In the Americas, 421,700 persons are estimated to be infected with *Wuchereria bancrofti*, the only known causative agent of lymphatic filariasis in the Region (Table 18). This number may increase as the results of ongoing mapping activities become available and far more sensitive techniques, such as the antigen detection assay, are processed. The only known vector in the Americas is *Culex quinquefasciatus*.

Since 1981, in the Americas there have been reports of transmission in Brazil, Costa Rica, the Dominican Republic, Guyana, Haiti, Suriname, and Trinidad and Tobago. Prior to 1980, 21 countries are known to have had transmission.

The 50th World Health Assembly passed a resolution in 1997 calling for the elimination of lymphatic filariasis as a public health problem by the year 2020. According to a consensus reached as a result of the resolution, elimination of filariasis would be achieved when the five-year cumulative transmission rate is reduced to under 1 new infection per 1,000 individuals. The focalized nature of the infection and the relatively small number of cases in the Americas suggest that this goal could be met in the Region before 2020. Two drugs are currently used in the Region for treatment of this disease. One, albendazole, will be donated by a large pharmaceutical company for as long as the disease exists. Albendazole also acts on intestinal helminths, one of the major underlying causes of malnutrition in children. Albendazole should be administered in combination with diethylcarbamazine, also known as DEC. DEC is relatively inexpensive and can be used either in tablet form or added to salt.

In Suriname, Costa Rica, and Trinidad and Tobago, a few individuals are suffering from the long-term consequences of the infection, hydrocele or elephantiasis. Ongoing mapping activities in these countries by means of immunochromatographic test cards will soon reveal whether the infection has ceased to be a public

health problem. Haiti has completed its mapping activities; the Dominican Republic and Guyana will soon follow.

In addition to the interruption of transmission, national programs, especially those in Brazil, the Dominican Republic, and Haiti, will need to focus a great deal of attention on the alleviation of the physical, social, and economic hardship caused by the disease. This is referred to as the morbidity component of the elimination program. Regular hygiene using soap and water, combined with other simple activities that can be easily carried out at home by the patient, have a dramatic effect in preventing painful, debilitating, and damaging episodes of swollen limbs and can reverse some of the damage already sustained. The technique was pioneered in Brazil and has since reached other countries within and outside the Region.

PAHO actively encourages partnerships among the ministries of health of the seven countries where the disease is endemic (Table 18), the United States Centers for Disease Control and Prevention, bilateral agencies, other United Nations agencies, the private sector, and NGOs to eliminate lymphatic filariasis in the Region.

Drug distribution and morbidity management are most efficiently carried out and coordinated by the ministries of health with the help of partners who can support the communities to ensure that these activities are properly carried out. Some of the determinants of this disease and its complications lie outside the purview of the health sector, including inadequate infrastructure, especially with regard to sanitation, water, and waste removal, as well as precarious housing and poor personal hygiene. Therefore, intersectoral partnerships should also be encouraged in order to ensure sustainability.

### Onchocerciasis

Human onchocerciasis is caused by a filarial nematode worm, *Onchocerca volvulus*. Infection can lead to eye lesions, including blindness, as well as severe itching and disfiguring skin lesions. Because the vectors, blackflies belonging to the genus *Simulium*, are insects which breed in fast-flowing rivers and streams and bite humans near these sites, the disease is also known as river blindness. In Latin America, the disease is sometimes referred to as Robles' Disease, in honor of Dr. Rodolfo Robles, the Guatemalan physician who first recorded its existence in the Americas.

Based on historical data, the estimated population at risk for the disease in the six countries of the Americas where it is endemic (Brazil, Colombia, Ecuador, Guatemala, Mexico, and Venezuela) was 4,700,000 persons in 1995. More data have been obtained as a result of rapid epidemiological and entomological assessments undertaken by the countries since 1995. As a result of these assessments, the at-risk population estimates dropped to 544,009 in 2001. The marked reduction was primarily a result of the assessments undertaken in Venezuela and Guatemala, where data from the early 1950s had not been reviewed (Table 19). The total population at risk in the Americas lives in 1,969 villages, of which 211 are considered to be hyperendemic and at a higher

risk of developing ocular disease. The areas at highest risk are those inhabited by indigenous people.

Epidemiological assessments conducted in the 1990s have not yet provided information on the estimated number of cases. Estimates obtained prior to the 1990s put the total number of infected individuals in the Region at 150,000 to 200,000. Massive drug administration to the total population at risk is the core activity of the Regional initiative in each country—this is referred to as the ultimate treatment goal, or UTG. Programs are monitored through the percentage of the UTG attained every year in each of the endemic countries.

In Mexico, the population eligible for treatment was estimated at 168,124 in 2001. The country has managed to achieve high levels of treatment coverage: in 2000, the program attained 91% of the country's ultimate treatment goal (eligible population treated twice a year). The latest assessments conducted in the Oaxaca focus suggest this state might be approaching interruption of transmission.

There are four foci in Guatemala, and the eligible population was estimated at 160,000 individuals in 2001. The program attained 74% of its UTG in 2000, a marked improvement over previous years. Migrant workers crossing the Mexico-Guatemala border pose an ongoing challenge in securing high treatment coverage.

Onchocerciasis was first recognized in Venezuela in 1948, in Colombia in 1965, in Brazil in 1967, and in Ecuador in 1982. Since 1985, there has been no convincing evidence of any expansion of existing foci in these countries.

In Brazil, onchocerciasis is limited to one focus located in the northern part of Amazonas state and in the western part of Roraima state, bordering Venezuela. The eligible at-risk population was estimated at 7,356 individuals in 2001. The disease primarily affects Amerindians of the Yanomami and the Yek'wana ethnic groups, although immigration by miners may put other areas of Brazil at risk. Since 1990, more than 50,000 miners have passed through the focus, staying between one and nine months. Some of these miners have resettled elsewhere in Brazil, including in areas bordering Colombia and Guyana, where competent vectors exist. Brazil managed to attain 56% of its UTG in the year 2000, a noteworthy effort given the extreme difficulties of access to the area. The alliance between the Ministry of Health and the nongovernmental sector has proven invaluable to the program as it attempts to cover all of the endemic villages.

The only known focus in Colombia is in and around the community of López de Micay, on the Pacific coast. This community is classified as mesoendemic. Only 70 cases have been identified between 1965 and 1991. The eligible population was estimated at 1,101 individuals in 2001. The program attained 99% of its UTG in the year 2000, and could well be approaching the interruption of transmission provided it can sustain high treatment coverage. However, the ongoing armed conflict in this area poses a serious threat to the success of the program.

In Ecuador, the main onchocerciasis focus is located in the northwestern coastal province of Esmeraldas in the Santiago River basin. Satellite foci have been detected, and can be traced to the migration of Chachi Amerindians from this area. The eligible at-risk population was estimated at 19,788 individuals in 2001. The program attained 50% of its UTG in 2000. Efforts are being conducted by the program authorities to improve treatment coverage and fully characterize satellite foci.

Three main foci have been detected in Venezuela. Amerindians of the Yanomami, Sanema, and Yek'wana groups are those primarily affected by the infection in the southern focus. The program attained 41% of its UTG in 2000. Extremely difficult access to the southern focus has been the major obstacle to the implementation of the program in the south. Studies conducted in Amazonas state in Venezuela have found that the geographical distribution of competent vectors is considerably larger than that of the disease. This means new foci could be created by the migration of individuals, especially miners. This issue, as well as the migration of Amerindians across the border to and from Brazil, needs to be properly addressed. Efforts are being conducted by program authorities to improve treatment coverage in the two northern foci.

Behavioral and community related factors must be taken into consideration in planning, implementing, and evaluating control measures. The intensity of exposure to transmission is determined by the distance between a community and the vector's breeding site, as well as by the presence (or absence) of other human settlements in the area. Individuals who frequently visit the breeding site(s) or whose work requires them to spend long periods on the river bank, such as fishermen, tend to be exposed more and to develop more severe manifestations of the infection. Programs need to address the occupational hazards of this parasitic infection.

Onchocerciasis has been recognized as a problem for which there is now a relatively easy and economical solution. With the advent of Ivermectin in 1987 and the Mectizan Donation Program, the world now can suppress and control the disease with chemotherapy. Morbidity and transmission rates in the countries are beginning to drop in response to the Regional initiative. Hopes are high that the Americas will be the first region in the world where morbidity from onchocerciasis will cease to be a public health problem and where transmission will be interrupted. Mexico and Colombia are approaching this stage, followed by Ecuador and Guatemala. Currently, the hard to reach areas of Venezuela and Brazil seem to pose the greatest challenge to the elimination of onchocerciasis from the Region.

### **STRATEGY FOR THE INTEGRATED MANAGEMENT OF CHILDHOOD ILLNESSES—IMCI**

Acute respiratory infections and diarrheal diseases remain the cause of at least one of every five deaths of children under 5 years of age in the Region of the Americas, and in some countries they are responsible for approximately half the deaths in this age

group. These diseases are leading causes of illness during the first five years of life. They constitute the principal reason for outpatient consultations at primary health care services and one of the leading causes of pediatric hospitalizations. To confront this problem, the Pan American Health Organization and the World Health Organization have developed specific control strategies, and in the early 1990s, together with the United Nations Children's Fund (UNICEF), proposed a unified, more effective intervention: the integrated management of childhood illnesses (IMCI).

The IMCI strategy is focused on children under 5 years of age. It establishes a sequence of steps for evaluating their condition and classifying the diseases that affect them, treating each illness, and implementing measures for prevention and health promotion. This sequence of steps is applied systematically to the care of each child, regardless of the reason for the consultation, and prevents missed opportunities for the detection and treatment of diseases when they are not the principal reason for the visit to health services. It also prevents missed opportunities for prevention and health promotion. This strategy focuses not only on the identification and treatment of existing health problems in children under 5 but also on recognition and control of the factors that may place them at risk, including the lack of protective actions, such as vaccinations, breast-feeding, and proper nutrition. Thus, the strategy contributes to achieving the objectives of reducing mortality in children under 5, decreasing the frequency and severity of their illnesses, and improving the quality of care at home, in the community, and in the health services.

### Mortality from Diseases Targeted by the IMCI Strategy

About midway through the period 1995–2000, it was estimated that approximately a third of deaths in children under 5 years old in the Region were due to diseases targeted by the IMCI strategy.<sup>1</sup> Applying that proportion to the estimates of mortality rates in childhood yields a figure of 170,000 deaths from these causes in this age group.

In 1999, according to the official mortality figures for 16 of the 26 countries with more than 10,000 annual births (which account for more than 95% of the births and mortality of children under 5 in the Region), 26.5% of the deaths from defined causes in children under 5 were attributable to these causes, although there were differences among countries and age groups (Table

20). The largest proportion resulted from infectious and parasitic diseases, which accounted for 13% of total deaths; they were followed by pneumonia and influenza, which were responsible for 8%. Of the infectious and parasitic diseases, intestinal infections were the most important group, accounting for 7% of the total. Malnutrition and meningitis, also targets of the IMCI strategy, were responsible for a smaller percentage of the deaths in children under 5 years old: 2.9% and 1.2%, respectively. In 1999 the diseases targeted by the IMCI strategy caused 23% of the deaths from defined causes in children under 1 year and 46% in the 1–4-year age group.

In the 16 countries of Latin America and the Caribbean considered in this analysis,<sup>2</sup> the percentage of deaths of children under 5 caused by this group of diseases varied substantially, ranging from 11.6% in Jamaica and Costa Rica and more than 40% in El Salvador, Guyana, and Venezuela. The differences were even greater with regard to percentage of deaths in the 1–4-year age group: these diseases were responsible for more than half the deaths from defined causes in Ecuador, Nicaragua, Panama, Paraguay, Peru, and Venezuela, but for less than 20% in Costa Rica.

Mortality from causes targeted by the IMCI strategy is less prevalent in the United States and Canada. Mortality data for 1999 are not available, but in 1998 these diseases accounted for 5.4% of the deaths from defined causes in children under 5 in the United States and 4.9% in Canada.

The differences observed among countries are also apparent within each country. Even in countries where the diseases included in the IMCI strategy do not contribute a high percentage of mortality in children under 5 at the national level, they continue to cause a significant number of deaths in certain areas. Conversely, in countries where they are responsible for a significant percentage of deaths, there are also areas in which they are much less prevalent than the national rate.

The information from Argentina, where these causes were responsible for 13.3% of deaths in children under 5 years, shows that this percentage ranged from 5% in the province of Santa Cruz to 22% in the province of El Chaco. In Brazil, where the national figure for the same age group was 24.0%, the percentage ranged from 11.3% in Amapá and 12.8% in the Federal District to 42.9% in Alagoas and 41.8% in Ceará. These differences are seen in the rest of the countries whenever mortality is analyzed by geographic area or socioeconomic, racial, or ethnic group.

The mortality trends for diarrheal diseases and for pneumonia and influenza—the principal causes of death among the illnesses in this group—show a reduction in their impact on mortality in children under 5 years. Between 1991 and 1995 the mortality rate from diarrhea in this age group fell 35%, and between 1995 and 1999 the decline was even greater, at 40.3% (Figure 3). The de-

<sup>1</sup> The term “illnesses targeted by the IMCI strategy” includes the following chapters of the International Classification of Diseases (ICD), tenth revision: certain infectious and parasitic diseases, codes A00–B99 (for ICD 9, codes 001–139); the meningitides included in codes G00–G03 (for ICD 9, codes 320–322); meningococcal meningitis, code A39 (for ICD 9, code 036); acute upper respiratory infections, codes J00–J06, and other acute infections of the lower respiratory tract, codes J20–J22 (for ICD 9, codes 460–466); pneumonia and influenza, codes J10–J18 (for ICD 9, codes 480–487); malnutrition and other nutritional deficiencies, codes E40–E64 (for ICD 9, codes 260–269); and nutritional anemias, codes D50–D53 (for ICD 9, codes 280, 281, and 285).

<sup>2</sup> Argentina, Brazil, Chile, Costa Rica, Cuba, the Dominican Republic, Ecuador, El Salvador, Guyana, Jamaica, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela.

crease in the mortality rate from pneumonia and influenza was 8.5% between 1991 and 1995, but between 1995 and 1999 it was 41.0%, a figure similar to that observed for mortality from diarrheal diseases. As a result of these reductions, the percentage of deaths of children under 5 from diarrhea, pneumonia, and influenza fell from around 20% in 1991 to about 12% in 1999.

The mortality rate from diarrhea in children under 5 declined in 17 of the 19 countries for which 1995 and 1999 data are available (Table 21), the exceptions being Panama and Canada. In Canada there were just two and six deaths, respectively, from this cause in the two study years. The percentage reduction ranged from 84.4% in the United States to less than 20% in Colombia, Paraguay, and Costa Rica.

The mortality rate from pneumonia and influenza fell in all countries except Guyana, Panama, and Paraguay. In Nicaragua, Mexico, and Peru, the reduction exceeded 50%, while in Colombia and Uruguay it was less than 15%.

### **Morbidity from Diseases Targeted by the IMCI Strategy**

Although data on the incidence and prevalence of the illnesses targeted by the IMCI strategy are not collected systematically at the regional level, the available studies reveal that they frequently affect the health of children under 5 years of age. All the studies and surveys carried out in the countries show that respiratory diseases are the principal cause of morbidity in this age group, and diarrhea also remains a threat. Both problems, in turn, are factors that influence the nutritional status of children under 5.

### **Problems Associated with Quality of Care**

In the home, many inappropriate practices increase the health risk for children affected by common diseases such as respiratory infections or diarrhea. These practices include restrictions on fluid intake (especially in cases of diarrhea) or improper feeding during and after the episode. Another significant problem is the use of drugs not prescribed by health personnel, which is particularly serious when the drugs given are antibiotics because this practice promotes the development of bacterial resistance.

In the health services, the high demand for consultations during the limited time that personnel have for this activity is one of the factors that leads to inadequate quality of care. The examination is performed quickly and fails to identify symptoms that could change treatment decisions. In general, children are not checked for signs of illnesses other than the ones that prompted the visit, so opportunities for early detection and treatment are lost. The consultation is also not used to make available preventive procedures such as vaccination or to promote health. All these omissions represent lost opportunities, often unique opportunities, to prevent diseases, reduce their severity, or find and treat episodes early.

The unnecessary prescription of antibiotics is a key aspect of inadequate quality of care delivered by some health services, which usually try to justify it by citing the pressure exerted by persons asking for the drugs. The problem of unnecessary and irrational use of antibiotics occurs in a work setting in which health personnel have very little time to provide explanations or do proper case follow-up.

### **Results of the Proposed Interventions**

The high rate of mortality from infectious diseases, respiratory infections, and nutritional disorders observed in many countries of the Region could be reduced if the entire population had access to the IMCI strategy at all levels of the health system and in the home and community. This strategy has three components aimed at improving the health conditions of children. The first seeks to improve the performance of the personnel—those in the health services, as well as community health agents and other volunteer personnel—with regard to care for children under 5 years. The second component is directed toward improving the organization and coordination of the health services to guarantee proper care of these children at the different levels of complexity required for evaluating, diagnosing, and treating the diseases and other problems that affect their health. The third seeks to improve the families' knowledge and practices in relation to care and attention to children under 5 in order to ensure their proper growth and development.

As of the year 2000, the IMCI strategy had been adopted by the 16 countries previously listed. In the majority of those countries, national and local plans were developed and the training of institutional health personnel was begun. Eleven of the countries undertook activities related to the community component of the strategy, which seeks to strengthen families' ability to provide care and attention to children under 5 years, increase access to appropriate care through community health agents and other volunteer personnel, and foster participation of other sectors in addition to health, such as the education system, community groups, and nongovernmental organizations. Six countries conducted activities in conjunction with the worldwide evaluation of the strategy, which examined its implementation and identified limitations and obstacles to continuing to increase access to its benefits. At the regional level, the strategy's impact on mortality is being evaluated. The preliminary figures showed the progress reported in the section on mortality.

### **Challenges and Future Prospects**

Progress in implementing the IMCI strategy in the countries of the Americas has demonstrated the impact that this intervention can produce in terms of reduced childhood mortality, particularly deaths from diarrheal and respiratory diseases. The evaluations conducted in some countries have also demonstrated

that this strategy leads to early identification and treatment for episodes of illness, even if they are not the principal reason for the health consultation, which helps reduce the incidence of serious cases. Through the community component, the strategy enhances parents' ability to identify and resolve problems and provide proper care to children under 5, both during episodes of illness and when they are well. Within the context of these successes, the principal challenge is expanding implementation of the strategy in terms of both its content and the population that receives its benefits.

With regard to the content, and within the framework of the countries' diverse epidemiological profiles, the strategy should evolve to address prevention, diagnosis, and treatment of additional health concerns. Noteworthy among these are neonatal problems, asthma, and broncho-obstructive syndrome, abuse, violence against children, accidents, and oral health care.

Regarding access for the population, the IMCI strategy must be included in the undergraduate and graduate curricula for all health personnel in order to reduce the on-the-job training burden and to ensure that graduates can apply it in their areas of work.

These activities, added to progress toward achieving the objective of universal access to the IMCI strategy, will make it possible to confront challenges beyond the reduction of mortality and advance toward decreasing the incidence and severity of childhood diseases and health problems, while instituting a higher quality of care that will contribute to healthy growth and development.

## HIV, AIDS, AND OTHER SEXUALLY TRANSMITTED INFECTIONS

### Status of the HIV/AIDS Epidemic

Now in its third decade, the epidemic of human immunodeficiency virus infection and AIDS (HIV/AIDS) in the Americas continues to grow steadily. In late 1999, it was estimated that approximately 2.5 million people were infected with HIV in the Region: around 1.3 million in Latin America, some 360,000 in the Caribbean, and approximately 900,000 in North America (Table 22). The Pan American Health Organization and the Joint UN Program on HIV/AIDS (UNAIDS) estimate that 600 to 700 new HIV infections occur in the Region every day and that by the year 2000 more than half a million people had died from this cause.

In the majority of the countries of the Americas, the epidemic still does not broadly affect the general population. In some areas, however, especially the Caribbean and Central America, it has reached alarming levels in terms of the percentage of people infected and its impact on the general population.

The transmission mechanisms of HIV (sexual, blood-borne, perinatal) and the affected populations vary from subregion to subregion (35). In the Caribbean, the vast majority of HIV-positive individuals were infected through unprotected heterosexual

relations. As a result of the transmission of HIV in both men and women, the epidemic reaches greater magnitude and extends into the general population. Thus, the seroprevalence rates among pregnant women, used as an approximation of the rates in the general population, reach 13% (1996) in Haiti, the most severely affected country in the Region. The epidemic has spread to both urban and rural areas in Haiti (approximately 10% of adults in urban areas and 4% in rural areas are infected with HIV, according to the national authorities). Guyana, Suriname, and the Dominican Republic are also facing widespread epidemics (HIV prevalence in excess of 1% in pregnant women) (36). In Guyana, HIV infection was found in 7.1% of pregnant women. In the Bahamas the prevalence was 3.6% in 1995 but fell to 1.8% in 2000, thanks to an intensive prevention program. In some parts of the Dominican Republic, 1 of every 12 women who received prenatal care was infected with HIV. As would be expected in widespread epidemics, the prevalence of infection is higher in groups that engage in high-risk behavior than in the general population, since such behavior sustains the epidemic. In the Bahamas, the prevalence of HIV in individuals with sexually transmitted infections (STI) was 7.2%, while in Guyana it was 46% in sex workers in the capital, Georgetown. In 1998, the prevalence of HIV infection among sex workers in the Dominican Republic averaged 5.5%, up from the 3.3% recorded in a similar study in 1991. Intravenous drug use also contributes to the epidemic in the Caribbean. In Puerto Rico, from the start of the epidemic to late 2000, 24,061 cases of AIDS and 15,188 deaths had been reported; 55% of the male cases were acquired through injection drug use and 59% of the female cases through heterosexual contact (37).

In Central America, the epidemic is predominantly heterosexual. It affects the general population in Belize and Honduras, where some 2.5% (1995) and 1.4% (1998), respectively, of pregnant women tested HIV-positive. Epidemiological studies in groups that engage in high-risk behavior show high prevalence rates, a reflection of a well-established epidemic. In San Pedro Sula (Honduras), one in every five sex workers was infected with HIV, while in five other Honduran cities, the prevalence in this group was approximately 10% in 1998. The rest of the Central American countries are confronting an epidemic of sexual transmission concentrated in groups that engage in high-risk behavior: sex workers and STI patients in El Salvador and Guatemala, and men who have sex with men in Costa Rica and Panama (38). In Puerto Barrios (Guatemala), 11% of the sex workers were HIV-positive, as were 4.7% in Guatemala City. In El Salvador, 6% of STI patients were HIV-positive in the 1995–1996 period.

In Mexico, the epidemic continues to affect mostly men who have sex with men, and the members of this group who also have sex with women probably act as a bridge to the general population. According to seroprevalence studies carried out between 1991 and 1997, 14.2% of this group was infected with HIV, in contrast to the low rates found in the heterosexual population, in-

cluding sex workers and STI patients. Official estimates suggest that in late 1999 there were six infected men for every infected woman. In Mexico, AIDS is now the third leading cause of death in men between the ages of 25 and 44, and the sixth leading cause of death of women in the same age group.

Brazil has reported more than 200,000 cases of AIDS since the appearance of the first case in 1981. According to estimates, there were nearly 540,000 people with HIV/AIDS by the end of 1999. All mechanisms of HIV transmission have contributed to the growth of the epidemic in Brazil. The majority of the cases occur in men who have sex with men and are concentrated in the principal urban areas. Information provided by the national authorities indicates that injection drug use is largely responsible for the increase in infections (39). It is calculated that half of drug users are infected with HIV; some studies cite figures of 25% in Rio de Janeiro and three times that in São Paulo. Heterosexual transmission increased between 1993, when it accounted for approximately 25% of the cases, and 1998–1999, when the figure was 40%. In STI clinics, 3.7% of the men and 1.7% of the women were HIV-positive in 1998. Nevertheless, the prevalence remained low in the general population (as determined from studies in pregnant women), ranging from 1.7% in the southeast (1997) to 0.2% in the north (1998). In an anonymous national survey in a sample of 6,290 people, a prevalence of 0.4% was found. In recent years, Brazil has considerably expanded its program for care of individuals with HIV/AIDS by including antiretroviral treatment. Consequently, the mortality rates (90%) have declined continually since 1995, changing the epidemiological picture in Brazil.

In the Southern Cone, men who have sex with men and injecting drug users remain the groups most severely affected by the epidemic. According to information provided by the national AIDS programs, between 5% and 10% of adult victims acquire the infection by sharing needles, syringes, or other unsterilized instruments used to inject drugs. The use of intravenous drugs is blamed for the epidemic's shift toward a younger age group (from 30–49-year-olds to 20–34-year-olds), as well as for the increase in the number of women being infected, which rose from zero in 1985 to more than 20% of the cases in 1996. In Argentina, the use of intravenous drugs has been the most important risk category since 1990 (40), and according to official data for 2000, it is the cause of more than 40% of the reported cases of AIDS. The epidemic has not spread to the general population; therefore, the prevalence in pregnant women is low. For example, in Chile the prevalence rates in pregnant women were less than 1 per 1,000 (1992–1997). In Uruguay, a prevalence of 0.26% was found in 1997 in a study of 8,000 samples from the general adult population (public and private sector workers).

Knowledge about the status of the epidemic in the Andean Area is limited, which could lead to unwarranted complacency about the problem. According to PAHO/WHO/UNAIDS estimates, there were more than 200,000 people with HIV/AIDS in that subregion in late 1999, and the risk behaviors are well estab-

lished. Colombia (41, 42) and Peru (43) have solid epidemiological information indicating that the epidemic principally affects men who have sex with men and occurs in urban areas. However, the male/female ratio has dropped from 37:1 in 1987 to 5:1 in 1998. Studies have shown that different transmission mechanisms operate in different geographic areas. In the Andean Altiplano, unprotected sex between men is the principal transmission mechanism, while in the coastal areas the infection is mainly spread by unprotected heterosexual relations. It is estimated that 44,200 people in Peru were infected with HIV as of late 1999. The information on cases of AIDS shows that the percentage of infections is 1 to 7 times higher in men than women. The prevalence is 0.23% in pregnant women and 0.07% in blood donors (1998); among sex workers, who constitute a more vulnerable group, the rates were 1.6% in Lima (2000) and 0.6% in other parts of the country. In Bolivia and Ecuador, the prevalence figures found to date are low: 0.5% in pregnant women (Bolivia, 1997), 0.3% in sex workers (Santa Cruz, 1998), and 0.2% in blood donors and military recruits (Ecuador, 1999). The available data from Venezuela reflect a well-established epidemic. It is estimated that there were between 50,000 and 100,000 people with HIV in that country in late 1999.

In North America, the widespread use of combinations of antiretroviral drugs has reduced mortality and delayed the onset of AIDS. Of 745,103 cases of AIDS reported in the United States to June 2000, nearly 73% were in two groups: men who have sex with men (47%) and injection drug users (25%). Some 10% of cases were attributed to heterosexual transmission. In Canada, the prevalence of HIV infection is very low, with a rate of less than 1% since the start of the epidemic. HIV transmission is increasingly associated with unprotected heterosexual contact and injection drug use as principal sources of transmission, which could lead to a more rapid increase in the number of infected individuals. When the epidemic began (1985), homosexual relations between men accounted for the majority of HIV infections (75%); 10 years later, only 36.5% fell into this category. In contrast, injection drug use, which accounted for just 9% of the cases in 1994, is now the cause of between 29% and 33.5% of HIV infections. The male/female ratio of new HIV infections reported in 1985 was 9.4:1, but it fell to 1.5:1 in 1998.

The increase in heterosexual transmission of HIV in the Region and the consequent increase in transmission from mother to child have expanded the number of pediatric AIDS cases. To May 2000, 19,321 pediatric cases had been reported, representing 1.8% of all reported cases of AIDS. The situation is particularly alarming in the Caribbean countries, where the epidemic is more intense than anywhere in the world except sub-Saharan Africa. In the Caribbean, pediatric cases represented 5.8% of all cases of AIDS reported to May 2000. The data indicate that mothers aged 15 to 24 years in Belize, Guyana, Jamaica, and Trinidad and Tobago are particularly vulnerable to HIV infection in comparison with older groups.

Chronic problems in the surveillance systems in the Region, such as the lack of funds to implement sustainable routine surveillance, make it difficult to obtain current and complete data. Lack of data, in turn, limits the capacity to analyze the status of the epidemic.

### *Prevention*

The principal mode of HIV transmission in the Americas is sexual. Controlling this mode of transmission requires interventions that enhance knowledge and reduce risky sexual behaviors. In practically all the countries of the Region, secondary school curricula include some reference to HIV/AIDS and to the need to adopt responsible sexual behavior. Knowledge about HIV and its transmission mechanisms has increased enormously throughout the Region. Two-thirds of adolescents can name some method of protecting oneself against infection. While this constitutes great progress, much remains to be done. Figure 4 illustrates the lack of information.

Available information indicates that prevention efforts have lessened risk behavior in the Region. In Brazil, condom use in the first sexual relationship increased from 4% in 1986 to 48% in 1999, and in recent years condom sales increased more than 400%, from 70 million in 1993 to 320 million in 1999. In Barbados and Guyana, condom sales nearly doubled between 1994 and 1997. A study in five countries showed that between 28% and 75% of adolescents used condoms with casual partners (44); this percentage was somewhat lower among adults (22% to 34% of individuals aged 40 to 49) (45). While the results are encouraging, the continued success of prevention interventions will depend on information and services being affordable and accessible, which is not the case in many areas of the Region.

With respect to HIV transmission from mother to child, when appropriate and timely prevention actions are taken, the perinatal transmission rate is from 1% to 2% or even lower. At the current time, Argentina, Bahamas, Barbados, Belize, Bermuda, Brazil, Chile, Cuba, the Dominican Republic, Jamaica, Mexico, and Uruguay, among other countries, are allocating considerable resources for the prevention of mother-to-child transmission of HIV, with successful results.

A high percentage of new HIV infections still occur in men who have sex with men, which indicates that preventive actions aimed at this group should not be abandoned. To this end, regional and subregional conferences have been held regarding specific interventions to promote sexual health. In addition to interventions in the form of information, communication, and education, activities to help prevent transmission also must be geared toward the reduction of discrimination and stigma.

Prevention among injection drug users has proven difficult, even where this group accounts for a significant percentage of HIV/AIDS cases. Stigma, discrimination, and moral objections have created countless obstacles to reducing the risks and dangers to users.

### *Comprehensive HIV/AIDS Care*

Care and prevention are intimately linked and should be considered a continuum in which preventive actions offer an opportunity to improve care, and vice-versa. Comprehensive care is founded in the principles of equity, efficiency, and quality in the delivery of services to individuals with HIV/AIDS. PAHO's "building blocks" model of comprehensive care (46) enables the countries to improve care for HIV/AIDS patients in keeping with available resources, ensuring equity and quality in service delivery. The model is being implemented in Mexico.

Access to drugs, including antiretroviral drugs, is one of the factors that has changed most in the last five years and is enabling people infected with HIV to live more years in better health. The therapeutic advances since 1996, the enactment of laws in many countries addressing access to treatment with antiretroviral drugs, and the high cost of treatment have triggered a strong movement with the common objective of increasing access to this treatment. A coalition of governments, international organizations, people with HIV/AIDS, nongovernmental organizations (47), and development organizations is exerting strong, worldwide pressure to reduce the cost of antiretroviral drugs. This effort, together with the initiatives and strategies implemented by individual countries, can be the driving force that will enable all people infected with HIV in the Region to obtain uniform access to this therapy.

The regional situation is very heterogeneous (48), ranging from nearly universal access to antiretroviral drugs in the systems operated by social security or ministries of health (such as in Argentina, Brazil, Colombia (49), Costa Rica, and Uruguay—Table 23), to partial coverage in many countries (essentially dependent on the type of health insurance), to lack of availability except in private pharmacies in still other countries (Table 24) (50). Progress toward greater access has been accelerated through various initiatives that began around 1998–1999, and a growing number of countries have found ways to reduce the cost of antiretroviral drugs (estimated at US\$ 10,000 to US\$ 15,000 per patient per year). At this point, prices have fallen by approximately one-fifth, thanks to legislative actions and to the introduction of high-quality generic drugs. Chile, Mexico, Panama, Honduras, and Barbados (51) joined the ranks of the countries that have reduced costs and increased the coverage of services during the 2000–2001 period.

In the countries that adopted public policies of universal access to antiretroviral drugs, important changes have been noted in the morbidity and mortality profiles for HIV/AIDS. In Brazil, according to official National AIDS Program records, the average number of hospital admissions per patient was significantly reduced from 1.65 in 1996 to 0.41 in 1999, and cases of tuberculosis decreased by 54%. Most notable, however, is the decline of approximately 50% in specific mortality from AIDS. The economic benefits of reducing morbidity are clear: in the period 1997–2000, a total of US\$ 677 million was saved on the treatment

of concurrent diseases (data from the Ministry of Public Health of Brazil).

Cost-effectiveness is one of the strongest arguments for the policy of improving access to antiretroviral drugs. In fact, studies have documented the cost-effectiveness of this policy in high-income countries. As experience is gained in the Region, more data are accumulated in support of the economic wisdom of this intervention—for example, the calculated savings of US\$ 677 million in Brazil noted above.

### **Sexually Transmitted Infections**

According to WHO estimates for 1999, STIs continue to be an important cause of acute (and sometimes chronic) illness, infertility, and death in the world and constitute one of the five most common reasons for use of medical services in the countries. In 1999, some 340 million new cases of STI occurred worldwide (52). According to PAHO/WHO estimates, there were 38 million new cases of curable STIs in Latin America and the Caribbean in late 1997 (Table 25) (53). The upward trend of these diseases is related to level of development, and in the less developed areas of the Region control of treatable and viral STIs is inadequate.

In 1998, PAHO carried out a qualitative study of the status of STI programs in all the Latin American and Caribbean countries. The research confirmed that these diseases are gaining prominence on the countries' health agendas, as evidenced by the fact that approximately 90% of the countries have programs to control STI and 83% have integrated those programs with the HIV/AIDS programs.

Attempts are currently being made to strengthen the national programs by adapting guidelines established by PAHO/WHO and the countries of the Americas to address the STI problem. The guidelines include comprehensive management of STI using a syndromic approach and epidemiological surveillance standards for these infections.

Some of the innovative initiatives in the Region include the attempt to establish an improved surveillance protocol for STI promoted by Brazil and implementation of the syndromic approach as national policy in 70% of the countries. In the Dominican Republic, Honduras, and Peru, trained personnel apply standardized guidelines for comprehensive care of STIs in accordance with the syndromic approach.

### **Development of National and Subregional Initiatives to Prevent and Control HIV/AIDS/STIs**

In 1999, integrated interinstitutional planning activities were carried out in the countries of Central America, Chile, Colombia, Jamaica, and Mexico. In addition, the Caribbean Working Group held meetings on infection with HIV/AIDS in June 1999 in Antigua and in March 2000 in Trinidad to develop the Caribbean Regional Strategic Plan of Action for HIV/AIDS and STI

(1999–2004). This plan, which was fully supported by the heads of state of the Caribbean Community (CARICOM), subsequently served as a basis for the mobilization of resources and the development of national strategic plans.

In the field of epidemiology, efforts were centered on second-generation surveillance of HIV infection (which includes behavioral components, molecular techniques, and STI surveillance) and on the mechanisms already in place for reporting cases of AIDS and carrying out sentinel surveillance of HIV. To disseminate the principles of second-generation surveillance, PAHO helped establish and support epidemiological networks, including the Latin American and Caribbean Surveillance Network (EpiNet). This strategy has been successful in bringing about the expansion, adaptation, and use of second-generation surveillance in the Region, while strengthening the capacity of the national epidemiological surveillance systems. By late 1999, all the countries of the Region had joined EpiNet. In addition, subregional HIV/AIDS surveillance networks had begun operating in the Southern Cone, the Andean Area, and Central America, and a Caribbean network was being established.

By the end of 1999, all the countries had completed regional training in the syndromic management of STI. At a workshop held in April 1999, guidelines for second-generation surveillance of STI were modified and strengthened. They will serve as a practical tool for improving surveillance of these infections in the Americas.

### **Progress in National, Subregional, and Regional Responses**

At this time, most of the countries of the Region have a national strategic plan for the prevention of HIV/AIDS/STI that is central to the national response and includes intersectoral actions undertaken by government, the private sector, and community organizations. At the subregional level, the Caribbean Regional Strategic Plan of Action for HIV/AIDS—spearheaded by CARICOM and provided with technical support by the Caribbean Epidemiology Center (CAREC)—will strengthen the national responses in all the countries of the Caribbean Basin. This plan has the support of UNAIDS, the European Union, the German Technical Cooperation Agency (GTZ), French Technical Cooperation (FTC), the Canadian International Development Agency (CIDA), the Department for International Development (DFID) of the United Kingdom, the United States Agency for International Development (USAID), and the World Bank, among others. The support of Spain, through the Spanish Agency for International Cooperation (AECI), has continued to benefit the Region via the Joint Action Plan. Financial cooperation from the Swedish International Development Agency (SIDA) and the Norwegian Agency for Development Cooperation (NORAD) in El Salvador, Guatemala, Honduras, and Nicaragua will probably be extended to other countries thanks to the support of these or-



ganizations for regional interprogrammatic activities. Finally, in addition to the interinstitutional cooperation PAHO provides through the Subject Groups on HIV/AIDS in the countries, a Regional Subject Group was recently established and was initially presided over by the Organization.

### Challenges and Opportunities for the Future

Despite the progress, the epidemics of HIV/AIDS and other STI continue to be a threat in the countries of Latin America and the Caribbean, as well as in North America's most vulnerable populations (for example, Hispanics, indigenous groups, and other minorities). All indications are that the number of men, women, and children infected through sexual, vertical, and blood-borne transmission of HIV, as well as injection drug use, will continue to grow in the coming years. Joint, sustainable, ongoing efforts to prevent infection and to care for those infected will be required.

Continued strengthening of the capacity for surveillance and monitoring of the HIV/STI situation at the national and regional levels is essential. Education, health promotion, and mass communication activities must also be reinforced, and the strategies for implementation and evaluation of comprehensive care for persons with HIV/STI must be adapted to the countries' needs and resources. A major obstacle that must be overcome is limited access to care, including high-quality antiretroviral drugs at an affordable price. Success will require action on the part of the countries' governments, nongovernmental organizations, and the business sector.

The vast national and regional experience with respect to the prevention and control of HIV/AIDS/STI must be shared. Information and work networks (such as EpiNet, the network for the prevention and control of STI, and the Horizontal Technical Cooperation Group), subregional strategic plans such as the plan for the Caribbean, and technical cooperation projects among countries have provided opportunities to share successful experiences. Such initiatives should receive political, technical, and financial support.

At the policy level, the clear commitments of the ministers of health, bilateral and multilateral organizations, and nongovernmental organizations in international policy forums—such as the Fourth Meeting of the Working Group on HIV/AIDS in the Caribbean, the Council of Central American Health Ministers (COMISCA), the special session of the UN General Assembly, and others—will make a significant contribution toward achieving effective support for HIV/AIDS/STI prevention and control activities in the Region. The Organization and its partners will continue to provide technical cooperation in the struggle against AIDS in the Americas. The Declaration of Commitment on HIV/AIDS, adopted at the twenty-sixth special session of the UN General Assembly (New York, 25–27 June 2001), which reinforced the resolutions of the Governing Bodies of PAHO and WHO, en-

dorses a multisectoral approach and the contribution of resources for HIV/AIDS prevention at the world, regional, and national levels. The establishment of a Global Fund to address the threat of AIDS, coupled with the desire to eliminate unequal access to comprehensive care, including antiretroviral drugs, presents a unique opportunity to improve the health of the Region's inhabitants.

### DISASTERS AND THE HEALTH SECTOR

The population of the Americas lives in a high-risk situation in terms of its vulnerability to threats of great magnitude, both natural and manmade. The period 1997–2000 was characterized by large-scale disasters, some of which affected an extensive region of a single country and others of which were international in scope, affecting several countries simultaneously. Many of these disasters exceeded the response capacity of national and local governments, and they jeopardized the potential for growth and development of the affected country or countries.

The disasters with the greatest impact on health in the previous quadrennium were the El Niño phenomenon (54), which caused floods and droughts; forest fires in Central America and Mexico; floods and mudslides in Venezuela; volcanic activity in Montserrat, Dominica, Mexico, Nicaragua, and Ecuador; earthquakes in Colombia (55), Venezuela (56), Bolivia (57), Ecuador, and El Salvador; and hurricanes Georges and Lenny in the Caribbean, Mitch in Central America (58), Floyd in the Bahamas, and Keith in Belize. Table 26 summarizes the principal natural disasters of the 1997–2000 period, selected according to the severity of their impact on lives and the economy, as well as the need they generated for international assistance immediately after the disaster or during the rehabilitation and reconstruction stages. While events of smaller magnitude are not listed, their overall impact on the population is considerable. In many cases such events are recurring and affect more than one country (59).

Few natural events have had the repercussions of the 1997–1998 El Niño/Southern Oscillation (ENSO) phenomenon in the Americas. From Central America to the Southern Cone, various countries were affected by this aberrant weather pattern, which, owing to its duration, intensity, and scope, is considered the worst natural disaster of the century. El Niño caused loss of human life, damaged agriculture and the health sector, depleted national resources, and disrupted the lives of millions of people (60). Together with Hurricane Mitch, it raised serious questions about disaster preparedness and mitigation and led to important changes in those areas (61).

In September and October 1998, hurricanes Georges and Mitch, a little more than a month apart, profoundly affected the populations of the Caribbean and Central America (58). These events caused an unprecedented call for assistance from subregional and regional organizations.

Hurricane Georges was one of the most devastating storms to hit the Caribbean in recent decades. With 185 kilometer per hour winds, it was classified as Category 3 on the international Saffir-Simpson scale when its eye passed directly over Saint Kitts and Nevis. It lashed Saint Kitts and Nevis, Antigua and Barbuda, Montserrat, Anguilla, the British Virgin Islands, Puerto Rico, Cuba, the Dominican Republic, and Haiti.

Hurricane Mitch received the highest rating on the Saffir-Simpson scale (Category 5), with winds of approximately 290 kilometers per hour, and was considered the worst disaster to hit Central America in the twentieth century. Its movement toward the Gulf of Honduras caused torrential rain from the Atlantic coast to the western area of the country, resulting in extensive flooding. The accumulation of heavy rain affected the Pacific coastal area of Nicaragua, causing a mudslide on the Casitas volcano. The hurricane also affected areas of eastern El Salvador, Guatemala, and Belize, which suffered additional flooding.

In 1999, Hurricane Floyd battered the Bahamas and Hurricane Lenny affected Anguilla, Antigua and Barbuda, Saint Kitts and Nevis, Dominica, Grenada, and Saint Vincent and the Grenadines, which had still not recovered from the effects of Hurricane Georges. These storms caused the loss of lives and homes, flooding, road blockages, and communication disruptions, leading to protracted interruption of social and economic activities. The persistent rains and mudslides on the Venezuelan coast in late December 1999 caused a major catastrophe that seriously affected the population in 10 of the 24 federal states, with devastating consequences for their economies and the environment (62).

The activity of the Soufrière volcano in Montserrat in 1997, the Colima and Popocatepetl volcanoes in Mexico in 1999 and 2000, Guagua Pichincha and Tungurahua in Ecuador, and Cerro Negro in Nicaragua in 1998 and 1999 placed many areas of the Region in a state of alert. The numerous evacuations precipitated by volcanic activity were made even more difficult to deal with by lack of experience with these types of emergencies.

The forced displacement of individuals due to the violence in Colombia has increased significantly in the last four years and has spread to a wider area. According to the records of the Social Solidarity Network, some 78,748 families, or approximately 377,990 individuals, were displaced in Colombia between 1995 and 2000, especially from rural areas where armed groups are more active. The displacement of medical professionals makes it more difficult for the rural population to obtain health care.

Chemical and radiological accidents have also been recorded in the Region. While these events have not been of great magnitude in terms of the number of individuals affected and the response of international organizations, they are a reminder of a latent threat, since such accidents can become major catastrophes. These events are complex in nature and can be difficult to characterize and address. Given that there may be reluctance to disclose details about them, they do not generate the response that should occur. One example is an accident that happened in

Panama in which a group of National Cancer Institute patients received radiation overdoses during treatment. After some of them died, it was determined that they had been treated with up to double the prescribed amount. The doses were established by computer and never checked manually. The cause of the overexposure was the improper use of the computerized radiation therapy system TPS (Treatment Planning System). The doctors had "invented" a faster method of programming it that resulted in the delivery of excess radiation. However, a good software program should have detected the problem and provided an alert (63–66).

### **Magnitude and Direct Human Impact of the Events**

In Latin America, the most devastating effects of El Niño—in terms of both loss of human life and economic loss—occurred in Peru and Ecuador, followed by Brazil, Mexico, Argentina, and Bolivia. Some 691 deaths, 1,262 injuries, 204 missing people, and 125,000 homeless were reported. As Table 27 shows, the number of deaths caused by El Niño during the 1997–1998 period was no higher than the number caused by this phenomenon during the 1982–1983 period, despite the fact that the population was larger in 1997–1998. The reason was a decrease in exposure to threats thanks to early warning systems, especially in Peru and Ecuador, whose governments implemented sound preparatory measures and effectively conceived and executed risk management tasks.

The greatest impact in terms of lives and property lost due to a disaster in the Region during the 1997–2000 period was from Hurricane Mitch, which left 9,975 dead, 9,176 missing, 12,942 injured, 1,895,437 homeless, 143,767 dwellings damaged or destroyed, and 362 bridges affected. The greatest damage occurred in Honduras and Nicaragua, followed by Guatemala and El Salvador and, to a lesser extent, Belize and Costa Rica (67) (Table 28).

Other major disasters in the Region were the 1999 mudslides in Venezuela, which left more than 546 dead, 5,582 missing, and 171,178 homeless; the 1999 earthquakes in Armenia, Colombia, which left 1,185 dead (68); and the El Salvador earthquakes in January 2001, which caused 1,259 deaths. Most of the deaths, traumatic injuries, and disappearances caused by these disasters occurred among the most disadvantaged and vulnerable segments of the population, largely because they did not live in well-built homes in safe locations and lacked access to basic services such as drinking water, and also because they had difficulty gaining access to information.

### **Socioeconomic Impact**

Any emergency or disaster situation produces significant social and economic effects. The governments of the Region have few resources for contingencies, so damage to production and infrastructure entails serious setbacks in development processes, which means decreased access to health services, deterioration of the quality of life, and increased dependency on foreign aid.

An evaluation of the damage caused by the principal disasters in the Region carried out by the Economic Commission for Latin America and the Caribbean (ECLAC) (69) shows the extent of the physical losses and the indirect damage to production caused by Hurricane Mitch. The total losses amounted to US\$ 5,000 million, which represents 15% of the regional gross domestic product (GDP). Honduras—with 70% of the affected population and nearly 68% of the economic damage—suffered the greatest losses, equivalent to 77% of the country's GDP. In Nicaragua the losses came to US\$ 900 million, which represented 44% of the GDP in its small economy. Guatemala, El Salvador, and Costa Rica also suffered significant losses.

The earthquakes in El Salvador in January and February 2001 caused damage estimated at US\$ 1,582 million. Most seriously affected was the social sector, 40% of which suffered damage, followed by the infrastructure, the productive sector, and the environment.

In the Andean countries, the greatest losses (totaling more than US\$ 7,693 million) were the result of the El Niño phenomenon. The most seriously affected country was Peru, with losses of US\$ 3,569 million, followed by Ecuador with US\$ 2,939 million. In Venezuela, the losses resulting from the floods and mudslides of December 1999 exceeded US\$ 3,000 million. The earthquake of January 1999 in Colombia caused losses of US\$ 1,857 million. These figures do not reflect total losses, since they do not take into consideration indirect damage such as the impact on the population's health, a disaster's social significance, the loss of labor capacity due to physical losses, and the emotional problems suffered by the victims.

### **Impact on Health and the Infrastructure of Health and Sanitation Services**

#### *Infrastructure*

Structural and functional weaknesses in health facilities have led to persistent damage and loss when events such as earthquakes, hurricanes, or flash floods occur (70). For example, the earthquake in Aiquile, Bolivia (1998), seriously damaged the Carmen López Hospital; the earthquake in Armenia, Colombia (1999), damaged 61 health facilities; and the floods in Venezuela (1999) affected 31 hospitals and 687 outpatient clinics.

A similar situation occurred during the El Niño phenomenon in Ecuador, where hospitals and health centers were repeatedly affected. In some cases, such as the Hospital de Chone, which had not even been inaugurated yet, the floods caused major losses in terms of medical equipment, furnishings, supplies, and drugs. In Peru, of 4,576 health facilities, some 437 (9.5%) suffered considerable damage as a result of El Niño.

Hurricane Mitch caused serious damage to the institutional health system in Honduras, which went out of service just when more than 100,000 people needed medical care. Often, hospitals

are completely evacuated when actual damage does not justify it. For example, after the earthquakes in Cariaco, Venezuela (1997), and in El Salvador (2001), some of the most important health establishments, which had suffered only minor damage to masonry, were immediately evacuated in a cumbersome, uncoordinated maneuver, despite the fact that they had conducted drills and received advisory assistance for emergency situations.

#### *Health*

In the aftermath of a major disaster, with a decrease in operating capacity of the health service system, conditions are favorable for the emergence of communicable diseases. Factors that contribute to this decrease in operating capacity are damage to the health infrastructure, interruption and contamination of the water supply, and interruption of sanitation services (71), displacement of the population, the provision of emergency food and water, and the deterioration of sanitation in the shelters.

The incidence of cholera, which is endemic in the Region, increased considerably in 1999 after Hurricane Mitch. The most serious problem occurred in Guatemala, where the weekly average of 59 cases before Hurricane Mitch increased to 485 weekly cases in the four weeks after the hurricane. Table 29 provides more information on the incidence of cholera, leptospirosis, and dengue fever.

The initial efforts in the health area were directed toward immediate treatment of cases, epidemiological surveillance, solid waste management, water disinfection, food hygiene, and vector control. Despite the aforementioned increase in the incidence of disease, the increase in the number of cases was low compared to the historical figures for epidemics or the appearance of cholera in South America in 1990. This shows that the implementation of simple epidemiological surveillance systems and immediate action to control the site after a disaster have improved throughout the Region.

#### *Preparedness*

The consequences of disasters on people's health have prompted the ministries of health in all Member Countries to have at least one person in charge of disaster preparation and mitigation. Countries with more than 300,000 population have offices or units within the ministries themselves. To improve their performance and ensure effective action, these offices need technical support and additional human and financial resources.

In Central American countries, such as El Salvador, Honduras, and Guatemala, where national disaster preparedness offices are staffed by human resources with up-to-date training, the coordination of work in response to Hurricane Mitch was faster and more effective than in those countries where training activities were not part of national preparedness programs.

The duration, intensity, cyclical nature, and geographic reach of the 1997–1998 El Niño phenomenon sparked an unprecedented institutional reaction in Latin American countries.

Changes in these countries' risk management organization reflect the governments' interest in and commitment to assuming their rightful responsibility in this regard, and they have incorporated disaster preparedness in their official activities. The health sector in the countries exposed to the El Niño phenomenon, particularly Ecuador and Peru, played a leadership role in planning and executing preparedness activities and in finalizing sectoral contingency plans.

In most of the Region's countries, setting up hospital disaster plans and holding disaster simulation drills have sensitized personnel at all levels to their roles and responsibilities. An important aspect of the preparedness effort has involved recognizing deficiencies or weaknesses in the organization in which they work, and working in teams to respond efficiently to emergencies.

The mass media played a decisive role during the El Niño phenomenon, not just in transmitting information, but also in effectively linking scientists and the public at large. Critical awareness of the phenomenon was raised and preparedness and prevention activities were effectively promoted. The Internet became one of the most widely-used tools during the 1997–1998 El Niño phenomenon and Hurricane Mitch. Latin American and Caribbean countries made available on the Internet a variety of information on preparedness and the course and impact of the phenomenon. Institutions and individuals involved in dealing with the consequences of the event were able to seek and obtain reliable information through regional and international meteorological networks and organizations. The countries also were able to exchange information with one another, sharing contingency plans and information about the health sector's response. Technological advances notwithstanding, Internet access remains limited, especially in public institutions.

The community's participation in risk management has been limited, partly because there are few areas where the community can exert its influence and few resources are assigned to them, and partly because the community has not been able to submit concrete proposals and to define its position as an organized social sector. In Central America after Hurricane Mitch, strategies were initiated to have all social actors consider the community's active participation in risk management, thereby strengthening the community's self-management as a different way to efficiently and effectively reduce the vulnerability to disasters in the Region (72).

During these four years, considerable progress has been made in the field of education with respect to emergencies and disaster preparedness, not just in the medical, nursing, and public health schools of the Region's universities, but also in Central America's engineering and architecture schools. Nicaragua, for example, established a National University Commission that includes all fields related to health, engineering, and architecture; similar activities have been carried out in El Salvador, Honduras, the Dominican Republic, and Panama. The Mesoamerican University Commission for Emergency and Disaster Education designed a

set of teaching modules addressing all disaster management issues, which PAHO/WHO's Collaborating Center at the University of Antioquia validated. The Central American subregion has carried out, among other things, risk analysis at the community level in Costa Rica, research on respiratory conditions in populations near active volcanoes, research on increased morbidity and mortality from vector-borne diseases in flooded areas in El Salvador, and fire risk analysis in hospitals in Honduras.

Costa Rica's School of Public Health conducted research at the post-graduate level on the relationship between natural disasters and malaria outbreaks, the usefulness of risk mapping, community resources as tools for health promotion, and the design of damage assessment tools for decision making. Mexico began to include subjects related to disaster and emergency prevention and preparedness within the analysis of risk and vulnerability of functional and structural elements in the *Municipios* for Health program.

The SUMA (Humanitarian Supply Management) project, initiated by PAHO in conjunction with several governments and international organizations and which aims to strengthen national capabilities to effectively administer humanitarian aid supplies, has been widely used in the Region (73, 74). More than 3,000 officials worldwide have been trained to use it in emergency situations or during normal times. The curricula of various universities have added courses on the integrated management of emergency supplies.

### *Prevention and Mitigation*

The inclusion of risk management in legislation in the Region's countries is an important indicator of the shift from a purely aid mindset to a broader, multidisciplinary, and interinstitutional vision. For example, Costa Rica's National Law on Emergencies, enacted in 1999, created the National Commission of Risk Prevention and Emergency Assistance; and Decree 1.250 (1999) established the Federal Emergency System in Argentina. After Hurricane Mitch, Honduras enacted laws to regulate land use; in 2000, Nicaragua promulgated Law 337, instituting the National System for Disaster Prevention, Mitigation, and Response. In 2000, Bolivia enacted the Law for Hazard Reduction and Disaster Response.

The Latin American and Caribbean countries have made significant advances over the last 10 years in making facilities safer. To this end, standards and codes in use set guidelines for the functional, structural, and non-structural protection of hospitals, public health centers, and water and sanitation systems. In 1997, before El Niño, the Ministry of Health of Peru began to correct deficiencies in the health sector infrastructure, and the National Agency of Sanitation Services (SUNASS) resolved to implement the necessary measures to reduce the impact of natural disasters on the drinking water and sanitation systems. In 1998, Colombia implemented the Colombian Code for Earthquake Resistant Structures (Law 400/97).

The Region's circumstances clearly show that, despite important scientific and technical advances, economic modernization, international cooperation, and regional integration, conditions of poverty remain unchanged, and it is the most disadvantaged groups that usually live under the most precarious conditions. In the last four years, there have been impressive efforts in the Region to develop a community approach to risk management and disaster mitigation that promotes awareness in the communities themselves. An example of this effort is the Central American Community Network for Risk Management, which links hundreds of communities in Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, and Panama. This network has become a venue for the integration, coordination, and convergence of Central American communities, community organizations, and individuals working in different areas of development.

#### *Mitigation Programs and the Maintenance of Health Facilities*

While there was a certain awareness in the Region with regard to the importance of reducing the impact of disasters on health facilities, the difficult experiences following major events have convinced health authorities of the need to include mitigation measures in hospital maintenance plans and in the design of new hospital buildings and water systems. One of the lessons learned was that the response is effective when the mitigation programs are implemented before a disaster. Most of the losses to the health infrastructure were due to the fact that facilities were sited in vulnerable locations and were poorly maintained. While the principal efforts in the Region during this four-year period were aimed at diagnosing and reducing the vulnerability of existing health facilities, in the last year there has been an increasing trend toward investing in new infrastructure.

Positive experiences in connection with this conceptual shift are noted in the Holberton Hospital in Antigua, which was repaired with mitigation criteria in mind after Hurricane Luis, and then avoided major damage from Hurricane Georges; in the San Juan de Dios Hospital in Armenia, where structural reinforcement work undertaken before the 1999 earthquake made it possible for the hospital to care for many injured persons during that event; in the Chilean hospitals, where vulnerability studies enabled Chile's collaborating center to conduct a rapid and immediate evaluation and make technical recommendations after the earthquake that hit Peru and Chile in 2001; and in the restoration of the JN France Hospital in Saint Kitts and Nevis, which was 90% destroyed by Hurricane Georges, which included mitigation measures. But the recent earthquakes in El Salvador (2001), which affected 39% of the hospitals' installed capacity, bear witness to the fact that more energetic action is needed to reduce the physical vulnerability of key health facilities, with greater political commitment and more investment of resources.

ECLAC and IDB consider that the funds they allocate to prepare for natural phenomena and mitigate their impact have a high rate of return. A review of the funds invested over the last

four years demonstrates that these investments represent great savings in comparison to the expenditures that would have been incurred to deal with the consequences of a disaster in the absence of preparation.

#### *Mitigation in Water and Sanitation Services*

While achievements in this sector are more modest than those in connection with hospitals, they have occurred more rapidly. Some ministries of health are charged with overseeing the quality of water and sanitation services; however, aspects dealing with coverage, regulations, construction, operation, and maintenance continue to be handled by the water and sanitation companies, the *municipios*, or the ministries of housing. This plethora of actors makes it difficult to adopt sectoral policies to address vulnerability reduction.

In order to achieve greater impact in connection with risk management activities in the water and sanitation sector, commitments have been obtained from the private sector, non-governmental organizations, and international organizations to promote opportunities to discuss and design national and Regional strategies and policies. Perhaps the most significant progress in the sector is in connection with the availability of updated technical information, which has increased the interest in and demand for training (75, 76).

Vulnerability studies carried out in Brazil, Chile, Costa Rica, Ecuador, Peru, and Venezuela have not yet resulted in specific actions for the reduction of water system vulnerability. But the drinking water and sanitation system concessions granted in Argentina, Bolivia, and Chile have incorporated special requirements for the inclusion of disaster management in the building, operating, and maintenance of these services.

#### *Response*

In the aftermath of a disaster, the first and quickest response is local. Overall, the countries have strengthened their national capabilities, providing coordinated, effective responses. As a result, some events that would previously have been considered disasters were resolved as local emergencies. That notwithstanding, high-impact events, such as Hurricane Mitch, exceeded the countries' capability to respond, and forced the health sector to divert resources from regular programs to address emerging needs. Since it is also necessary to continue regular activities and strengthen some basic programs for the prevention of post-disaster diseases (vaccination, vector control, and surveillance of communicable diseases, zoonosis, water disinfection, environmental sanitation, and community education), international cooperation is generally needed.

The concept of situation rooms was developed as a result of the disasters of the last four years. These are strategic centers where multidisciplinary experts collect, analyze, and disseminate timely information to facilitate interinstitutional and intersectorial coordination and technical guidance for interventions and

decision making. The usefulness of situation rooms was evident during Hurricane Mitch in 1998, the floods in Venezuela in 1999, and the earthquakes in El Salvador and Peru in 2001 (77).

National emergency strategies and hospital plans are not generally designed with the necessary flexibility for action in the face of different disasters. But their validity is without question as tools for raising awareness and educating the authorities, health personnel, and the general public with respect to the need to understand vulnerability to disasters, be prepared to confront them, direct an effective response, prepare for other events, and mitigate their impact.

In complex emergencies, such as in Colombia, where a systematic, multidisciplinary, and interorganizational humanitarian response is required, the health sector has adopted inter-program strategies aimed at strengthening national capabilities, facilitating access to health services, establishing health policies and lines of action, producing specialized material, and providing physical and emotional care on site.

All the Region's countries have personnel trained in the Humanitarian Supply Management System (SUMA), and most have established national multidisciplinary and interinstitutional teams to ensure that they have local trained human resources who can implement and operate SUMA in disaster situations. This promotes the transparency, organization, credibility, and quality of the delivery of donations to the affected countries. Mobilization of regional volunteers in disasters such as Hurricane Mitch or the earthquakes in El Salvador and Peru was a great source of support to the local teams and expedited the implementation of SUMA immediately after the disaster (78).

More and more organizations and associations are participating in disaster response, increasing support but, at the same time, making coordination more difficult.

## FOODBORNE DISEASES AND FOOD SAFETY

Foodborne diseases (FBD) are an important public health problem in the Region, with social, economic, political, and cultural implications. In the period 1997–2000, food safety elicited special interest not only on the part of public health authorities but also from consumers and producers.

Some factors that favor the appearance of FBD pose a challenge to the national health systems. They include problems of basic sanitation, which result in food contamination; an increased percentage of elderly people (who, along with children, are most vulnerable to FBD) due to increased life expectancy; the appearance of new pathogenic agents and growing resistance to antimicrobials; and an increase in the number of immunodeficient individuals, who are more susceptible to these illnesses. Other factors that contribute to the spread of FBD are changes in eating habits, changes in the technology of food production, processing, and distribution, the increase in international com-

merce, the growth of tourism and domestic and international travel, and people's lack of knowledge about preventing food contamination. The natural disasters that struck several countries of the Region in recent years exacerbated the risk factors for these diseases in the affected populations.

### Current Situation and Trends in Foodborne Diseases

The Regional Information System for the Epidemiological Surveillance of Foodborne Diseases (SIRVETA), coordinated by the Pan American Institute for Food Protection and Zoonoses (PAHO-INPPAZ), does not function equally well in all the countries, and therefore information about outbreaks of FBD is still incomplete and does not reflect the real magnitude of the problem. During the four-year period 1997–2000, 19 countries in the Region reported 2,984 outbreaks of FBD, which resulted in 93,842 cases of illness and 117 deaths (Table 30).

Figure 5 shows the causal agents of those outbreaks. Bacterial contamination of food due to poor handling was the most important risk factor associated with the outbreaks in Latin America and the Caribbean. Bacteria were responsible for 42% of all outbreaks for which the causal agent was identified and accounted for 58% of cases of illness.

While marine toxins caused 10% of the outbreaks, they were associated with just 2% of the cases. The percentage of outbreaks in which the causal agent was not identified is relatively high (38%), which underscores the need to strengthen surveillance systems and research capability in the countries to ensure the timely and full investigation of reported outbreaks.

Figure 6 shows the distribution of bacterial outbreaks by causal agent. Some 55% (682/1,247) of all bacterial outbreaks were alimentary infections, and salmonellosis was the most prevalent illness. Next most common were poisoning caused by *Staphylococcus aureus*, with 32% (398/1,247), and alimentary intoxication-infection caused by *Clostridium perfringens* and *Bacillus cereus*, with 12% (148/1,247). Of the outbreaks from poisoning, the staphylococcus enterotoxin was responsible for 400 and marine toxins for 298. However, the number of victims in the outbreaks due to marine toxins (1,786) is very small compared to the 13,820 victims of poisoning by the staphylococcus toxin. Of the outbreaks caused by bacterial agents, 87% were produced by *Salmonella* spp., *Escherichia coli*, *Clostridium perfringens*, and *Staphylococcus aureus* toxins. Outbreaks caused by *Shigella* spp., *Bacillus cereus*, and *Vibrio cholerae* accounted for just 8.4% of the total.

With regard to the place of origin of individual outbreaks, the greatest proportion occurred in homes (31%), followed by institutional dining rooms (24%) (Figure 7).

The foods most frequently associated with outbreaks caused by bacteria are those of animal origin (red meat, fish, dairy products, egg-based products, and fowl), which account for 62% (Figure 8). Therefore, FBD prevention efforts should give priority to ensuring the safety of these types of foods.

### Interventions to Prevent Foodborne Diseases

In the 1990s, the Pan American Health Organization initiated technical cooperation activities to improve food safety by developing FBD prevention strategies. The importance of these diseases was expressed by the 53rd World Health Assembly in Resolution WHA53.15 and reiterated by PAHO's Directing Council in Resolution CD42.R3. These resolutions stress that organizing comprehensive food safety programs is an essential public health function and urge the countries to promote active coordination among the health and agriculture sectors, industry, and consumers.

The Ministers of Health and Agriculture of the Americas, through Resolution RIMSA XII.R3, recommended to PAHO's Governing Bodies the creation of the Pan American Commission for Food Safety (COPAIA) to establish policies and strategies that will foster success in the prevention of these diseases. In recognition of the importance of FBD and their negative health effects, the Commission was established in early 2001, and a review of food safety policies is under way in the countries.

Another initiative in which the countries participated in the 1997–2000 period was the founding of the Inter-American Network of Food Analysis Laboratories (RILAA). PAHO, through INPPAZ, and the United Nations Food and Agriculture Organization (FAO) share responsibility for the Network's implementation. In 2001 the Network consisted of 60 laboratories in 30 countries of the Region, including some that act as national reference laboratories in support of FBD prevention activities.

During the same period, the food safety inspection and monitoring services in the countries were modernized thanks to implementation of the HACCP (Hazard Analysis and Critical Control Points) system, recognized worldwide as the most effective tool for controlling potential hazards related to outbreaks of FBD. Community participation has been used to raise awareness of the importance of guaranteeing food safety in order to reduce the impact of FBD on the population's health.

As mentioned previously, one of the consequences of natural disasters is the increased risk of food contamination. The disasters that affected the Region recently, especially the Dominican Republic, El Salvador, Honduras, Nicaragua, and Venezuela, necessitated technical cooperation for food protection. In anticipation of future catastrophes, a document entitled "Inocuidad de alimentos en situaciones de desastres (Food Safety in Disaster Situations)" was developed and has served as a guide for emergency response plans in the affected countries.

Surveillance for foodborne diseases should be the activity that drives national programs for food inspection and FBD prevention in the Region. It provides the information needed to perform risk analyses and to spur regional implementation of the HACCP approach.

### ZOONOSES

The zoonoses that are covered by regular epidemiological surveillance systems are rabies, equine encephalitis, and plague. Information on the others included in this section comes from data published in the epidemiological bulletins of the countries' ministries of health.

#### Rabies

Since 1969, PAHO has been coordinating the Regional Information System for the Epidemiological Surveillance of Rabies in the Americas (SIRVERA). This system, used by all the countries of the Region, consists of immediate weekly reports on cases of human and canine rabies by province, state or region, and *municipio*, and a confirmatory monthly report on rabies cases in humans (which includes individual epidemiological case records) and all animal species. All the countries report regularly on the rabies situation. According to information provided through SIRVERA, the annual average number of cases of human rabies in the Americas fell from 270 in the 1980s to 168 in the 1990s. In the year 2000, only 65 cases in humans were reported for the entire Region (Table 31).

The specific mortality rate for rabies likewise declined sharply, from 1.3 per million population in 1980 to 0.1 per million in 1999. With the exception of Suriname, which reported a case transmitted by a bat in 1998, the countries and territories of the English-speaking Caribbean remained free of human rabies.

In the last four years, there has been a marked reduction in the incidence of human rabies transmitted by dogs. In the year 2000, 38 of the 65 cases in humans were transmitted by rabid dogs, as compared to 82 cases in 1997. During this period, no cases of human rabies were transmitted by dogs in Uruguay, Chile, Argentina, parts of Brazil (the southern region and the states of São Paulo, Rio de Janeiro, and the Federal District), Panama, Costa Rica, the countries of the English-speaking Caribbean, the United States of America (including Puerto Rico), or Canada. In 2000, Belize, Cuba, the Dominican Republic, Mexico, and Peru joined that group.

While dogs remain the principal source of infection for humans, the relative importance of rabies transmitted by wild animals, especially bats, is increasing. However, the absolute number of these cases remains stable. In 1999, bats were responsible for 26.4% of cases of human rabies in which the species that transmitted the infection was known. This figure represents a 147% increase over 1997, when bats were the source of infection in 10.7% of human rabies cases. In the United States, all human rabies cases in the period, as well as the case recorded in Canada in 2000 (the first there in two decades) were transmitted by bats.

From 1995 to 1999, an average of 874,923 people were attacked by animals each year, and 306,722 (35.1%) received rabies prophylaxis after exposure. The availability of human rabies vaccine in Latin America during the two-year period 1998–1999 was

9,243,350 doses; 8,957,185 units (96.8%) were Fuenzalida vaccine (suckling mouse brain, SMB) and 285,165 (3.2%) were cell culture vaccine. Although the supply of the SMB biological was satisfactory for the Region as a whole, some countries faced shortages and received shipments from other countries, particularly Brazil and Chile, with the cooperation of PAHO.

Canine rabies is showing a declining trend similar to that of human rabies. The annual average of 3,912 cases for the five-year period 1995–1999 represents a 57% reduction compared to the annual average of 9,187 cases for the previous five-year period (1990–1994). In the year 2000, some 1,958 cases of canine rabies were reported in the Region, 79% less than in 1990–1994 (Table 32).

This favorable situation can be mostly credited to the sustained efforts of the countries' national rabies control programs. One of the principal strategies used in the Region to control canine rabies has been mass vaccination campaigns. In the period 1998–1999, the Latin American countries administered a total of 75,106,533 doses of canine rabies vaccine, with annual average vaccination coverage of 68%. In 1999, the highest coverages were achieved in Peru (97.7%), Mexico (92.2%), Brazil (87%), Paraguay (76.3%), and Cuba (76.2%). The supply of the vaccine in the Region has been sufficient to meet the countries' needs. PAHO/WHO has provided technical assistance to the national programs on the importation of cell culture vaccines against canine rabies, which have immunological advantages over the SMB vaccine and are gradually displacing it.

Another factor that has contributed to progress in rabies control is the continued epidemiological surveillance of the disease throughout the Region. The use of molecular biological techniques to characterize strains of rabies virus circulating in the United States and Canada and, in the last three years, in several Latin American countries has made it possible to monitor the behavior of rabies in the principal affected species, mainly wild animals.

Table 33 shows the number of rabies cases in animals in Canada and the United States during the period 1997–2000.

### Brucellosis

*Brucella abortus* has become less of a health and economic problem in the United States, where the 50 states are free of bovine brucellosis. Canada and Jamaica are considered to be free of *B. abortus* and *B. suis*, and there has never been a confirmed case of infection with *B. melitensis* in these countries. Mexico has guaranteed continuation of the program for control and elimination of brucellosis with resources contributed by the Federal Government through the Secretariat of Agriculture, Livestock, and Rural Development (SAGAR), the state governments, and cattle producers.

In 14 countries of the Caribbean subregion, there is no evidence in livestock of infection with *B. abortus*. Some 95% of the cattle and 100% of the dairy cows in Cuba are free of brucellosis. No infection with *B. melitensis* has been found in the subregion, and brucellosis in pigs is reported only sporadically in nine coun-

tries. In the Central American countries (except Belize, where infection with *B. abortus* has not been confirmed), the disease is prevalent in cows and pigs. Between 1994 and 1999, the annual average number of bovine brucellosis cases in the subregion was 1,328. Figure 9 shows the latest year in which infection with *B. abortus* was reported in each country and each affected species.

During the period 1994–1999, 382 cases of human brucellosis were recorded in the Caribbean subregion in Cuba, the Dominican Republic, and Trinidad and Tobago. The latter country reported cases only in 1998, and none were recorded from Haiti or Jamaica during those years. In Central America during the same period, 55 cases of human brucellosis were reported.

The impact of animal brucellosis on public health is evident from the fact that the highest morbidity and mortality rates occur in people living in rural areas. The risk of illness and the agent of infection vary among the subregions according to the proportion of the population that is rural, people's eating habits, animal husbandry practices, and the endemicity of the disease in livestock (the reservoir). For example, in Argentina, Bolivia, Mexico, Paraguay, and Peru, 90% of the cases in humans are caused by *B. melitensis* and principally occur among indigenous groups.

In the border area of northwestern Argentina, Bolivia, and Paraguay, infection with *B. melitensis* has been endemic for more than 40 years. In this area, where more than 20,000 families make a subsistence living from goat breeding, high percentages of infection occur in women and children (54% and 32%).

In 1998 Mexico and Peru established annual vaccination cycles for goats under the coordination of health and agriculture institutions, which has made it possible to control the cause of human brucellosis. It should be emphasized that in most countries of Latin America and the Caribbean, this disease is not subject to mandatory reporting, and thus epidemiological surveillance is limited.

### Bovine Tuberculosis

At the end of 1999, Canada was on the verge of completing the eradication stage, as the last cases of infection by *Mycobacterium bovis* in bovines had occurred in 1997 in Manitoba. The United States concluded eradication work in California, Pennsylvania, and Puerto Rico, whereupon 46 states were free of the disease. Michigan was removed from this epidemiological category when the infection was found in deer and cows.

In Central America, national programs for the control and eradication of bovine tuberculosis have been suspended and surveillance activities are limited, so updated information is not available on the health status of cattle herds. Panama, which had been free of bovine tuberculosis since 1994, was reinfected in 1997 when the disease reappeared in the province of Bocas del Toro, near the Costa Rican border. During the period 1998–2000, new cases were found through tuberculin testing, preventing the country from being declared free of the disease once again.



In Costa Rica, structural and functional reforms in the animal health service affected the continuity of activities. The current official structure and available resources do not permit interventions to be maintained at the same level as in previous years. In El Salvador and Nicaragua, activities are limited to testing animals being sent to fairs and restricting some movement of herds. None of the Central American countries conduct epidemiological surveys to determine prevalence.

In South America, the presence of lesions in animals in the slaughterhouses subject to veterinary inspection indicates that bovine tuberculosis continues to be a problem. Between 1994 and 1999, the rate of tuberculosis per 100,000 slaughtered cattle was 220 in Argentina, 99 in Guyana, 57 in Brazil, 32 in Paraguay, and 31 in Chile. Tuberculous lesions are also found commonly in the lungs and other organs of pigs, resulting in confiscations during health inspections in meat processing plants. Porcine tuberculosis is believed to occur when pigs are housed with infected cows or are fed milk from diseased animals.

Although the routine use of culture studies is limited, *Mycobacterium bovis* was isolated in pulmonary tuberculosis patients in Argentina, Chile, Guyana, and Trinidad and Tobago between 1994 and 1999. In Bolivia, where the rate of human tuberculosis is 134.3 per 100,000 population, it is believed that *M. bovis* infections account for a significant number of human cases, especially in rural areas with a high prevalence of infection in livestock.

### Equine Encephalitis

Eastern equine encephalitis (EEE), western equine encephalitis (WEE), and Venezuelan equine encephalitis (VEE) are found in North, Central, and South America. They are viral zoonoses that occur seasonally, causing outbreaks in horses and, less frequently, in humans. They are associated with environmental conditions that favor an increase in the vector mosquito population and amplification of the virus in susceptible vertebrate hosts.

During the period 1997–2000, 14 countries reported syndromes compatible with equine encephalitis through the Pan American Foot-and-Mouth Disease Center (PANAFTOSA) weekly quadrant information system. The data are provided irregularly, with most countries reporting only in weeks when cases are found. In the period under discussion, only eight countries (Brazil, Colombia, Ecuador, Mexico, Panama, Paraguay, Peru, and Venezuela) submitted regular weekly reports regarding the presence or absence of foci of the disease.

The information provided reveals the existence of endemic areas in various countries where clinical episodes of equine encephalitis are reported frequently. Between 1996 and 2000, 1,065 clinical cases of equine encephalitis were reported, and the causal agent was isolated in 64 (6%). Of the latter group of cases, Colombia had 57 (all VEE), Venezuela had five (four EEE and one VEE), Brazil had one case of EEE and one of WEE, and Honduras had one case of VEE. The cases were sporadic and did not consti-

tute an epidemic outbreak such as the one recorded in 1995 in Venezuela and Colombia. However, failure to regularly immunize horses in high-risk areas (principally due to a lack of vaccine) poses a permanent threat of epidemic outbreaks.

### Bovine Spongiform Encephalopathy

Bovine spongiform encephalopathy (BSE), also known as “mad cow disease,” is a fatal, communicable, neurodegenerative disease that principally affects the brains of bovines. The disease was first diagnosed in 1986 in the United Kingdom, where it became an epizootic that reached its maximum prevalence in 1992 and 1993. The most widely accepted theory on the origin of BSE is that changes in the animal processing industry allowed infectious material to survive in the meat and bone products. To September 2001, 183,520 cases had been reported in various countries, 99% of which occurred in the United Kingdom. The importance of BSE to public health derives from the association between the appearance of cases of variant Creutzfeldt-Jakob disease (vCJD) and the consumption of food products from BSE-contaminated bovines. This variant is a rare, fatal human disease. Like the classic form of CJD, it is classified as a transmissible spongiform encephalopathy because of the characteristic sponge-like appearance of the degenerated brain tissue and the disease’s ability to be transmitted from infected cows to humans. This is a new human disease, first described in March 1996. Since then, 101 cases have been reported in the United Kingdom, three in France, and one in Ireland.

The appearance in 2000 and 2001 of indigenous cases of BSE in European countries previously considered free of this disease (Germany, Austria, Denmark, Slovakia, Slovenia, Spain, Finland, Greece, Italy, and the Czech Republic) has increased authorities’ and consumers’ concerns about the possibility of its spread to other regions of the world. That concern is magnified with the diagnosis of three cases of BSE in Japan between September and November 2001—the first indigenous cases to appear outside Europe. The cases that had previously occurred outside Europe (one in Canada, one in the Falkland Islands, and two in Oman) were in imported animals. The control and prevention measures adopted in those places eliminated the disease, which was limited to the index cases.

According to the available scientific and technical information, the Region of the Americas is free of indigenous cases of BSE. This conclusion was reached in a meeting of experts from the Americas and Europe held in Montevideo, Uruguay, in April 2001. The meeting was convened by PAHO to assess the status of the disease and make recommendations to the countries for keeping the Region free of bovine spongiform encephalopathy.

### Leptospirosis

Leptospirosis is a zoonosis found worldwide that affects a large number of animal species and, accidentally, man.

Leptospirosis is difficult to diagnose because its various symptoms can be confused with those of other diseases, such as dengue fever and hepatitis. It is considered an emerging disease, and it has captured the attention of several countries in the Region in recent years because of an increase in the number of cases reported. Table 34 presents the available information on cases of leptospirosis in humans reported by some countries for the period 1996–2000. As it shows, the prevalence of this disease has tended to increase in the Region, but there are pronounced differences and large fluctuations in the reporting of cases by country and by year. Several possible explanations exist for the inconsistent information. National epidemiological surveillance systems may have difficulty detecting and reporting cases on a routine basis. In the majority of the countries, leptospirosis is not subject to surveillance and, consequently, the information available refers mostly to epidemic outbreaks, which are easier to detect. In addition, failure to reconcile case definition criteria may be a factor, as well as the limited capacity of the laboratory system and the absence of standardized diagnostic techniques and reagents for case confirmation. Finally, deficiencies in the training of health personnel in clinical diagnosis, epidemiological investigation, and treatment may hamper reporting of leptospirosis.

### Plague

During the period 1996–2000, five countries in the Americas reported cases of plague: Bolivia, Brazil, Ecuador, Peru, and the United States. Cases appeared sporadically and were limited to areas previously known to be active foci of plague transmission. Table 35 shows the number of cases by country. The 14 cases reported by Ecuador in 1997 correspond to an epidemic outbreak in the province of Chimborazo in which 11 people died.

Between December 1996 and January 1997 in Bolivia, there was an epidemic outbreak of bubonic plague in the *municipio* of Apolo, Franz Tamayo province, La Paz department, consisting of 27 reported cases and 4 deaths. The five cases recorded in 1998 were in the same locality.

In Peru, an epidemic outbreak started in 1992 and peaked in 1994 with 1,128 cases and a case-fatality rate of 4.6%. The experience acquired in combating that outbreak allowed adoption of preventive measures directed specifically toward high-risk localities and led to the effective control of plague.

### Foot-and-Mouth Disease

From mid-1997 to mid-2000, no clinical cases of foot-and-mouth disease were recorded in an extensive area of South America. That area, which covers approximately 6.2 million km<sup>2</sup> and contains 140 million cattle in 1.5 million herds, is the center of South America's livestock economy and includes Argentina, Chile, Paraguay, Uruguay, and all the states that comprise the livestock circuit in south, west-central, and southeast Brazil.

The disease showed a declining trend in all countries of the Andean subregion except Bolivia, where it remained endemic. In Bolivia, despite progress in developing the National Foot-and-Mouth Disease Eradication Plan with the active participation of the cattle producers, weaknesses in control activities facilitate the disease's spread. In Peru, unaffected zones have remained free of the disease since vaccination was suspended in those areas in 1996, even though the country confronted an epidemic caused by the type A virus from mid-1999 to late 2000. In Colombia, vaccination coverage at the national level increased considerably in the 1997–2000 period, rising from 49.7% in 1997 to 85% (or even 90% in some important cattle-raising areas) in 2000. Consequently, the incidence of the disease has decreased and a significant area of Colombia's Atlantic coast has been recognized by the International Office of Epizootics (IOE) as free of foot-and-mouth disease with vaccination. This achievement was threatened by the appearance in August 2000 of a focus of foot-and-mouth disease (type O virus) in the *municipio* of Necoclí. It was eradicated by slaughtering the susceptible animal population. The disease is concentrated in the department of Nariño on the Ecuadorian border, where 80% of the foci recorded in Colombia in 2000 were located. Ecuador has made significant progress in controlling the disease, especially during 1999–2000 and the first half of 2001. In 1997, an outbreak caused by the O virus was confirmed in the Galápagos archipelago, which had never before been affected. Epidemiological investigation indicated that the agent probably arrived in contaminated food from continental Ecuador. The diseased animals and their contacts were sacrificed, and the results of subsequent serological sampling indicated no residual viral activity on the affected island or the other islands of the archipelago.

Venezuela has significantly reduced the occurrence of the disease and improved national vaccination coverage, which increased from 63% in 1997 to 87% in 2000. There has also been marked progress in the area covered by the Amazonian- and non-Amazonian Brazil and Guyanas Basin Project. In Brazil, 16 of the 30 jurisdictions of the Federation, containing nearly 80% of the country's total bovine population, were recognized as free of foot-and-mouth disease. Guyana achieved similar status.

The favorable situation in the Southern Cone began to deteriorate in the second half of 2000, when Argentina found animals seropositive for foot-and-mouth disease virus A on the border with Paraguay. Around the same time, clinical disease caused by the O virus appeared in herds in the state of Rio Grande do Sul, Brazil, an area which had been free of the disease with vaccination since 1998 and where its presence had not been detected since 1994. Also affected was the *municipio* of Artigas in Uruguay, a country which had been free of foot-and-mouth disease without vaccination since 1995 and had not seen the disease since 1990. In both areas, the foci were eradicated by sacrificing the diseased animals and their contacts.

During 2001, Argentina, Uruguay, and southern Brazil experienced an epidemic. It began in late February, when the presence of foot-and-mouth disease caused by the A virus was confirmed in two establishments in the administrative areas of San Andrés de Giles and Mercedes in the province of Buenos Aires. In one month, the epidemic spread through the provinces of Buenos Aires, La Pampa, San Luis, Córdoba, Santiago del Estero, Santa Fe, Entre Ríos, and Corrientes, reaching the department of Soriano in Uruguay on 23 April.

In Uruguay, slaughter prevented the spread of the disease. Between 23 and 29 April 2001, 4,593 cattle, 1,481 sheep, and 332 pigs were sacrificed. On 29 April, slaughtering was suspended because of evidence that the disease had already spread to the rest of the country. In early May, foot-and-mouth disease spread to the state of Rio Grande do Sul in Brazil, affecting the *municipios* of Santana do Livramento and Alegrete.

As of September 2001, the cumulative number of foci was 1,538 in Argentina, 1,722 in Uruguay, and 17 in Brazil. In Argentina, the total number of cattle at risk was 1,407,584, with 79,116 diseased (5%); in Uruguay, 1,160,863 with 23,815 diseased (2%); and in Brazil, 8,110 with 276 diseased (3%). The health measures adopted included the sacrifice of animals and reinitiation of vaccination. The epidemic was controlled, and toward the end of 2001 no active foci remained in any of the three countries.

According to the ministries of agriculture of Argentina and Uruguay, exports of meat and products of animal origin from those countries decreased 60% and 56%, respectively, owing to the reintroduction of foot-and-mouth disease. Conservative estimates suggest that direct losses amounted to US\$ 300 and US\$ 400 million, respectively.

Some of the possible causes of the foot-and-mouth disease epidemic in the Southern Cone are the illegal movement of animals and animal products and by-products across international borders and the weakening of veterinary services and epidemiological surveillance and control systems. The countries have reiterated the need to strengthen collaborative efforts by the public and private sectors to ensure organized participation by all social actors in improving the systems for prevention, surveillance, and response to health emergencies.

## NONCOMMUNICABLE DISEASES AND INJURIES

### Risk Factors

Noncommunicable diseases share many risk factors, which interact with genetic factors to produce disease. As a result, the surveillance of risk factors for noncommunicable diseases requires many resources and much technical expertise, which poses a challenge for many developing countries. Moreover, results from surveys conducted in various countries may not be comparable, because countries may use different methodologies and instruments.

Table 36 shows the prevalence of the most important risk factors for noncommunicable diseases as estimated by surveys conducted in Barbados, Canada, Colombia, Cuba, and the United States. Table 37 shows the prevalence of risk factors for cardiovascular disease in Mexico City men, as reported in 1996 (79). A sedentary lifestyle, smoking, and alcohol consumption were more frequent among males, while obesity or overweight was statistically more prevalent among women.

Urbanization has been identified as one of the determinants related to the increase in the prevalence of risk factors for noncommunicable diseases in Latin America and the Caribbean. For example, people living in urban areas in Mexico were six times more likely to be obese than those living in rural areas (80).

### *Distribution of Risk Factors by Social Class, Educational Level, or Economic Status*

Evidence has consistently shown that some risk factors for noncommunicable diseases are more prevalent among persons with lower socioeconomic status or educational level. For example, in Porto Alegre, Brazil, the prevalence of smoking, obesity, and hypertension was higher among those with less education or lower per capita income (81). Table 38 shows that the prevalence of obesity, diabetes, hypertension, and lack of exercise in Bolivia, one of the Region's poorest countries, varied by gender and was higher among those with lower educational level (82). In addition, a study carried out in Brazil (83) reported an association between low social class and tobacco use in both women and men, alcohol use in men, and sedentary lifestyle in women (Table 39). A multicenter study of cardiovascular risk factors and socioeconomic status examined population samples from Rio de Janeiro and São Paulo in Brazil, Temuco and Santiago in Chile, and Bogota in Colombia. The study found an inverse association between socioeconomic status and the prevalence of high body mass index (BMI) in Bogota and of systolic blood pressure in Rio de Janeiro, São Paulo, and Bogota (84). The higher prevalence of risk factors for noncommunicable diseases among the poor and the difficulties they have in accessing preventive programs may exacerbate inequities in the occurrence of these diseases.

### Hypertension

About 140 million people in the Americas suffer from hypertension. This condition is one of the most important risk factors for major cardiovascular diseases such as cerebrovascular disease and ischemic heart disease, which are the leading causes of premature death among adults in most countries. And yet, there is not enough concerted action at this time to enable health systems and services—especially in Latin America and the Caribbean—to develop effective and efficient strategies and programs to combat hypertension. In the United States it has been demonstrated that reducing 5 Hg in median blood pressure can lead to a reduction of 15%–20% in mortality from ischemic heart disease and 35%–40% in mortality from stroke; if

hypertension is controlled, mortality from cardiovascular disease could be reduced 23% (85). A significant decrease in mortality also has been observed among persons 65 years old and older (86).

### *Surveillance of Hypertension and Related Risk Factors*

The benefits of maintaining a normal blood pressure have been well demonstrated, and yet, there still are not enough effective blood-pressure control programs in many of the Region's countries. One of the major barriers in establishing such programs is that many countries in the Americas have incomplete information about the hypertension problem—not enough hypertension surveillance systems have been developed that could provide information on the prevalence of this condition and its distribution in the population, so that effective interventions could be developed targeting specific groups developed.

Based on survey data, the prevalence of hypertension in Latin America and the Caribbean has been estimated at between 8% and 30%. It should be kept in mind, however, that even though several cross-sectional studies that estimate hypertension have been published in recent years, the diversity of methodologies used has been considerable, and these studies may not be comparable. For example, the geographical scope of studies (e.g., national, regional, selected sites) may vary greatly, as can diagnosis criteria used for classifying individuals, the age groups under consideration, data collection, and sampling procedures. Data on hypertension that meets minimal technical requirements is scarce in Latin America and the Caribbean, and cross-sectional surveys have been conducted only once in the subregion, which makes it nearly impossible to assess trends and identify population groups in which changes have occurred.

Table 40 shows reports of hypertension screenings in the Americas. Age-adjusted prevalence rates of hypertension by sex indicate that the highest prevalence among males was found in Maracaibo, Venezuela (49.7%) in 1997, and the lowest was among Chile's Mapuche Indians (9.1%) in 1998. Among women, the highest age-adjusted rate was in Paraguay (43.9%) in 1995, and the lowest in Mexico City (9.7%) in 1999.

Among 35–64-year-olds, the highest age-adjusted rate for hypertension in males was seen in Paraguay (49.7%), while the lowest was among Mapuche Indians in Chile (12.5%); in women of the same age group, the highest rate again was in Paraguay (52.2%), and the lowest was reported in Mexico City in 1999 (9.7%) (see Table 41).

### *Role of Behavior Modification*

Behavior modification has proven to be particularly effective in preventing hypertension. Hypertensives should be encouraged to change harmful lifestyle practices, particularly if they have additional risk factors such as dyslipidemias or diabetes mellitus. Eating a proper diet, engaging in physical activity, and controlling

body weight can help reduce the number and dosage of antihypertensive medications needed. Modifying lifestyle is difficult, and it should rely on health promotion coupled with prevention, including detection and control of specific risk factors.

Studies show that risk factors tend to concentrate in specific population groups, a phenomenon that occurs both in industrialized countries and in developing nations. In four Bolivian cities, the prevalence of all cardiovascular risk factors is higher among hypertensives than among persons with normal blood pressure (see Table 42).

### *Caring for People with Hypertension*

Controlling hypertension through the primary health care services is a challenge. The management of hypertension cases, many of them diagnosed late, only partially addresses the problem, however. In order to reduce the prevalence of hypertension, lower cardiovascular risks, detect hypertension cases early, and improve treatment, primary health care mechanisms, which are already in place for other types of problems, must come into play. This approach was proposed several years ago, but programs have seen only limited success. In 1997 and 1998, PAHO's Program on Non-Communicable Diseases conducted a study to determine the organizational status of hypertension prevention and control in 21 countries, together representing 88% of the Region's population. Every country, save one, reported that it had a national program in place for preventing and controlling hypertension, although only four countries reported having programs exclusively devoted to hypertension. In the remaining 16 countries, hypertension activities were subsumed into programs dealing with adult health or programs to prevent chronic diseases; activities to prevent hypertension did not necessarily have any priority within these programs. Only six of the countries with national programs had allocated a budget specifically for hypertension.

In most of the countries, national programs to control hypertension have only been created very recently, most of them in the 1990s. Almost all the countries shared programming goals that met basic criteria, but only eight countries reported having a comprehensive goal—the prevention, control, and management of hypertension. In seven countries, the goal was only preventive, and in five only case control and clinical management were covered. It is significant that all the national programs make use of the country's health services infrastructure, but those with activities outside the health services are few. Clinical management guidelines are available in 15 countries, 10 of which have developed them by consensus; 7 countries hold periodic working meetings to review and program activities. Despite the fact that effective hypertension control requires the involvement of both the community and professional organizations, fewer than half of the national programs include the nongovernmental sector, and only 6 of 21 countries reported having working groups that included the nongovernmental sector.

Hypertension treatment aims to keep blood pressure below 140/90 mm Hg. In the United States, one of five hypertensive patients attain this goal, but in Latin America and the Caribbean the average figure is one in ten. As hypertension frequently develops without any symptoms, new cases are often found during routine medical check-ups; consequently, the proportion of diagnosed hypertensives is heavily influenced by access to health care. Figure 9 compares the proportion of people with undiagnosed, untreated, treated controlled, and treated uncontrolled hypertension in selected countries. The hypertension prevalence rate among the countries analyzed varied between 13.9% in Mexico City and 37.5% in Cuba. The proportion of unidentified hypertensive individuals varied from 29% in Barbados to 59% in Ecuador. The proportion of treated individuals with blood pressure under 140/90 mm Hg was the highest in Barbados (29%) and the United States (27%) and was the lowest in Ecuador (3%) and Bolivia (6%).

In the United States, medical care for hypertension has been improving since the 1970s. For example, the proportion of undiagnosed hypertensive individuals decreased from 49% in 1971–1972 to 31% in 1991–1994. Similarly, the proportion of individuals without medical treatment also has decreased, while the number of diagnosed, treated, and controlled hypertensives has steadily increased. The proportion of undiagnosed hypertensive persons seen in the United States in 1971–1972 is comparable to what is seen in most Latin American and Caribbean countries today, where roughly 50% of people with hypertension are not detected by the medical services. Data from Cuba (87) also shows a similar pattern, despite this country's medical care system's excellent reputation. There is a high proportion of persons with high blood pressure in the Americas who are unaware of their condition. The fact that 75% of the population in the Region has access to some form of health service reveals the extent to which opportunities for hypertension control are being lost.

### *Economic Impact*

In several countries, the prevalence of hypertension has been shown to be three to six times higher in groups with no schooling than in those with higher educational levels (88). Because people with no schooling tend to have lower income, their ability to obtain the necessary drugs in the required dosages also is seriously compromised. Antihypertensive medications can cost up to US\$ 100 per month, which puts them out of reach of people in countries where the average monthly income may be only US\$ 50 to US\$ 200.

Most Latin American and Caribbean countries have no studies that could provide information on the economic impact of cardiovascular disease. In the United States, the total cost of this group of diseases is on the order of 2% of the gross domestic product (89), and a study in Canada found that 21% of the total cost of disease in that country is attributable to cardiovascular disease, totaling US\$ 12 billion annually. These costs include treatment, consultations, and indirect costs, such as loss of in-

come due to disability and death. Cardiovascular disease also was considered responsible for the highest proportion (32%) of lost income due to premature death (90).

### **Diabetes Mellitus**

The number of people with diabetes in the Americas was estimated at almost 35 million in 2000, and is expected to increase to 64 million by 2025 (91). Diabetes represents a high burden to society, as it increases premature mortality and disability due to a high risk of heart diseases, nephropathy, lower extremity amputation, and blindness.

### *Incidence and Prevalence*

The incidence of type 1 diabetes varies greatly in the Americas, ranging from 24 per 100,000 in some areas of Canada to 0.2 per 100,000 in Venezuela (92). The prevalence of type 1 diabetes among children in the Americas was estimated at 88,000 in 1997; 35,000 diabetics were estimated to live in Latin America and the Caribbean (93). Type 1 diabetes seems rare in most Latin American and Caribbean countries, but because diabetics are at increased risk of premature mortality, and given the high frequency of diabetes-related disability among young adults, this disease represents a considerable burden to society (94–97).

A growing prevalence of type 2 diabetes has been reported among children in various population segments in the United States (98–101). It is unclear whether this phenomenon also is occurring in Latin America and the Caribbean, but given the increased prevalence of diabetes and obesity observed there according to recent surveys, it can be expected that a similar trend will emerge unless prevention strategies are put in place (82, 102).

Several studies have examined the prevalence of type 2 diabetes. Comparison between studies is a problem, however, because many of these surveys have used different diagnostic criteria and sampling frameworks. Table 43 shows results of various surveys conducted in the Americas during the 1990s. More than half of adult Pima Indians in Arizona (U.S.A.) are known to have diabetes (103), and other Native American populations in the United States and Canada also show high prevalence of diabetes. Various ethnic groups in the United States, such as Mexican Americans (25.7%) and non-Hispanic Blacks (19.8%), also are disproportionately affected by diabetes. In Mexico (101) and Jamaica (101, 104), surveys showed prevalence rates of diabetes above 10% among adults. In most urban populations in Latin America and the Caribbean, the prevalence of diabetes among adults is between 6% and 8%. An interesting change has occurred in the Mapuche Indians in Chile, who were practically free of diabetes in 1985 (105), but exhibited prevalence rates of 3.2% among males and 4.5% among females in 2000. This change suggests that acculturation in this indigenous community is having a negative effect on its health. Results of various Latin American and Caribbean surveys show that diabetes more often affects

people from the lower economic classes, as seen by higher prevalence rates for people with lower educational levels in Bolivia (82) and Jamaica (102).

Table 44 shows age and sex adjusted prevalence rates of diabetes among 40–64 year olds. Although gender is not a risk factor for type 2 diabetes, the gender difference in the prevalence of diabetes in some populations may be related to a higher prevalence of obesity among women.

### *Mortality*

The limitations of mortality statistics that are based on the underlying cause of death in death certificates are well known. For example, diabetes is reported to appear on only one-third of death certificates of people with diabetes in Canada (106), the United States (107–111), and Europe (112). Reports from Cuba (115, 116), Jamaica (117), Costa Rica (114), and Brazil (113) show similar results. Because the accuracy of death certificates for people with diabetes may vary, comparison between countries is problematic. The annual number of deaths attributed to diabetes as an underlying cause of death in Latin America and the Caribbean is approximately 40,000. In 1990, the estimated the number of deaths attributed to diabetes in Latin America and the Caribbean was 291,000 in 1995 (118), while newer WHO research (119) estimated it at 465,828 deaths in 2000. Population-based studies in various countries demonstrated that mortality is three to four times and seven to eight times higher among people with type 2 and type 1 diabetes, respectively, than among their age counterparts without diabetes (95–97, 120).

### *Caring for People with Diabetes*

A comparison of reports from Bolivia and Chile—which have 34% and 94% of their populations with access to health care, respectively (121)—with those of the United States shows that the prevalence of undiagnosed hypertension among people with diabetes is three to four times higher in Bolivia and Chile than in the United States. Diabetes care has been shown to be substandard in most Latin American and Caribbean countries that have been evaluated (122–126): For example, the proportion of patients with poor blood-glucose control ( $>7.7$  mmol/l) varied from 37% in Tortola, US Virgin Islands (1996), to 71% in Chile (1998); documented foot care fluctuated from 2% in Tortola (1996) to 28% in Barbados (1996), and documented eye care varied from 1% in Trinidad and Tobago in 1996 to 13% in Jamaica in 1995; the figures for Latin America and the Caribbean and for the United States were 26% for eye care and 51% for foot care.

Although insulin has been used in clinical practice since 1921, access to the medication remains a problem in some countries of the Region. In 1992, the International Diabetes Federation estimated that about 20% of persons with type 1 diabetes did not always have access to insulin (127). In a workshop in Peru analyzing diabetes needs in children, 7 of 15 participating Latin

American and Caribbean countries reported that access to insulin was a major problem (128).

In the 1990s, the Diabetes Control and Complication Trial and the United Kingdom Prospective Diabetes Study (129) demonstrated that glycemic control could reduce the prevalence of major micro-vascular complications such as retinopathy and nephropathy, and there are two technologic advances that are critical for achieving good metabolic control—glycosylated hemoglobin testing and home glucose monitoring. These technologies are expensive, however, which makes their implementation problematic in most developing countries. In 1999, for example, only 6.5% of people with diabetes attending clinics in Chile monitored their glucose at home, and only 12.5% had been given the glycosylated hemoglobin test, a lab test that shows average blood glucose over two or three months, in the previous year (130).

Diabetes education is the cornerstone of diabetes management. In 2000, PAHO, working with the International Diabetes Federation and the Pharmaceutical Industry, launched the Standards and Norms for Diabetes Education Programs for People for Diabetes in the Americas, which was an important advancement in improving diabetes education. In 2001, a PAHO inventory of diabetes educational programs identified 20 diabetes education initiatives in Latin America and the Caribbean (131). Programs varied widely in terms of features and coverage, and only two of them have been fully evaluated. One of the most successful efforts has been an educational program for non-insulin dependent diabetics (“Programa de Educación para Diabéticos No Insulino Dependientes de Latino America”). The Experimental and Applied Endocrinology Center (CENEXA), a PAHO/WHO Collaborating Center in La Plata, Argentina, established this initiative in centers in Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Mexico, Paraguay, and Uruguay (132).

### **Cardiovascular Diseases**

In the first decade of the 21st century, cardiovascular diseases will claim some 20.7 million lives in the Region of the Americas (133). Today, 31% of all deaths in Latin America and the Caribbean are attributable to these diseases. In 2000, 180,000 deaths due to cardiovascular diseases were estimated to occur in women aged 15 to 69, making it the leading cause of death in this age group (133); in men of the same ages, cardiovascular diseases were responsible for 253,000 deaths annually, representing the second leading cause of death, after external causes, in this group.

The two most important cardiovascular diseases—ischemic heart disease and cerebrovascular disease—can be effectively prevented by controlling primary risk factors. The most significant of these are related to smoking, improper diet, and lack of physical activity, and controlling them leads to a simultaneous reduction of secondary risk factors, such as hypertension. The following analysis describes the patterns that characterize the current situation in the Americas, in terms of observed mortality trends and the magnitude of changes in premature death in the

1970–1995 period. Ten countries were selected for the analysis, representing each geographical subregion in the Americas; 4 of the 5 groups of countries were selected according to gross national product, at which stage they were in the epidemiological transition, and different organizational models of health services. Criteria for selection included that the country had the necessary information for the study period available and that the level of under-reporting in the country was intermediate or low.

#### *Trends in Ischemic Heart Disease Mortality*

The latest available information on ischemic heart disease is shown in Table 45. Trinidad and Tobago presented the highest mortality rates in all age groups among men and women, followed by Cuba and Venezuela. The lowest mortality rates were observed in Barbados, followed by Chile, the United States, and Canada.

According to information received by PAHO, in Canada and the United States, mortality from ischemic heart disease has progressively declined since 1970. In 1995, mortality in both countries, for both men and women, was approximately 60% lower than the figure reported at the beginning of the 1970s. Although the decrease was greater for men, the male/female mortality risk ratio is still 2 in Canada and 1.8 in the United States. In Argentina, mortality rates from ischemic heart disease also decreased progressively over time (64.7%). In that country, the risk of death in men was 2.5, the highest among all countries in this analysis.

Cuba and Trinidad and Tobago had moderately high mortality rates at the beginning of the 1970s. In Cuba, mortality rates increased from 1975 to 1990, and then declined from 1990 to 1995 in both sexes, for an overall decline of 14.7% (6% for males and 23% for females). Trinidad and Tobago, which continues to show the highest mortality rates in the entire Region, had the highest rates for both men and women in 1995; between 1970 and 1995, the mortality rate in Trinidad and Tobago increased by 5.1%, and was highest among women (11.5%).

Chile, Costa Rica, and Venezuela had lower ischemic heart disease mortality rates in 1970 than Cuba and Argentina. From 1970 to 1995, rates in Chile decreased by 31.7%, but increased in Costa Rica and Venezuela to 21.0% and 15.8%, respectively. Over the 1970–1995 period, male mortality rates in Costa Rica increased by 30%, while rates for women increased 9.2%. In this same period, ischemic heart disease mortality in Venezuela rose by 22.9% in men and 8.2% in women, with a noticeable increase in the 1985–1990 period.

In 1970, Mexico experienced the lowest ischemic heart disease mortality levels among the group of countries under analysis, but after 1975 rates began to rise steadily in both men and women. In 1995, Mexico was the country with the highest increase in mortality rates (81%) for the period under analysis, and this increase was greater among women. Although Barbados continues to have low mortality rates when compared with other countries in the Region, an increase of 24.5% has been observed among women, while rates among men have increased 12.4%.

#### *Trends in Cerebrovascular Disease Mortality*

Canada and the United States experienced a continuous decline (more than 50%) in cerebrovascular disease mortality rates between 1970 and 1995. Both countries experienced the most significant decreases between 1975 and 1990. After that, the decrease slowed considerably in Canada and the United States rates remained virtually unchanged. At the end of 1995, mortality rates in both countries were similar for men and women, and were the lowest in the Region. Argentina, Barbados, Chile, Costa Rica, Cuba, and Trinidad and Tobago reduced mortality rates by 30% to 40% during 1970–1995, although the decrease was neither continuous nor sustained over time. In fact, these countries experienced periods of no change and even of increases in mortality rates. For example, no change was seen in Cuba from 1975 to 1990, in Barbados from 1985 to 1995, and for men in Chile from 1975 to 1980. Trinidad and Tobago had the highest mortality rates in the group, for men and women.

Mexico, which had the lowest rates in the 1970s, experienced a slight and discontinuous decrease of 5.7%. Venezuela, with relatively low mortality rates at the beginning of the 1970s, experienced an increase of 5.7%—interestingly, there was an increase of 19% in men and a decrease of 4.6% in women.

#### *Changes in Premature Death due to Ischemic Heart Disease and Cerebrovascular Disease*

Although the ultimate goal of public health programs should be the overall reduction of cardiovascular mortality, decreasing premature mortality (death before age 75 years) can actually have a greater impact, given that the human and economic burden is considerable at that age. Deaths among people younger than 75 years reflect lost opportunities for prevention and control. Argentina, Canada, and the United States experienced a decline in overall mortality for both sexes, and they also attained decreases in mortality greater than 60% for all age groups between 35 and 74 years for both men and women. Chile, which had relatively low mortality rates, also achieved reductions in premature mortality in both men and women during this period. In Cuba, ischemic heart disease mortality decreased overall from 1970 to 1995, but premature mortality did not decline. In fact, there was an increase in mortality among men aged 35–54 years and there was little decrease among young women. In Costa Rica, overall mortality and premature mortality in men of all age groups increased, but it declined in women aged 35–44 and 55–64 years. In Barbados, there was a dramatic increase in premature mortality among women aged 45–74, and a decrease among younger men. Trinidad and Tobago succeeded in attaining lower premature mortality in men and women aged 35–54, while it increased for age groups 55–74 in both sexes. In Mexico and Venezuela, total mortality and early mortality increased for both sexes.

Between 1970 and 1995, the overall mortality rate from cardiovascular disease increased among women in Barbados, Costa Rica, Mexico, Trinidad and Tobago, and Venezuela. Changes in prema-

ture mortality from cerebrovascular diseases can best explain the change in mortality from this cause. For example, Canada and the United States achieved the greatest decreases in total mortality in addition to early mortality; in fact, a decrease of around 60% occurred among those aged 35–74 years old, in both sexes. The rest of the countries analyzed, save for Cuba and Venezuela, also achieved marked declines in early mortality. Particularly noteworthy is the decline in the rate among women in Barbados. Although Cuba's early mortality rates declined for men and women, the drop did not exceed 12.4% among men aged 55–64 or 21.9% among women aged 45–54. Premature and early mortality increased among men of all ages in Venezuela, and declined slightly in young women. Cuba, Trinidad and Tobago, and Venezuela not only experienced the highest age-adjusted mortality rates among the countries in 1995, but also consistently showed the highest age-adjusted mortality rates among the youngest age groups. For example, in Trinidad and Tobago mortality rates for men and women were somewhere between three and almost seven times greater than they were in Chile. The highest mortality rates for cerebrovascular diseases were concentrated in the same countries, where premature mortality from ischemic diseases was highest. In addition, Barbados and Argentina, although they do not have high premature mortality due to ischemic heart disease, report high mortality rates for cerebrovascular disease. The lowest rates of premature mortality were observed in Canada and the United States, two countries that achieved dramatic reductions in 1970–1995.

#### *Inequalities and Cardiovascular Disease*

The poor quality of mortality registries hinders the determination of whether there is a social gradient for cardiovascular mortality, and whether there are differences by sex. There is significant under-reporting in several countries, which is unequally distributed among different population groups. Under-reporting generally is higher in groups with lower income and educational levels. In 1994–1996, Chile, one of the countries that has better mortality statistics, reported mortality rates from ischemic heart disease of 101 per 100,000 population in men and 74 per 100,000 in women; and mortality rates from cerebrovascular disease of 71 per 100,000 in men and 69 per 100,000 population in women. These national averages conceal major differences between persons at different educational levels, however. Table 46 shows the age-adjusted mortality for men and women by years of schooling in Chile. For both ischemic heart disease and cerebrovascular disease there is a clear gradient in women, with lower rates in the groups with more schooling. In men, this gradient is evident for cerebrovascular disease. The risk ratio shows the existing gap between the higher mortality and lower mortality groups. For both diseases, the gap by years of schooling is greater in women than in men, and greater for cerebrovascular disease. Mortality from this cause is higher in men than in women in groups with higher educational levels, but in groups with lower educational levels, women present higher mortality rates.

It would be worth exploring whether this situation occurs in other countries of the Region and whether these inequalities are caused by differences in the incidence of the disease, differences in the prevalence of primary risk factors, or inequities in access to control and prevention of these risk factors and to the health services.

#### *Progress and Challenge*

Cardiovascular and cerebrovascular disease mortality continued its downward trend in developed countries and also began to decline in other countries that had never had such elevated rates. Today, there is consistent scientific evidence to support that these diseases are preventable by lowering or controlling the main risk factors, as well as through secondary prevention (134). As noted earlier, it is with cerebrovascular disease where the greatest opportunities for improvement lie, through adequate control of blood pressure that yield reductions in mortality rates of up to 40% in adults. The development of new diagnostic and treatment tools, including more efficacious drugs, has helped to bring about successes in clinical care (135–137).

The cardiovascular disease epidemic is far from being controlled, however. In fact, countries with declining mortality rates are now experiencing new challenges: the growth in the elderly population and the decrease of acute mortality for coronary diseases have led to an increase in the total number of people living with heart disease, and these people need medical attention, with its attendant increases in cost. In the United States, for example, more than 75% of the 5 million patients with heart failure are over 65 years old (138); heart failure also is the main cause of hospital admission in the elderly (139).

If the current trend continues, more than 11 million people in Latin America and the Caribbean will die from circulatory system disorders by 2010. Between 70%–80% of these deaths will be due to coronary and cerebrovascular diseases, which will represent 15%–30% of all causes of death in the most of the Region's countries; nearly 23% of these deaths will occur in people younger than 60 years old (140).

#### **Malignant Neoplasms**

In 2000, there were an estimated 459,000 deaths due to cancer in Latin America and the Caribbean and about 696,000 such deaths in the United States and Canada. This represents a 33% rise from 1990 in Latin America and the Caribbean and a 14% rise in the United States and Canada, an increase that can be partially attributed to the proportional and absolute increase in the adult population. Many of these cancers are preventable through basic public health interventions, and approximately 30% are curable, if detected early. The total number of cancer cases is expected to continue rising, however, generating costly demands on health services.



The pattern of cancer occurrence differs across countries of the Americas. Cervical cancer in women and stomach cancer in men and women are more frequent in developing countries, whereas lung, breast, and colon cancers are the leading causes of cancer in industrialized countries (Table 47). As mortality declines, two major cancer transitions can be observed: the first involves an increase in lung cancer and a decline in stomach cancer in males; the second involves an escalation of breast cancer and a decline in cervical cancer among females. Figure 10 shows the ratio of deaths from stomach to lung cancer among males and cervix to breast cancer among females. In the United States and Canada, followed by Cuba and Argentina, low ratios are observed among males and females, revealing an advanced transition. The magnitude of the ratio for the other countries does not correlate with economic development or with level of overall mortality, however. Moreover, in countries such as Cuba, Guatemala, Mexico, and Venezuela, the cervical-to-breast cancer ratio is higher than the stomach-to-lung cancer ratio for males, suggesting that in these countries the transition is not occurring evenly.

The cancers with the highest incidence in the Region are prostate cancer among males and breast cancer among females in the United States. Mortality is much lower than incidence (M/I ratios 0.17 and 0.23 respectively) for both cancer sites, however, suggesting that effective treatment is available at older ages. Prostate cancer also is very frequent in the Caribbean, as indicated by incidence and mortality rates in Barbados and Trinidad and Tobago. Interestingly, in these two countries the ratio between mortality and incidence is 0.70 for Barbados and 0.63 for Trinidad and Tobago, which does not compare favorably with those of North America. Regarding breast cancer, estimated incidence and mortality rates from Argentina, Barbados, and Trinidad and Tobago are similar to those of the United States and Canada; age-standardized mortality rates are within the range of 21–25 per 100,000 in all these countries. In contrast, breast cancer incidence and mortality is much lower in the rest of the Latin American countries, with age-standardized mortality estimations in the 11–15 per 100,000 range. Lung cancer is highest among males and females in the United States and Canada, but lung cancer is decreasing in these two countries, while it is still increasing among males in most Latin American countries. This implies that countries are at different stages of the smoking epidemic. In 2000, lung cancer mortality rates for males in the United States and Canada were 59 and 55 per 100,000, respectively, compared with 47 per 100,000 in Cuba and 41 in Argentina. Among females, however, mortality is 25 and 27 per 100,000 in the United States and Canada, respectively, and much lower in the rest of the Region, ranging from 3 per 100,000 in Barbados to 9 per 100,000 in Venezuela. The exception is Cuba, which exhibits a mortality rate for lung cancer of 16 per 100,000 among females.

Latin America and the Caribbean have some of the highest rates in the world for stomach cancer in both males and females

and of cancer of the cervix uteri among females. Among males, the highest mortality rate for stomach cancer is 45 per 100,000 in Costa Rica, followed by 30 per 100,000 in Chile; the lowest rate is 4 per 100,000 in the United States—a tenfold difference between the highest and the lowest. In the rest of the countries, estimated mortality ranges between 6 per 100,000 in Canada to 17 in Venezuela.

The highest incidence and mortality rates for cervical cancer are observed in Mexico, followed by Venezuela and Trinidad and Tobago. As will be seen later in this chapter, there also are extremely high incidence rates in other countries, such as Peru, some areas of Brazil, and in the Central American and the Caribbean countries. The estimated mortality rate in Mexico is 17 per 100,000, six times higher than Canada's rate.

These differences in cancer occurrence are a result of the underlying prevalence and distribution of risk factors, such as smoking and diet, which are at the root of the cancer epidemic. Changes in reproductive patterns contribute to the differences observed among female cancers, particularly breast and, to some extent, cervical cancer, although the latter is causally linked to the sexual transmission of human papillomavirus. In addition, the differences between incidence and mortality may be due to the capacity for intervention for early detection and treatment, but alternative data are required, particularly survival studies.

### *Stomach Cancer*

Some of the Region's countries, such as Chile and Costa Rica, exhibit very high incidence rates for stomach cancer (see Table 47). In general, stomach cancer has been declining worldwide, particularly in those countries with high incidence rates. The United States has one of the lowest stomach cancer incidence rates for both men and women in the world: 8 per 100,000 for males and 4 per 100,000 for females. The age-standardized incidence rate is 23 per 100,000 for males in Latin America and 14 per 100,000 for men in the Caribbean; and 12 per 100,000 for females in Latin America and 7 for females in the Caribbean. The number of deaths due to stomach cancer in 2000 (228,600 males; 107,000 females) was higher than the figure reported in 1985 (150,900 males and 73,800 females) (141).

Stomach cancer has been found to be inversely associated with socioeconomic status both in ecological studies conducted in several Latin American countries and in a recently published case-control study from a high-risk area in Venezuela. According to a longitudinal study (142), "socio-economic differences for stomach cancer were evident using the most recent data on housing tenure and social class"; an association with a person's height and access to a refrigerator in the first two decades of life also supports this correlation. Even when studies differed from each other in regards to the type and number of fruits and vegetables consumed, it has been consistently shown that having these staples be part of a person's diet confers a protective effect for stomach cancer. *Helicobacter pylori* infection, one of the most common

chronic infections in humans also has been causally associated with stomach cancer; an interaction between antioxidants and *H. pylori* is suggested. Tobacco and alcohol consumption also represent risk factors for stomach cancer.

### *Breast Cancer*

Historically, the incidence of breast cancer has been higher among industrialized countries and populations of higher socioeconomic status. However, during the last two decades breast cancer mortality has been increasing in developing countries, currently accounting for 31% of all female cancers worldwide. In the Americas, mortality from breast cancer is increasing in most countries, surpassing even that of cervical cancer. The highest mortality rate is seen in Uruguay, with a high age-standardized mortality rate of 45 per 100,000 among women aged 25–74 years in 1996–1998. Argentina, Canada, Trinidad and Tobago, and the United States, whose rates vary between 34 and 37 deaths per 100,000 women, follow Uruguay. Chile, Costa Rica, Cuba, Mexico, and Venezuela show much lower rates. The last two countries have shown a rapid rate of increase since the 1980s, however. Among countries with high breast cancer mortality, the downward trend seen in Canada and the United States is notable, where mortality rates began falling in 1987 and 1990, respectively. Since incidence has not decreased, this decline has been partly attributed to early diagnosis and improved treatment effectiveness.

Up to 50% of the international variations in breast cancer incidence can be attributed to such reproductive factors as nulliparity, early menarche, late menopause, and late age at first birth (143). This is consistent with the inverse correlation between fertility rates and breast cancer incidence in the Americas. Canadian women have the lowest fertility rates, at 1.6 children per woman, and an age-standardized breast cancer incidence rate of 82 per 100,000. Women in Ecuador, on the other hand, have an average of 3.1 children per woman, and an incidence of breast cancer of 26.8 per 100,000, one of the lowest documented in the Region. Genetic factors also contribute importantly to breast cancer. Other contributing factors with lower population attributable risks are ionizing radiation, use of oral contraception, long-term hormone replacement, and postmenopausal obesity.

Much effort has been devoted to assessing the effectiveness of secondary prevention of breast cancer through screening. Mammography for women 50–69 years old is the only screening test that has been shown to reduce mortality; a reduction estimated at 23% according to evidence from eight randomized trials. Breast self-examination has not proven to be an effective screening method, and there is no direct evidence of the benefit of having clinical breast examinations conducted periodically by a health care professional, as compared to no screening or to mammography. Latin American and Caribbean countries report having many different screening policies, and target age groups vary from 15 to 75 years old. For example, in a recent assessment

9 of 11 countries studied recommended breast self-examination and mammography; all recommended clinical breast examination (144). Moreover, because mammography screening is widely practiced in both the private and public health sectors, it may be extremely difficult to evaluate the effect of other screening methods, especially clinical breast examinations. Clearly, available evidence is not relied upon in formulating screening policies. Screening policies also should consider the baseline incidence of breast cancer, in order to best use available resources. For example, in low incidence countries such as Chile, Colombia, Costa Rica, Mexico, and Venezuela, approximately 3,000 50-year-old women would need to be screened with mammography every 2 years for 20 years to prevent one cancer death. In a high-incidence country, however, only 270 50-year-old women would need to be screened with the same frequency and over the same period in order to prevent one breast-cancer death. New evidence has increasingly shown the efficacy and cost-effectiveness of treating breast cancer in its early stages, which means that access to diagnosis and treatment should be ensured in every program.

### *Cervical Cancer*

By 2000, an estimated 470,606 cases and 233,372 deaths due to malignant neoplasms of the cervix uteri will have occurred worldwide in women, with more than 80% of this estimated burden occurring in less developed countries. An estimated 92,000 cases and 38,000 deaths due to cervical cancer will occur among women in the Region of the Americas, and Latin America and the Caribbean will contribute 84% and 81% of the total cases and deaths, respectively (145).

**Incidence.** Over the past 40 years, Canada, the United States of America, and other established market economies have experienced significant declines in cervical cancer incidence and mortality. Such decreases have not been seen in most Latin American and Caribbean countries, however. Between 1993 and 1997, for example, high age-standardized incidence rates for cervical cancer continued to be recorded by cancer registries in some countries of the Americas (146). Data for 1968–1993 from the metropolitan Lima cancer registry show that although the annual average, age-adjusted incidence rates for cervical cancer fell by roughly 40%, from 45 cases per 100,000 population, the incidence in the period remained high, at 26 cases (147). Recent reports from the Kingston-St. Andrew cancer registry in Jamaica also record an average annual age-adjusted incidence rate of 25 cases per 100,000 population over the 1993–1997 period (148).

**Mortality.** Mortality trends have been rather similar to incidence patterns, with few countries in Latin America experiencing declines in reported mortality between 1968 and 1993, compared with the trends in North America (149). Available annual age-adjusted data from the Caribbean also suggest that cervical cancer mortality remains high there, with an annual average of 25

deaths per 100,000 population. An analysis of age-specific mortality rates in four subregions of the Americas indicates that age-specific rates for women aged 65 years old and older, although initially highest in Central America, are outranked by rates in the Caribbean (145).

Assuming a life expectancy at birth of 75.8 years for women in the Region of the Americas, premature mortality from cervical cancer was responsible for 265,395 potential years of life lost in women aged 24–44 years and 243,672 potential years of life lost in women 45–64 years during 1996–1999. (These figures are considered to be crude estimates, as all of the age specific deaths for the period were used, without regard to the actual year of death.) While incidence and mortality rates increase with age, the greatest absolute burden of cervical cancer is borne by women in their middle years. A review of reported cervical cancer mortality data from Latin American and Caribbean countries indicates that women aged 35 through 54 years consistently account for the greatest proportion of annual deaths (PAHO, SHA, Technical Information System, 1988–1995). Analysis of the data from a newly established cancer registry in Trinidad and Tobago reveals that of the 750 cases recorded between September 1994 and January 2000, 47% were between the ages of 35 and 54 years old. Similarly, data from the cancer registry for the Province of Buenos Aires, Argentina, indicate that 55% of cervical cancer cases documented between 1 January 1997 to 31 December 1999 were aged 35–54 years old (150). In Mexico, the highest frequencies of cervical cancer have been noted among women between 35 and 44 years old (151).

In 1995, cervical cancer deaths in women aged 35–54 years in the Region of the Americas accounted for 183,487 potential years of life lost (assuming a life expectancy at birth of 75.8 years for females). Data from 16 countries revealed 6,065 deaths notified in women of this age range.

**Prevalence of Human Papillomaviruses.** There is a global body of evidence, derived from molecular virological and epidemiological research, which confirms that some genetic types of human papillomaviruses (HPV) play a necessary etiologic role in cervical carcinogenesis (152–154). As documented in other parts of the world, oncogenic HPV types 16 and 18 have been repeatedly detected in cervical carcinomas from women in Latin America and the Caribbean (Tables 48 and 49), making HPV infection an important risk factor for cervical cancer in this subregion. The ability to screen women for infection with high-risk HPV types is another tool for the early detection and prevention of cervical cancer, in that it will facilitate tighter monitoring of persistently infected women, even those with normal cervical cytology.

**Cervical Cancer Prevention and Control Programs.** An effective cervical cancer prevention and control program must address several issues—first, and perhaps most important, is the

religious, sociocultural, health, and gender perspectives held by women in a given area; second, the coverage and quality of early detection screening services; third, availability of prompt, reliable and affordable diagnosis, treatment, and follow-up care; fourth, a system of referral with multiple, linked levels; and, finally, adequate information systems to facilitate monitoring and evaluation.

The quality and coverage of cervical cancer prevention programs in Latin America and the Caribbean are generally poor. The quality of such areas as smear sampling, collection, preparation, and interpretation have been repeatedly cited as needing improvement in many reviews of country programs in Latin America and the Caribbean (151, 155, 156). Persistently low coverage of the target population is pervasive in most of these countries (157) (see Table 50).

Women's perceptions and mores often are insufficiently considered in developing cervical cancer programs. For example, findings based on four qualitative studies in Latin America revealed that women were reluctant to participate in screening because they equated cervical cancer with death and putrefaction (158). Health care workers' impersonal manner in dealing with affected women further deepened their fears. In Mexico, it has been noted that the presence of male health care providers was a deterrent to women's seeking a Pap smear test (155). Health education efforts have not been ongoing, and data gathered from various health needs assessments suggest that many women still do not understand the purpose of a Pap smear test. Moreover, diagnosis and treatment are not automatically programmed, resulting in lack of appropriate and timely follow-up of affected women. In some instances, geographic access and cost represent serious barriers for women. Approaches that pair screening with immediate treatment, such as visual inspection with acetic acid followed by cryotherapy, and decrease the number of visits to health facilities need to be field tested to assess their effectiveness, cost, acceptability, and sustainability in a given health care delivery structure.

Clearly, while countries in Latin America and the Caribbean have attempted to implement cervical prevention and control programs, these programs have not had the same success in reducing mortality as those of the Nordic countries (159). The lack of success is due both to the screening test *per se* and to the system's capacity to incorporate and sustain such programs. For example, a recent assessment in Peru's Amazonia showed that only 23% of women with positive Pap smears received appropriate treatment. Most programs overemphasize outreach and coverage of the screening test, without considering the capacity of the system as a whole.

Cervical cancer incidence and mortality are projected to increase. Murray and Lopez have estimated that deaths from cervical cancer in Latin America and the Caribbean will increase to 42,000 by 2010 and to 52,000 by 2020 (118). A significant proportion of these deaths could be prevented if effective and highly

organized programs were established to detect early and treat precursor and noninvasive cervical lesions.

Sensitive, low-cost laboratory assays to screen for human papillomavirus are being developed for commercial use. Given the documented variability in sensitivity of the Pap smear in different settings, several studies are being undertaken to assess whether or not HPV DNA testing may have an adjunct role in cervical cancer screening. The results of these and other operational research initiatives will be used to inform the further development and refinement of policies related to cervical cancer prevention and control in Latin America and the Caribbean.

### *Palliative Care for Cancer*

Argentina, Brazil, Chile, Colombia, Cuba, Paraguay, and Peru have expressed the need to establish a palliative care approach within public health (160–162). Other countries offer some palliative services to patients with advanced cancer, but accessibility is limited. Data from the International Narcotics Control Board show that in the 1990s, morphine consumption increased worldwide, but data from 1991 indicate that 57% of the total morphine consumption occurred in developed countries (163). Latin America and the Caribbean accounted for less than 1% of the worldwide morphine consumption (164).

Restrictions or excessive bureaucracy in the importation and manufacturing processes, laws and regulations that set maximum dosage limits, an inefficient distribution that does not adequately supply rural areas, lack of knowledge on how to treat cancer pain among health care professionals, and lack of pharmacists licensed to dispense the medication have been cited to explain why opioid consumption is so low in Latin America and the Caribbean (165). An analysis of the average daily consumption of daily defined doses (DDD) of 30 mg of morphine per 1,000,000 inhabitants between 1995 and 1999 showed that not only were there vast differences in DDDs between the Region's developed and developing countries (Canada: 3,815; U.S.A.: 2,471; Argentina: 473; Brazil: 364), but also among the developing countries (166). Argentina, Brazil, Chile, and Costa Rica, which have mature palliative care programs, had higher DDDs than countries where programs were only beginning or nonexistent. Figure 11 shows the DDDs of Latin American and Caribbean countries that reported on morphine consumption.

An analysis of legislation on opioids and other controlled substances in Argentina, Colombia, Costa Rica, Mexico, and Peru (161), conducted according to principles set by WHO and the International Narcotics Control Board, identified several barriers to adequate opioid utilization. In all of these countries, national laws and regulations limit the number of days allowed for prescription, the potency of the dosage, and the number of doses allowed per day. Moreover, the study found that in all countries there was confusion on the meaning and use of the terms "physical dependence," "psychological dependence," "addiction," "tolerance," and "abuse." Finally, all laws and regulations in these coun-

tries include provisions whereby the patient's access to opioids may be further interfered with. In countries that have opioid availability problems, existing laws and regulations need to be revised, and the potential barriers impeding access to adequate treatment must be identified.

Preliminary data from a survey conducted by PAHO/WHO's Collaborating Center in Supportive Cancer Care (167), which evaluated the quality, access, and affordability of care given to persons with advanced cancer in Latin America and the Caribbean, indicated that Brazil and Mexico provide a stark example of the significant variations in prevailing practice patterns. Brazilian health care professionals reported that both the majority of advanced cancer care (62%) and cancer deaths (62%) occurred at hospitals; data from Mexico, however, suggest that most care in Mexico took place at home (52%), and most patients died at home (92%). On average, in other Latin American countries examined in the survey, most of the care given to persons with advanced cancer occurred at hospitals (48%), rather than at other facilities or at home, whereas the majority of cancer deaths (61%) took place at home. The leading barriers to optimal cancer pain management in the respondents' practice settings were: inadequate staff knowledge of pain management (69.9%), patients' inability to pay for services or analgesics (52.9%), inadequate assessment of pain and pain relief (51.2%), and excessive state/legal regulation of prescribing opiates (46.9%). These preliminary results varied substantially between nations and by the type of practice settings experienced by the respondents.

### **Injuries**

Mortality from external causes includes intentional and unintentional injuries. Unintentional injuries include motor vehicle accidents, drowning, falls, and suffocation. Intentional injuries can be directed toward others (homicide) or self directed (suicide). In the Region of the Americas injuries account for 13.2% of the total number of deaths. This section will examine violence (intentional injuries) and unintentional injuries, specifically mortality due to motor vehicle accidents.

### *Violence*

Violence has been defined as "an intentional action of force or power by which one or more people sustain physical, mental (psychological), sexual injury or lack of freedom of movement or the death to one or other people, or to themselves, with or without a predetermined end" (168). In terms of public health, violence takes a high toll in mortality and avoidable morbidity, especially among women, children, and young people. It also results in high health care spending, sometimes preventing the timely and adequate care of patients who come to the hospital for reasons other than violence. Clearly, violence not only affects the victim, but also his or her family and environment, and immediately harms a community's economic, social, and psychological life.

Violence even harms society's broader political and economic processes.

**Violence against Boys and Girls.** WHO classifies abuse against boys and girls into four levels—international, social, institutional, and interpersonal (169). Although at this time there is no study that can offer accurate and comprehensive figures that show the magnitude of violence at each of these levels, a combination of data provides a composite picture of the situation in Latin America and the Caribbean. The prevalence of corporal punishment against minors is on the rise in Latin America. For example, according to a PAHO-coordinated study on attitudes, skills, and cultural norms to counter violence (the ACTIVA study), which was conducted in 1996 and 1997 in seven Latin American cities and in Madrid, Spain, 28.4% of respondents in Salvador Bahia and 7.6% in Rio de Janeiro (Brazil), 31.8% in Cali (Colombia), 7.3% in Caracas (Venezuela), 16.3% in San José (Costa Rica), 15.3% in San Salvador (El Salvador), and 6.0% in Santiago (Chile) agreed on the need to use corporal punishment to correct or discipline children (170) (see Table 51). Most minors who are subjected to corporal punishment are between 2 and 7 years old, but the most affected were between 3 and 5 years of age, gradually declining as age increased. Parents or young family members and those with lower educational levels are more prone to consider physical punishment as a valid way to discipline (171). An interesting attitude noted in this study is the percentage of those interviewed who thought that street children should be incarcerated, with responses varying from 10.0% in Santiago, Chile, up to 33.7% in Rio de Janeiro, Brazil. Another study conducted in Costa Rica and in Santiago, Chile, provides useful information concerning what behaviors and/or actions parents consider punishable by corporal punishment. For example, the study found that 23%–45% of parents in Santiago would hit children if they ran into the street, hit other children, or refused to go to bed. In Costa Rica, 20% of those interviewed indicated that they hit their children often in order to control them when they misbehaved (172). These sorts of studies help health professionals realize how important it is to provide education on alternative methods to discipline boys and girls.

In addition to physical aggression at home, violence against minors also is a major problem in the street. In Brazil it is estimated that there are between 7 to 8 million boys aged 5 to 18 years who live and work in city streets, and at least 800,000 girls live in the street, mainly working in prostitution (173). These minors are often subject to violent persecution from vigilante groups, drug dealing bands, and the police. Many of these children end up on the street because inequities and poverty force them to work in the street in order to contribute to the family income.

Domestic violence against women also can affect children, either directly by violence perpetrated by the assailant or indirectly, through the trauma caused when children witness abuse. Despite the unreliability of the limited information available, it is known

that sexual abuse is frequently a form of violence against children in many societies. In Barbados, for example, 30% of women surveyed reported sexual abuse in their childhood (174). A retrospective survey among university students in Costa Rica found that 32% of women and 13% of men had suffered sexual abuse in their childhood. A similar survey in Nicaragua found child abuse in 20% of men and 26% of women (172).

**Violence against Women.** As defined by the 1994 Convention of Belém do Pará, violence against women includes “any action or behavior, based on gender, that causes death, injury, or physical suffering, sexual or psychological abuse to the woman, both in the public arena and in private.” This definition includes actions within or outside a woman's home, and the assailant may be her spouse or companion, or it may be a stranger. Interestingly, 85% of physical assaults in the family occur in the home, and the spouse is the most frequent assailant.

In Nicaragua, research found that violence was more prevalent among women who had five or more children, had a history of violence in their home of origin, were poor and did not work outside the home, were young and had little or no education, and lived in urban areas (175).

The different methodologies and the definition of the type of injuries or assaults that are found in many studies hinder valid comparisons. If domestic abuse observation is restricted to physical or sexual violence, the psychological factor is left out. Such emotional/psychological abuse is often reported less frequently, making it more difficult to track its actual incidence among women. Groups of women who fight against the abuse of women and children through national or international networks are trying to achieve greater awareness about gender equity. Bolivia, Colombia, Costa Rica, Ecuador, Guatemala, Honduras, Mexico, Peru, and other Latin American countries have enacted legislation protecting women and children from domestic violence.

**Youth Violence.** Studies on youth violence show that young men of low socioeconomic status sustain the highest homicide rates. Young people not only are victims, but also are perpetrators involved in youth gangs that are responsible for much urban violence. In 1998, the homicide rate in San Pedro Sula, Honduras, a city that is besieged by youth violence, was 95 per 100,000 persons (176). Studies conducted in a San Pedro Sula hospital's emergency ward showed that most persons seeking treatment for injuries were young men 16–29 years old, and 70% of the lesions seen were attributed to social violence (177). The homicide rate for young people aged 15–19 and 20–24 years old in Cali, Colombia, in 1997 was 250 and 340 per 100,000 persons, respectively (178). A study conducted in a Cali suburban hospital on injuries sustained through violence showed that of 712 assailants, 78% were men, and of them, 16% were between 10 and 19 years old. The study also showed that 39% of the victims were under the influence of alcohol when they were attacked; almost all were

youth-gang members (179). In Caracas, Venezuela, some 6,300 homicides occurred between 1992 and 1996, affecting young people between 10 and 24 years of age, with a male:female ratio of 19 to 1; this ratio was consistent each year in that period (180). In São Paulo, Brazil, the male:female homicide ratio increased with age, and was 6.3:1 in 10–14-year-olds, 15.6:1 in 15–19-year-olds, and 16.2:1 in 20–24-year-olds (181).

In El Salvador and Honduras combined, police estimate that there are roughly 30,000 young persons involved in youth gangs, known as *maras*. In Managua, Nicaragua, there are an estimated 110 youth gangs composed of some 8,200 young people (182). A study in the San Salvador metropolitan area identified family life risk factors that facilitate young people's incorporation into gangs, including poverty (found to be the case for 82.9% of those interviewed); lack of a father figure and the mother being the head of household; the quantity and quality of time parents or guardians spend with children (more likely for children in families where the parent(s) work more than nine hours each day and are unaware of what their children do in their free time); witnessing violence and/or being a victim of violence (8 of 10 young gang members were victims of or witnesses to violence at home); and exclusion from the educational and labor system (being a gang member often requires getting tattoos and along with those come various social stigmas that preclude youth from getting jobs) (183). A comparison between a recent study in San Salvador that surveyed 930 young people who were part of gangs with a 1996 study revealed that there has been a qualitative and quantitative increase in the various risk factors associated with gang membership and violence (184, 185).

**Political Violence, Wars, Forcible Displacement.** Political violence is directed towards political leaders, dignitaries, judges, and heads of various causes and organizations. Almost every country has experienced political violence at different times; this has had varying effects on a given country's governance and it may increase other forms of violence. The health sector has demonstrated that it can function as a strategic means through which this sort of violence can be decreased or ended, since often all sides in a conflict situation demonstrate a respect for the health sector. In the Region of the Americas, the most significant examples of the role of the health sector were seen in the various Central American civil wars, in which joint efforts between the Pan American Health Organization and other international organizations succeeded in brokering truces to be able to distribute oral rehydration salts, expand the use of oral contraceptives, and operate immunization programs (186). More recently, PAHO has contributed to vaccination campaigns and to health brigades working in Colombia's conflict areas.

Wars and internal armed conflicts typically force people to move for safety. The most affected population group are peasants, who must abandon their land, homes, and belongings to seek refuge in urban centers. In Colombia, Guatemala, El Salvador, and

Nicaragua, between 1.2 and 1.5 million displaced persons are estimated to have fled confrontations and harassment perpetrated by guerrilla or paramilitary forces, with peasant massacres being a particularly cruel manifestation. Fleeing peasants typically occupy odd urban spaces, begging and trying to sell various goods at traffic lights to earn meager incomes; many are young boys and girls, or mothers with babies.

**Homicides and other Forms of Social Violence.** According to official reports received by PAHO, the Americas have averaged nearly 120,000 homicides, 55,000 suicides, and 125,000 deaths due to motor vehicle crashes over the past ten years. The crude rate of registered homicides is 14 per 100,000 population, one of the highest reported in different regions of the world (little data from sub-Saharan Africa or countries of the former Soviet Union are available, however). Homicides occur more frequently in urban areas. Figure 12 presents the estimated homicide rate for cities in the United States and Latin America from 1991 to 1999.

A slightly higher figure than for homicides is observed for deaths by motor vehicle accidents, whereas a lower figure is common for suicides (187). Nearly 81% of the total 120,000 homicides in the Region occur in Brazil (37,151); Colombia (23,466); the United States (20,984) and Mexico (15,625) (188). Estimates of homicides in several countries of the Americas in recent years are shown in Figure 13.

Despite the continuing high incidence of homicide throughout the Region, homicide rates have been reduced in many cases. In the United States, for example, the mortality rate for homicide decreased from 11 per 100,000 in 1991 to 7 in 1997; in Colombia, the rate fell from 80 per 100,000 to 54 during 1991–1998. Despite these decreases, reported homicide rates are higher than 10 per 100,000 in more than 12 Latin American and Caribbean countries. According to the United States Centers for Disease Control and Prevention, the United States has the highest homicide rate among developed countries, with a rate of 7 per 100,000 for 1997. The lowest rate in the Region was that reported by Canada at slightly under 2 per 100,000 in 1995 (189). Mexico is reported to have the highest homicide rate in North America; Brazil has the highest homicide rate in the Southern Cone and Colombia has the highest rate in the Andean subregion.

Despite the under-registration and inaccurate registration of deaths, national and municipal groups have conducted studies and monitoring specifically designed to more precisely determine the level of homicides, and these efforts have been able to show the depth and magnitude of the problem. For example, in Argentina in 1997, the Ministry of Justice, through the Office of the Director of Criminal Policy, conducted an exhaustive review of data from judicial files and found that the homicide rate for that year in Argentina was 8.8 per 100,000 population, considerably higher than the 4.5 figure that had been reported previously (190). In Cali, Colombia, an epidemiological surveillance system for deaths by external causes was established in

1993, which has been extremely helpful in getting better data (178). According to data analyzed by the system, between 1983 and 1994, the homicide rate in Cali increased fivefold, spiking from 23 per 100,000 to 124; it then decreased again to 86 per 100,000 in 1997, before increasing once again to 102 in 2000. The fluctuation observed between 1992 and 2000 has been attributed to the lack of continuity in preventive interventions as well as to other factors such as Colombia's economic crisis and civil war.

In El Salvador, data suggest that social violence has been on the rise since the Chapultepec Peace Agreements were signed in 1992 (186). The country's Office of the Attorney General has succeeded in carefully reviewing data, which indicate that the homicide rate in 1995 was 139 per 100,000 population. This figure can be compared with the official death registry, which puts the mortality rate from homicides at 40 per 100,000. Using the new system, it has been observed that El Salvador's homicide rate declined to 70 per 100,000 in 2000. Careful monitoring of the completeness and quality of the data is necessary in order to assess the magnitude and distribution of the problem, so that a public health approach can be applied to combat it.

#### *Motor Vehicle Accidents*

A recent systematic review of the risk factors for motor vehicle accidents determined the following as main causes (191):

- Individual: alcohol consumption, use of drugs that can alter a person's level of alertness (whether drivers or pedestrians); lack of seat-belt use for automobile drivers or passengers or of protective helmets for motorcyclists and cyclists; speeding; lack of awareness of other vehicles or motorcyclists; driving inexperience; and use of cellular telephones while driving.
- Vehicular: absence or inadequacy of seat belts; too many passengers; poor vehicle design that may impede visibility or maneuverability.
- Environmental: high traffic density and speed; unsafe street crossings (for children); and play areas not separated from driveways (for children).
- Other problems: poor or unsafe road, crosswalk, or bus-stop designs that are not always compatible with the needs and convenience of the inhabitants to move freely within the cities. These deprivations occur most frequently in countries of low or medium income (192).

In the Region's high-income countries—the Bahamas, Canada, and the United States—45,664 people died from motor vehicle accidents and there were 83,179 such deaths in low- or medium-income countries (all the others) (193). It is important to note that in developed countries mortality from motor vehicle accidents has declined, despite the increase in the number of passengers over the last three decades. Mortality from this cause has not de-

creased in developing countries, however, despite the fact that these countries have expressed a great interest in confronting this public health problem. Countries could be classified in any one of five categories, based on the level of registered deaths by motor vehicle accidents. Some of the Region's poorest countries are in the very high mortality level, and some are in the very low level, although this may be the result of under-reporting (Table 52).

**Prevention Strategies.** Some countries have recently enacted legislation to address motor vehicle accidents. Costa Rica has a national plan for the prevention of traffic accidents that covers the 1995–2000 period (194). The plan encompasses an epidemiological surveillance system, regulations to accredit drivers, police control and regulations of blood alcohol levels, compulsory reporting of accidents, and strategies for communication and social marketing. After the plan was introduced, mortality from motor vehicle crashes declined from about 7 per 10,000 circulating vehicles in 1990 to 5 in 1996. In the same years, the rate of mild injuries increased from 176 per 10,000 vehicles to 199 and the rate of serious injuries increased from 28 per 10,000 vehicles in 1996 to 38 in 1990—this means that despite a reduction in the number of motor-vehicle crashes, the rate of mild and serious injuries increased dramatically in the period. Furthermore, an estimated one in every six serious injuries resulted in death; most deaths involved pedestrians. The surveillance system has made it possible to identify the causes of these accidents in Costa Rica, such as passing another car recklessly, not keeping a safe distance from other vehicles, not respecting road signs, speeding, and driving under the influence of alcohol.

In Trinidad and Tobago, a recent observational study on the prevalence and determinants of seat-belt use showed that only 42% of the drivers, 35% of the adult passengers in the front seat, and 31% of children in the front seat used seat belts. More women (56%) than men (40%) used seat belts (195). In Tijuana, Mexico, the city's municipal council has established an office to coordinate social security projects, one of whose activities involves developing surveillance systems for traffic accidents. In 1999 it published its first "atlas," mapping the location and characteristics of accidents; according to this report, the accident rate decreased from 91 per 10,000 population to 78 between 1995 and 1999. Men are more involved in motor vehicle crashes than women, with a ratio ranging from 6 to 9 men for every woman. Alcohol was detected on the drivers' breath in 18.6% of men and 5.1% of women involved in accidents (196).

#### **Opportunities for Prevention and Control of Noncommunicable Diseases**

There are several myths about noncommunicable diseases that have hampered initiatives for action. These diseases have been portrayed as diseases of men, of those of higher socioeconomic status, and of the elderly (197).

### *Primary Prevention*

The most frequently seen noncommunicable diseases share a set of risk factors, among them smoking, hypertension, high serum cholesterol, obesity, physical inactivity, and diabetes. The main, most effective strategy for decreasing the appearance of new cases and for preventing major cancers is the primary prevention of these conditions through community based programs that promote and positively modify the lifestyles of individuals and groups (198, 199).

The timely identification of individuals who may be at risk for disease and assuring that they receive appropriate treatment will confer additional benefits. This is especially relevant in the case of hypertension, high cholesterol, and cervical cancer. Several countries currently recommend periodic health exams in adults as a way to detect these conditions early and manage them, as well as their risk factors.

Proactive testing for hypertension is recommended in persons aged 21–64 years and treatment of hypertension is justified for persons in this age range who have a diastolic blood pressure of 90 mmHg or higher. There is enough evidence to indicate that treatment reduces the risk of stroke and ischemic heart disease. Total blood cholesterol measurement is recommended for males 30–59 years old at time of consultation with a physician for any reason, although the best frequency of exam repetition is unknown for persons whose total blood cholesterol levels are at 6.2 mmol/L or higher. The detection and treatment of intraepithelial neoplasia, a precursor of carcinoma of the cervix uteri, has been proven effective in many settings. However, the low sensitivity of cervical cytology (51%), the current recommended screening test, increases the possibility of false negative test results, thus reducing overall program effectiveness; research to evaluate alternative or complementary screening tests is under way. On the other hand, the potential effectiveness of screening programs for breast cancer is much lower and costly, but appropriate treatment at early stages has rendered good results. This is particularly important in countries with increasing incidence and mortality.

### *Detection and Timely Treatment of Diseases*

As stated earlier in this section, many countries in the Region have not fully incorporated noncommunicable disease prevention and control programs into their primary health care services, even when these programs have been identified as priorities. Within the primary health care services, management of noncommunicable diseases has been hospital-centered and led by specialists, which limits accessibility. A recent assessment of policies for prevention and control of breast cancer in the Region revealed that policies were not fully based on evidence and that technology was used without regard to its effectiveness or cost. These findings highlight the need to assess the countries' capabilities to address noncommunicable diseases within their existing primary health care networks and policy framework. Table 53 shows the results of a survey conducted in 2001, which revealed

the status of existing guidelines for hypertension, diabetes, and cervical cancer—three priority conditions in 34 of the Region's countries that responded to the survey (200).

Overall, little research has been conducted in developing countries to assess the cost-effectiveness, acceptability, and sustainability of simple interventions to prevent and control noncommunicable diseases, although there is ample evidence that several cancers can be cured by the timely application of relatively unsophisticated surgery, chemotherapy, and basic radiotherapy. Recent studies also have demonstrated that if appropriate metabolic control can be achieved in persons with type 1 and type 2 diabetes, mortality from microvascular complications can be reduced by 30% (158). For this benefit to accrue, however, persons with diabetes must adhere to pharmacological treatment, diet, and exercise, all of which can be facilitated by self-monitoring of glucose. The benefits from the detection and timely treatment of acute myocardial infarction have been extensively documented, but in many of the Region's countries, treatment continues to be administered later than in the period considered optimal (201–205). Moreover, many persons at risk are not fully aware that these treatments exist or of how to gain access to them.

The United States has adopted a strategy intended to decrease mortality from coronary diseases by 20% by 2010—it illustrates the importance of early detection of cases. The strategy involves increasing the assessment of persons 20 years old and older who are susceptible to early detection of symptoms and signs of a heart attack and having them have quick access to emergency care; increasing the application of reperfusion therapy within the first hour of symptom onset for eligible patients with acute myocardial infarction; increasing the number of adults who receive cardiopulmonary resuscitation outside of the hospital when heart attack and an emergency call occurs; and increasing the number of persons who receive their first defibrillator electric shock during the first six minutes of identifying heart failure outside of a hospital (206).

Finally, because the early detection of disease symptoms and proactive and periodic case monitoring is so critical for diseases such as these, every effort must be made in the countries to create a system that takes into account a patient's ability to receive care and that guarantees services that enable timely access to care, appropriate diagnosis, and correct treatment. When this system fails, it is the persons with chronic conditions who bear the cost. In Jamaica, for example, a study found that 67.8% of persons with cancer and 57% of those with diabetes faced financial difficulties because they had to make out-of-pocket expenditures for their health care.

After having made substantial progress in terms of life expectancy, an important group of young and middle age adults—in addition to older adults—are at increased risk of noncommunicable diseases. Given this, the health sector can work to make the best possible use of the efforts and resources at its disposal, while simultaneously developing partnerships that facilitate the



implementation of population-based preventive strategies. The prevention of noncommunicable diseases must be tackled through a comprehensive and multidisciplinary approach that includes the most disenfranchised groups and communities (207, 208).

## VACCINES AND IMMUNIZATION

### Introduction

The end-of-the-decade review of the 1990 World Summit for Children's goals issued by the Secretary General of the United Nations concluded that high and sustained coverage levels of child immunization in most of the world's regions have significantly contributed to the progress of child survival initiatives. The review reiterated that immunization remained the most practical and cost-effective public health intervention (209). Health authorities in the Americas, in recognition of the impact of vaccination, have placed immunization programs high on their national health agendas.

Vaccination coverage of children under 1 year of age in the Region of the Americas has progressively increased, reaching coverage levels higher than 90% for most antigens (Figure 14). This coverage figure is the best evidence of the impact that immunization programs have had on the sharp reduction of morbidity and mortality associated with common childhood diseases that can be prevented through vaccination. As a result of improved knowledge of the epidemiological situation of diseases, immunization programs are now also reaching out to other age groups, ranging from adolescents, to women of childbearing age, to elderly population groups.

The Region of the Americas has taken the lead in generating valuable information on the eradication strategies of vaccine-preventable diseases and has demonstrated the complementarity between disease eradication and primary health care initiatives. Disease eradication strategies have become a major portal for the development and/or improvement of vaccination and surveillance capabilities in the Region, and have paved the way for establishing current routine immunization programs. Notable disease eradication breakthroughs in the Region include the eradication of smallpox and poliomyelitis, as well as the interruption of indigenous measles transmission that is now under way.

In the Americas, the main means used to improve the delivery of immunization programs have traditionally involved a periodic evaluation of national immunization programs, the elaboration of five-year and annual plans of action, the promotion of interagency coordinating committees, and the promotion of passing immunization laws. New tools have been added of late, such as rapid monitoring of vaccination coverage to validate reported coverage at the municipal level, combined with the active search of cases; use of performance agreements in immunization to promote the

concept of management by results; and accountability in all aspects of planning and supervision of immunization. Strengthening these tools is instrumental as PAHO intensifies its collaboration with countries to identify localities with persistent low coverage levels, even within countries that report adequate aggregate national coverage. These efforts seek to prevent countries from developing a false sense of security based on data aggregated at the national level, which may conceal weaknesses in certain areas.

Other programs within and outside the health sector are adapting immunization strategies and methodologies when they design and implement various child survival initiatives, such as the administration of vitamin A supplements and the treatment of parasitic diseases during national immunization days. By taking advantage of immunization contacts, these other programs have increased their own coverage. The cross-fertilization is especially evident in the planning aspects, and this has allowed for substantial contributions to be made in the effective programming of resources and design of monitoring tools, sustained disease information flows within the system, and the fostering of a monitoring and analysis culture (210).

Establishing an environment that ensures a continuous and effective delivery of immunization and surveillance programs has emerged as the most critical area of work. Efforts in this regard have involved every aspect of immunization programs, from securing financial sustainability, to promoting accountability among private and public immunization service providers at all levels of the health system, to ensuring widespread use of new vaccines of public health importance, and adopting new tools to improve managerial processes.

Immunization programs also have had to cope with the rapid development of new generations of vaccines. New vaccines have the potential of simplifying immunization delivery, improving the performance of existing vaccines, and protecting children against additional vaccine-preventable diseases, but they also are likely to be considerably more expensive than those currently in use. National surveillance systems that generate epidemiological information on the disease burden of vaccine-preventable diseases have had to rapidly incorporate new diseases in their systems; these data are essential for health authorities to be able to prioritize interventions, allocate sufficient resources for sustainable vaccine introduction, and eventually monitor the impact of vaccination.

How and when to introduce new and/or combined vaccines in routine immunization programs is being greatly discussed in the Region. The per capita price of a second-generation vaccination schedule that includes pentavalent, MMR, BCG, and polio vaccines has been estimated at US\$ 12 for the biologicals. The arrival of these new vaccines also calls for totally revamping cold chain systems in the Americas, which were established several years ago basically to handle six traditional vaccines. The gradual financial contribution toward the procurement of vaccines by national governments, with an attendant decrease of outside contributions, has continued to be advocated (211).

The relative cost of a second-generation immunization schedule has once again highlighted the importance of PAHO's Revolving Fund for Vaccine Procurement, which remains the most effective means for allowing the rapid introduction of new vaccines in several countries in the Americas. It also has placed a great deal of pressure on local vaccine producers in the Region, which have had to quickly enter into joint ventures with private manufacturers to access the new technology, as well as to embark on substantial investment plans for their facilities. The introduction of new vaccines, developed with new technologies, also calls for added expertise and capabilities among national regulatory authorities and national control laboratories in the Region to license and release these new products.

Given strong lobbying by anti-vaccine groups, the public's trust in immunization must be sustained as countries face these critical issues. Adverse effects allegedly attributed to vaccines are being rapidly disseminated through the mass media, before science has been able to properly study this issue.

### Whooping Cough

Figure 15 shows the considerable decline of whooping cough incidence, which has plummeted from 123,466 reported cases in 1978 to 15,069 cases in 2000. Between 1995 and 2000, the annual number of reported cases of whooping cough has hovered between 15,000 and 23,300, with 50% to 75% being reported in the United States and Canada. The remaining cases were reported after epidemics in some Latin American countries, such as the one in Chile in 1999, with 3,064 cases, and the one in Peru in 2000, with 2,388 cases.

This reduction in the number of cases is a direct result of improvements in vaccination coverage against diphtheria, pertussis, and tetanus (DPT). These improvements have allowed most of the Region's countries to reach coverages above 80% during 2000 (Figure 16).

The Region's countries also have worked to improve their diagnostic capabilities and the use of homogenous criteria to confirm cases. This is particularly important, because whooping cough's clinical picture is similar to those of other acute respiratory pathologies that primarily affect young children; there is no uniformity between countries regarding case definition; and there are atypical presentations of the disease, among other factors.

### Diphtheria

As is the case with other respiratory diseases, diphtheria's transmission increases with overcrowding and poor socioeconomic conditions. Before the introduction of the vaccine, diphtheria used to be a disease with cyclical epidemics that affected young and school-aged children, with deaths resulting from damage caused by the toxin to organs such as the heart. This

changed dramatically as immunization levels rose after the vaccine was introduced.

One year after the official launching of the Expanded Program on Immunization in the Americas, the first data were obtained regarding vaccination coverage levels reached in Latin American and English-speaking Caribbean countries. Coverages for the third dose of DPT in children under 1 year were 20% in 1978. Since then, a steady increase of this indicator has been observed, and it topped 85% in 1996. Along with the DPT3 vaccination coverage increase, there has been a major reduction in the number of diphtheria cases, from 6,857 reported cases in 1978 to 113 cases in 2000 (Figure 17).

The countries continue to report isolated diphtheria cases and, occasionally, an outbreak, such as occurred in Ecuador between 1994 and 1995, when a total of 724 cases were reported, and, most recently, in Colombia in 2000. During the outbreak in Colombia, eight cases were confirmed and the most affected group were persons under 20 years old, especially those under 10 years old. The fatality rate of the outbreak was 12.5% (1/8); one case was a child who had received all three doses of DPT, and 62% of the cases had incomplete vaccination schedules; 75% (6/8) did not have access to health insurance and all eight cases were from low socioeconomic backgrounds with unmet basic needs. Analyses at the local level mention the application of Law 100, which brought about significant changes in immunization delivery starting in 1997, when several actors of the country's social security system became involved in the service delivery network, and a sustained reduction of coverage was observed from that year until the end of the decade (212).

Changes in the epidemiological profile of diphtheria after the vaccine was introduced and the lessons learned from the last outbreaks have shown that immunization is a proven means of preventing future outbreaks. This means that the countries must maintain high vaccination coverages with the three-dose primary series among children and then administer booster doses of diphtheria and tetanus toxoid to older children and adults.

### Tetanus

Reported tetanus cases have continued to decline in the Region. Between 1997 and 2000, 3,692 cases were reported, 48% by Brazil, 14% by Mexico, 7% by Peru, 5% by Venezuela, and the remaining mainly by Spanish-speaking Latin American countries. The countries are continuing to immunize new cohorts of newborns and are stepping up their efforts to vaccinate adults. Tetanus toxoid vaccine for adults, alone or combined with diphtheria toxoid, is administered to women of childbearing age, school-aged children, and adult men in high-risk occupational situations. Among these three groups, women of childbearing age (ages 15–49 years) are considered the main target group for the vaccination strategy aimed at eliminating neonatal tetanus as a public health problem. Tetanus cases also have been reduced due

to the fact that those cohorts vaccinated with DPT vaccine as children are now immune adults.

### Neonatal Tetanus

Activities towards the elimination of neonatal tetanus in the Americas intensified in 1988, with the strategy of vaccinating women of childbearing age with at least two doses of tetanus toxoid and ensuring a thorough investigation of all cases. Health services launched active disease surveillance and conducted a retrospective case search as far back as 1985. Control measures included the identification of risk areas so as to prioritize vaccination and resource allocation; the establishment of epidemiological surveillance systems that include the investigation of all neonatal tetanus and non-neonatal tetanus cases; case detection in silent areas; and monitoring progress of efforts to eliminate the disease (213, 214). In 1989, the World Health Organization adopted a resolution to eliminate neonatal tetanus as a public health problem worldwide, setting as a goal an incidence rate of below one case of neonatal tetanus per 1,000 live births in each municipality (215). In 1990, the World Summit for Children set a further goal that no district in any country should have a rate of more than one neonatal tetanus case per 1,000 live births by 2000 (216).

Neonatal tetanus is endemic in Argentina, Bolivia, Brazil, Colombia, the Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, and Venezuela. These countries have a total population of approximately 470 million, of which some 110 million are women of childbearing age, and an estimated 12 million births.

To make the campaigns against neonatal tetanus more effective, municipalities or districts in the Americas are classified as high-risk depending on the number of neonatal tetanus cases being reported. A high-risk municipality also is determined using criteria based on the area's known epidemiological conditions—seasonal migration of agricultural workers, peri-urban poverty, hard-to-reach populations, marginalized populations, and percentage of rural areas, among others. The strategy concentrates on population groups known to be exporters of cases, or on areas where the absence of cases can be attributed to weaknesses of surveillance (silent areas). Initially, all municipalities reporting an incidence of neonatal tetanus higher than the national average for the three previous years are considered to be high-risk areas. As neonatal tetanus is brought under control, other areas that presented either one or more cases, or recurrent cases in any given year, also are considered at high risk (214).

Thanks to these efforts, the incidence of neonatal tetanus in the Americas began to decline. In 1987, 1,495 cases were reported; by 1999, only 160 cases had been reported; and in 2000, there were only 120 cases reported. The epidemiological characteristics of cases show most to be rural infants of multiparous women who lack prenatal care, are unvaccinated, and deliver mainly at home. These facts suggest that there have been at least

two lost opportunities for vaccination when these mothers previously made contact with a health service.

An evaluation carried out in 2000 in all endemic countries demonstrated that only 33 municipalities in the Americas (fewer than 0.5%) continue to show neonatal tetanus rates above 1 per 1,000 live births each year. In analyzing the 147 neonatal tetanus cases reported between 1998 and 2000, 19% were children of mothers under 20 years of age; 74% were children of mothers who had had no prenatal care; in 10%, the mothers had had prenatal care; and in 15%, the mothers had had more than two prenatal care sessions. In addition, 90% had home deliveries.

Based on the current situation, efforts have targeted special vaccination services and surveillance efforts in those areas and population groups at highest risk within high-risk municipalities. Countries are encouraged to evaluate the epidemiological and social conditions associated with these remaining cases (such as migration, lack of vaccination, and marginality). Ensuring that every contact between a woman of childbearing age and a health center becomes an opportunity for vaccination against the disease also has been stressed (217).

### Measles

In 1994, the Region's countries committed themselves to interrupt indigenous measles transmission by the end of 2000 (218). From 1990 to 1996, measles cases had declined, from approximately 250,000 to an all-time low of 2,109 confirmed cases (218). A resurgence of measles virus circulation began in 1997, however, with 52,284 confirmed cases reported from Brazil after a large urban outbreak occurred in São Paulo (Figure 18) (219). In 1998, 1999, and 2000, the number of confirmed measles cases progressively decreased to 14,330; 3,209; and 1,755 respectively. By 2001, only 509 confirmed cases were reported in the entire Region, the lowest figure for any year since the Plan of Action to support the hemispheric initiative of measles eradication was put in place in 1996. This section shows the significant progress achieved between 1998–2001, as a result of the implementation of PAHO's recommended vaccination strategy for measles eradication.

#### Measles Vaccination

In support of the measles eradication goal, PAHO recommended a three-part strategy designed to achieve and sustain high levels of vaccine-induced measles immunity:

- a one-time, nationwide catch-up campaign targeting everyone 1–14 years old, to rapidly interrupt chains of measles transmission;
- attaining and maintaining high vaccination coverage (keep-up) through routine vaccination among 1-year-olds as soon as possible after their first birthday in every district of every

country (recommended vaccination coverage has been  $\geq 95\%$  in a country's every district and/or municipality); and

- complementary, nationwide follow-up measles vaccination campaigns every four years, targeting all children 1–4 years old, regardless of previous measles vaccination status (220).

This three-pronged strategy is supplemented by the use of mop-up vaccination, aimed at targeting pockets of unvaccinated children, especially in urban areas and hard-to-reach rural areas following catch-up and follow-up measles vaccination activities. Mop-ups usually include the same age group that was targeted in a mass campaign. High-risk areas are generally selected on the basis of coverage results from the campaign, although other criteria have been used, including cases of measles within the last three months, poor measles surveillance, poor access to health services, and large concentrations of urban poor, especially with frequent migration. Mop-up vaccination has been used in all those districts that have failed to reach the recommended 95% vaccination coverage (221).

Targeted vaccination also has been used, which aims at population groups considered at high risk for sustaining measles outbreaks and for transmitting measles to susceptible persons of other age groups. These high-risk groups include young adults who migrate from rural areas with low population densities and who may, as a result, have had a lower risk of previous exposure to circulating measles virus and, in turn, may have escaped both natural measles infection and measles vaccination (222).

Experience in the Americas has shown that house-to-house vaccination is the most efficient strategy for attaining high coverage in risk areas and hard-to-reach areas, as was demonstrated during measles outbreaks in Haiti and Bolivia. The outbreak in Bolivia also showed that house-to-house vaccination, coupled with house-to-house monitoring of vaccination, were critical supervisory tools to reach high vaccination coverage in all municipalities.

The countries that have fully implemented PAHO's recommended strategies for measles eradication have successfully interrupted indigenous transmission of measles virus. Of 41 countries in the Americas reporting to PAHO, 39 (95%) have conducted catch-up vaccination campaigns during 1989–1995 and follow-up measles vaccination campaigns since 1994. Vaccination coverage through routine services has increased in the Region, from 80% in 1994 to 94% in 2000. Measles vaccination coverage for 2000, by country, has ranged between 75% and 99%. The lowest reported coverage came from Colombia (75%), Haiti (80%), Venezuela and Costa Rica (84%), Guyana (86%), and Jamaica and the Dominican Republic (88%).

Those most susceptible to measles infection remain unvaccinated children under the age of 5 years, followed by young adults, especially rural migrants, and population groups living in certain institutional settings that facilitate measles transmission whenever measles virus is introduced. While young adults have been

shown to be an important vehicle for measles virus introduction in an area, the 1997 measles outbreak in Brazil showed that they were not able to sustain endemic transmission without the contribution of unvaccinated children under 5 years old.

### *Measles Surveillance*

PAHO has recommended a surveillance strategy that includes five major components:

- weekly reporting to the Organization of suspected measles cases by every municipality, including reports of zero cases when none occur;
- investigation of suspected cases within 48 hours of reporting;
- confirmation of cases by testing of serum specimens collected at first contact with suspected cases;
- active search for other cases in health centers and schools in municipalities that report confirmed cases and in those that do not submit weekly reports; and
- isolation and genetic sequencing of measles virus.

PAHO has developed the concept of active municipalities to highlight localities that require extensive follow-up of surveillance and vaccination, and quality epidemiological investigations. Municipalities are considered active if they have confirmed measles cases with onset within the 12 weeks prior to the report. PAHO tracks measles transmission in these municipalities on a weekly basis. Moreover, since 1999 PAHO has actively promoted the concept of institutionalized active case finding as a quality control mechanism for the regular surveillance system.

### *Measles Cases*

As a result of intensified vaccination efforts the incidence of measles has sharply declined between 1998 and 2001. The resurgence of measles in Brazil in 1997, particularly in São Paulo, continued into 1998, spreading into other countries. That latter year, 17 (41%) of the 41 countries that report to PAHO confirmed 14,332 cases, with Argentina (10,229 cases) and Brazil (2,781 cases) having the highest number of cases in the Region (see Table 54 and Figure 19).

As the 1997 measles outbreak spread beyond São Paulo, Brazil, Argentina reported 10,673 confirmed cases in 1997–2000, with 96% of them occurring in 1998. Cases decreased after a 1998 follow-up vaccination campaign among children aged 1–4 years old, with a 98% reported measles vaccination coverage.

Between January 1999 through December 2000, 28 (68%) of the 41 countries reporting to PAHO, including Cuba, the English-speaking Caribbean countries, and most of the Central and South American countries, were free of measles. In 1999, 3,209 confirmed cases were reported from 11 countries, 78% fewer cases than in 1998 and 94% fewer than in 1997. Canada, Chile, Costa Rica, Mexico, Peru, Uruguay, and the United States reported measles importations in 1999, with limited spread due to high

vaccination coverage. Endemic transmission occurred in four countries during 1999: Bolivia (1,441 cases), Brazil (908), Argentina (313), and the Dominican Republic (274) (Figure 19).

In Bolivia, 1,441 confirmed measles cases were reported in 1999, an increase from the 1,004 cases seen in 1998. The measles outbreak in this country began in May 1998, spreading from Yacuiba, along the border with Argentina, to all regions. A follow-up vaccination campaign was conducted during November/December 1999, with a 98% reported national coverage. Nonetheless, house-to-house monitoring indicated that many areas had not achieved 95% coverage. During 2000, 122 confirmed cases were reported, mainly among rural, unvaccinated children and young, unvaccinated adults who had immigrated from rural areas. In September–December 2000, a nationwide, house-to-house vaccination campaign was implemented. To supervise the campaign, measles vaccination coverage was monitored house-to-house in most municipalities, and those that did not approach the required 95% coverage were requested to revaccinate. Since October 2000, no measles cases have been confirmed (223).

During 2000, 1,754 confirmed measles cases were reported in the Americas, the lowest number recorded so far in any year (Figure 18). Endemic transmission occurred in Argentina, Brazil, Bolivia, the Dominican Republic, and Haiti (Figure 19). Sixteen (<1%) of the 12,010 reporting municipalities reported confirmed measles cases during this period (224–226). Canada, Mexico, and the United States, three countries with high vaccination coverage, reported measles importations with limited spread in 2000. The largest of these outbreaks (165 cases) occurred in Canada, among groups opposed to vaccination, after an importation from Bolivia. During 2001, 423 cases were reported in the Region, the lowest number ever recorded.

In the Dominican Republic, 512 confirmed measles cases were reported during 1999–2000. In 2001, 113 confirmed cases (22% of the Region's total) were reported from 18 provinces, mainly among children under 5 years old. A nationwide vaccination campaign was carried out in May 2001, with reported 100% coverage; average coverage following rapid monitoring was 93%. No additional cases have been confirmed since May 2001.

In Haiti, routine measles immunization coverage has been low for many years, averaging 47% (range 32%–85%) during 1995–1999. A follow-up vaccination campaign was conducted in 1999, but coverage was low (70%–80%). In 2000, an outbreak began in Artibonite, most likely an importation from the Dominican Republic. In 2000, Haiti had 992 cases (57% of the Region's total). During 2001, Haiti reported 158 confirmed cases (31% of the Region's 509 confirmed cases). Most cases occurred among children under 5 years old. Between August and November 2001, Haiti conducted a nationwide house-to-house vaccination campaign, with a preliminary reported coverage of 100% and average coverage by house-to-house monitoring higher than 90%. The last confirmed cases in the country were reported in September 2001 (227).

Since August 2001, following an importation from Europe, 101 measles cases were reported in Venezuela, a country with low routine vaccination coverage. Since September 2001, Venezuela is the only country with known endemic transmission in the Region. A nationwide measles vaccination campaign has been implemented.

### **Poliomyelitis**

The Region of the Americas has been free of indigenous transmission of wild poliovirus since 1991 (224). In May 1985, PAHO Member Countries unanimously approved the initiative to eradicate the indigenous transmission of the wild poliovirus from the Western Hemisphere during the XXI Meeting of the Directing Council of the Pan American Health Organization. International organizations overwhelmingly supported this effort.

The strategy to eradicate wild poliovirus transmission, which built upon the lessons learned from the successful global eradication of smallpox, was developed by PAHO and focused on the acceleration of the Expanded Program on Immunization, with special vaccination strategies targeted to each country's needs. Key components of the vaccination strategy involved the intensification of immunization activities through national immunization days, house-to-house (mop-up) campaigns, and attaining and maintaining high vaccination coverage of children under 5 years old. In addition, a surveillance system was developed for the early detection of cases of acute flaccid paralysis. These cases were rapidly investigated, and stool samples from patients and their contacts were collected to rule out the circulation of wild poliovirus. A confirmed case of polio was defined as one presenting acute paralytic illness with or without residual paralysis and where there was isolation of wild poliovirus from the stools of either the case or its contacts.

As the number of cases decreased, more reporting units were added. During the last years, the most comprehensive surveillance system in the Americas was put in place, with more than 22,000 health units participating and covering every county or district in the Americas. These local surveillance systems opened the way for decision-making and program implementation to be decentralized. In that way, polio eradication, in fact, played a significant role in strengthening local health infrastructures.

The last case of polio in the Americas was reported in 1991 in Peru. In September of 1994, following an extensive review of surveillance information, key polio surveillance indicators, and laboratory results, an International Commission for the Certification of Poliomyelitis Eradication (ICCPE) formally declared that transmission of wild poliovirus had ceased in the Western Hemisphere.

The global eradication of wild poliovirus transmission progressed as a result of accelerated control activities in every region of the world, with a rapid reduction of the number of countries endemic for polio. The Americas, however, must remain vigilant until wild poliovirus transmission ends worldwide. High levels of

vaccination coverage with oral polio vaccine (OPV) must be maintained, as must a fully-functional surveillance system for acute flaccid paralysis to rapidly detect wild poliovirus circulation should the virus be reintroduced. In March 1996, an importation of wild poliovirus from India was detected in Canada. This marked the second importation of wild poliovirus detected in Canada. The first one, in 1993, had been imported from the Netherlands, but adequate surveillance detected the importation quickly, allowing for rapid implementation of control measures and containment of the outbreak (225, 226). During the 1990s, OPV vaccination coverage remained around 87% (Figure 20). The recommendation is to reach vaccination coverage levels at the municipal level of 95%.

#### *Vaccine-derived Poliomyelitis Outbreak in Hispaniola*

As the countries of the Americas continue to fight to keep the Region polio free, they also must cope with a new development that will require careful study. An unusual outbreak of poliomyelitis caused by Sabin type 1-derived poliovirus was detected in the Dominican Republic in October 2000. As of November 2001, there were 13 confirmed cases due to vaccine-derived poliovirus type 1. Most cases affected unvaccinated children under 5 years old in areas with very low coverage with oral polio vaccine. Investigations also revealed poor sanitation in these areas. In Haiti, 8 confirmed cases due to Sabin type 1-derived virus had been reported as of November 2001. Aggressive control measures were immediately put in place, and environmental sampling was conducted as part of the investigations. In the Dominican Republic, three national immunization rounds with OPV, targeting children under 5 years old, were carried out in December 2000, as well as in February and May of 2001. In Haiti, the strategy of “rolling” campaigns for polio and other antigens is being used to control the outbreak (228, 229). The first confirmed case in the Dominican Republic was a nine-month-old girl in the Province of Monseñor Nouel, County of Bonaó, with paralysis onset dated 18 July 2000. In Haiti, the first confirmed case, a two-year-old girl from the town of Nan Citron, had paralysis onset dated 30 August.

The analysis of the genomic sequence revealed that the virus associated with the outbreak in both countries is unusual because it derives from the oral polio vaccine and presents a divergence of 3% to the parental OPV strain (usually, vaccine-derived poliovirus does not diverge more than 0.5% from the parental strain). Normally, wild polioviruses have a lower than 82% genetic similarity to OPV. The poliovirus associated with this outbreak appears to have recovered the neurovirulence and transmissibility characteristics of wild poliovirus type 1. The differences in nucleotide sequences among the outbreak isolates suggest that the virus had been circulating for approximately two years in an area where vaccination coverage is low, and that the virus had accumulated genetic changes that restored its essential properties of wild poliovirus (228).

Prolonged circulation of vaccine-derived poliovirus in areas with very low OPV coverage had only been documented in one other setting—a type 2 OPV-derived virus that circulated in Egypt for an estimated 10 years (1983–1993), and which was associated with more than 30 reported cases. Vaccination coverage was quite low and circulation of the vaccine-derived poliovirus ceased rapidly once OPV vaccination coverage increased (228).

Besides low OPV vaccination coverage, epidemiological investigations have identified poor sanitation as a risk factor for transmission of the virus. In the Dominican Republic's Constanza County of La Vega Province, where most of the outbreak-related cases have been detected, coverage with three doses of OPV has ranged between 20% to 30% in children under 5 years old. The national vaccination coverage with three doses of OPV in children under 1 year old in the Dominican Republic has consistently been around 80% for each of the last five years; 20% of districts have had coverage above 80%. National immunization days were discontinued in that country five years ago. In 1999, Haiti's Northwest Department reported OPV coverage of 40%. During the last 10 years, national vaccination coverage with three doses of OPV in children <1 year of age has ranged between 30% and 50%. National immunization days were also discontinued five years ago (229).

In the Dominican Republic, the acute flaccid paralysis rate has been below 1 per 100,000 population aged under 15 years old in six of the last ten years, and around 0.1 in Haiti since 1995. The proportion of acute flaccid paralysis cases with adequate stool specimen collected in the Dominican Republic has been approximately 80% from 1993 to 1998, followed by 30% in 1999 and 36% in 2000. In Haiti, none of the acute flaccid paralysis cases reported during the last five years had stool specimens collected. The proportion of notification sites reporting weekly during the last 10 years has been above 80% in the Dominican Republic, except in 1999 when it was 50%. In Haiti, the proportion of notification sites reporting weekly has been below 50% for the last 10 years, except in 1998 when it was 95%. Enterovirus isolation has been above 15% in the Dominican Republic for the last 10 years, except in 1996 and 1999 when it was zero, and in 1997 when it was 9% (230).

Ongoing intensive case finding determines the extent and magnitude of the outbreak, identifies disease activity foci, and helps organize areas for vaccination activities. Teams of national and international epidemiologists have been established to conduct active search for acute flaccid paralysis cases, in the Dominican Republic and in Haiti. Active search continued to be carried out in health centers, hospitals, emergency care centers, physical therapy clinics, orphanages, day care centers, and the community. All suspected cases underwent a complete epidemiological investigation, with stool specimens being taken (229, 231, 232).

Actions to date include making a clear determination of the extent of the outbreak, risk factors, and future outbreak potential. All Sabin poliovirus isolates from acute flaccid paralysis cases in

the Americas since 1995 are being sequenced, in conjunction with epidemiological analysis of those high-risk areas where new Sabin-derived poliovirus has been identified. A special call has been issued to the countries in the Americas and worldwide to remain vigilant of this situation by maintaining high levels of OPV coverage and active surveillance in all areas of countries. Specific recommendations include:

- carrying out a risk analysis within each country, both for potential circulation of the virus (imported wild poliovirus or vaccine-derived) and for the acute flaccid paralysis surveillance system's capability to detect circulation on a timely basis—OPV coverage levels also should be reviewed;
- using all mass vaccination activities as opportunities to vaccinate with OPV, especially in risk areas;
- complying with indicators for acute flaccid paralysis surveillance, at national, departmental, or provincial levels;
- maintaining 95% vaccination coverage with OPV in all municipalities or equivalent geopolitical areas—countries that fail to reach this coverage level in more than 80% of their municipalities should conduct at least two national immunization campaigns.

## Rubella

In support of the Regional goal of measles eradication, an enhanced surveillance system for measles was developed in 1996. Information generated by this system showed that rubella virus circulated widely in several countries in the Americas. A careful review of surveillance data for rubella and congenital rubella syndrome showed that more than 20,000 infants are born with congenital rubella syndrome each year in the Americas, even in the absence of major epidemics. Furthermore, an increasing proportion of cases in the United States were among persons of Hispanic ethnicity, suggesting a potential susceptible group. In two of the large United States outbreaks, 98% of cases were among persons of Hispanic ethnicity (233).

In 2000, data on rubella obtained through PAHO's regional measles eradication surveillance system showed that out of 81,054 laboratory analyses performed on samples of suspected measles cases, 28,276 (34%) were confirmed as rubella. Brazil (80%) and Peru (8%) reported most of the confirmed rubella cases; both countries have integrated their measles and rubella surveillance systems.

Congenital rubella syndrome is associated with great morbidity, mortality, and cost. Direct costs associated with the disease can be categorized as high care costs for physicians and institutional care, as well as long-term rehabilitation and special educational costs. A cost study was conducted in the English-speaking Caribbean in 1997. Results estimated that even with the present

strategies now in place in some of the countries, a total of 1,500 cases of congenital rubella syndrome would occur over the next 15 years. Expenditures for rehabilitation and care of these cases, excluding human suffering, were estimated at more than US\$ 60 million for those years. Implementing a strategy consisting in vaccinating men and women to interrupt rubella transmission and to prevent the occurrence of congenital rubella syndrome over this period would cost approximately US\$ 4.5 million. The cost-effectiveness of the mass campaigns was estimated to average US\$ 2,900 per case of congenital rubella syndrome prevented (234).

In Guyana, an interview-based study of prevalent congenital rubella syndrome cases estimated that the average lifetime cost of care per child with the syndrome, including indirect costs, was about US\$ 64,000. The Ministry of Health in Jamaica estimated that the direct costs associated with care of a child with congenital rubella syndrome may be about US\$ 13,400 each year. The Ministry of Health in Barbados determined that the estimated lifetime costs of care for one child with congenital rubella syndrome might be US\$ 50,000. In the United States, the lifetime cost of treating a patient with congenital rubella syndrome is estimated to be more than US\$ 200,000.

This epidemiological situation has made rubella and congenital rubella syndrome a serious public health problem. Based on these data and the fact that there are safe, effective, and inexpensive vaccines, PAHO's Technical Advisory Committee for Vaccine Preventable Diseases recommended in 1997 that a regional initiative to strengthen rubella and congenital rubella syndrome prevention efforts be put in place (235). The initiative called for reducing the number of susceptible women of childbearing age and for supporting countries in developing integrated surveillance systems for measles and rubella.

Rubella vaccination has only recently been introduced in the Americas. By 2001, 37 of the 41 countries and territories reporting to PAHO had included rubella vaccine in their national immunization programs, with the Dominican Republic, Haiti, Paraguay, and Peru pending to introduce it. Canada, Cuba, the United States, Panama, and Uruguay have used measles-mumps-rubella (MMR) vaccine for several years, and large cohorts of women of childbearing age are being protected.

To reduce the risk of rubella infection in women of childbearing age, the English-speaking Caribbean countries, Chile, Costa Rica, and Brazil have undertaken accelerated rubella control programs and prevention of congenital rubella syndrome, and their experiences will provide useful information on the implementation of rubella vaccination strategies that can be applied elsewhere.

In April 1998, CARICOM's Council for Human and Social Development resolved that every effort would be made to eradicate rubella and prevent the occurrence of new cases of congenital rubella syndrome by the end of 2000. As part of rubella elimination efforts in the English-speaking Caribbean, 18 of 19 countries (Bermuda has not implemented its campaign) have carried out or are completing adult rubella mass campaigns, tar-

getting men and women mainly in the 20–39-year-old group (slightly more than two million persons). Most of the campaign activities have been implemented since 1998 to 2001. Country vaccination coverage ranged from 64% to 97%. More than 75% of the targeted population in all countries has been vaccinated. In 1999, two cases of congenital rubella syndrome from Suriname were confirmed, and zero cases in 2000 and 2001.

Chile carried out a preventive rubella vaccination campaign, targeting women between 10–29 years old to prevent the occurrence of congenital rubella syndrome. The decision to target this age group was based on data showing that rubella outbreaks were affecting primarily adolescent and young adult women in childbearing years. During the 1997 and 1998 rubella outbreaks in Chile, more than 70% of cases were among persons between 10 and 29 years old, half of them women. The campaign achieved 98% vaccination coverage, partly due to a highly successful social mobilization campaign. Health authorities have put in motion a surveillance system that will provide information on the effectiveness of policies and the campaign; measure impact on the occurrence of rubella and congenital rubella syndrome; and identify groups of people or geographic areas in need of additional control efforts. Up to September 1999, there were 13 congenital rubella syndrome cases, 4 confirmed after the campaign; the last case was confirmed in February 2000 (236).

Costa Rica also embarked on an accelerated rubella control program and prevention of congenital rubella syndrome. In the past 14 years, rubella outbreak cycles were reported in 1987/1988 (1,079 cases), 1993/1994 (492 cases), and 1998/1999 (1,282 cases). A progressive reduction in the proportion of cases was observed in these outbreaks among 15–24-year-olds, decreasing from 45% between 1987 and 1988, to 25% between 1993 and 1994, and to 11% between 1998 and 1999. In the 25–44-year-old age group, a steady increase to 23%, 31%, and 41% was observed for those years, respectively. Furthermore, in analyzing attack rates by age group in the last two outbreaks, it was observed that those at greater risk were in the 20–29-year-old age group, followed by the 30–39-year-old age group (237). Costa Rica's Ministry of Health and the country's Social Security Administration developed an action plan for accelerated control of rubella. The campaign's target group reached 42% of the country's total population of men and women between the ages of 15–39 years with rubella- and measles-containing vaccine. A national coverage of 98% was reached during this campaign (238).

In Brazil, the Ministry of Health implemented an accelerated plan to be executed in two stages, one in 2001 and one in 2002. In November 2001, a measles/rubella vaccination campaign covering some 16 million women was conducted in 13 states. The most frequent age group to be vaccinated were persons 12 to 29 years old; each state has established the target group based on the introduction date of the MMR vaccine and the revaccination campaigns carried out. Global coverage has topped 90%. In municipalities that have not reached 95%, mop-ups have been carried

out; remaining states will program their activities for the first semester of 2002.

Most of the information on surveillance of congenital rubella syndrome comes from the English-speaking Caribbean. Given the importance of surveillance in preventing congenital rubella syndrome and the still limited available data, information also is being gathered through the Latin American Center for Perinatology and Human Development (CLAP) and the Latin American Collaborative Study of Congenital Malformations.

Efforts also are under way for standardizing the rubella/congenital rubella syndrome surveillance system, implementing congenital rubella syndrome reporting systems and networks, implementing strategies to reduce the number of susceptible women of childbearing age and follow up all pregnant women who have developed rubella, collecting samples for viral isolation from every outbreak, developing virus isolation capabilities in the countries, and promoting appropriate vaccination strategies.

### Yellow Fever

Yellow fever remains an important cause of morbidity and mortality in several tropical countries of the Americas. Between 1997 and 2000, 733 cases and 340 deaths were reported by the Region's national health authorities (Table 55). Bolivia (27%), Brazil (27%), Colombia (2%), Ecuador (5%), French Guiana (0.1%), Peru (37%), and Venezuela (2%) reported cases. Most of these were diagnosed during the investigation of outbreaks, although several isolated cases also were reported. Still, official figures do not reflect the disease's true incidence, because studies conducted during outbreaks continue to show marked underreporting. Since 1942, when the last cases of urban yellow fever were reported in the Americas, only cases of the jungle form of the disease have been officially notified.

An analysis of reported cases of yellow fever since 1950 shows a marked decrease in the disease's incidence in the 1960s (905 cases), compared to the previous decade (2,918 cases). Since the 1960s, however, the number of reports have increased: 1,212 cases in the 1970s, 1,625 in the 1980s, and 1,939 in the 1990s. Since the 1980s, most cases were reported by Bolivia and Peru: 83% in the 1980s and 84% in the 1990s (239). Lately, however, the pattern in reported cases from these two countries has begun to change. In 1999, for example, there was balance among the proportion of cases reported by Peru (27%), Bolivia (33%), and Brazil (37%). In 2000, however, Brazil alone reported 82% of all cases. These changes can be explained by the historical pattern of the virus's dissemination in the Region, as well as by improvements in disease surveillance in the last five years, mainly in Brazil, Peru, and Bolivia.

Yellow fever remains confined mainly to the forested areas of the Amazon, Orinoco, and Magdalena river basins, where it affects unvaccinated persons. The main forest vectors are mosquitoes of the genus *Haemagogus*, and several species of the genus



*Sabethes* are considered secondary vectors. *Haemagogus* are day-biting mosquitoes that are found predominantly in the forest canopy, although they can descend to the forest floor. Occasionally they bite humans outside or inside houses located near forests. Although monkeys are considered to be the main vertebrate hosts for the virus, it is thought that marsupials also may act as hosts in some areas. In the enzootic areas of South America, the virus is believed to move in waves through populations of susceptible monkeys, with periodic invasions of other areas such as central and southern Brazil and northern Paraguay and Argentina.

Interestingly, the virus may reappear in certain areas after long periods of dormancy as documented in Sierra Nevada, Colombia, in 1979, and in Rincón del Tigre, Bolivia, in 1981, when the disease re-emerged after a 20-year absence. In Brazil, cases were identified in 2000 in the São Francisco and Rio Grande river basins located west of Bahia and São Paulo states, respectively; the latter had not reported cases since the early 1950s. In 2001, yellow fever virus was isolated from *Aedes leucocaelanus* mosquitoes in the Uruguay River Basin, west of Rio Grande do Sul State, Brazil, on the border with Argentina.

Jungle yellow fever occurs sporadically. In some outbreaks, hundreds of cases have been reported, but serologic surveys suggest that thousands of persons may become infected in certain epidemics. Most outbreaks occur during the rainy season in the first half of the year, probably because of higher densities of *Haemagogus* mosquitoes at this time. It is conceivable, however, that outbreaks observed during the first months of the year may be associated with increased rural and forest labor practices carried out by susceptible populations in areas where yellow fever is enzootic. The seasonal distribution of cases differs from country to country, depending on latitude and other factors affecting the onset of the rainy season.

In the enzootic areas of the Americas, most cases occur among young adults between 15 and 40 years of age, and males are affected four times more often than females. This age and sex pattern is explained by occupational exposure to forest activities such as hunting, logging, or forest clearing for agriculture. In certain outbreaks, however, a significant number of children under 10 years old are affected, and the male/female ratio can be 1:1.3. These differences may be attributed to the fact that children and women in these areas play a significant role in agriculture or because they live along the forest fringe. Unvaccinated colonists who migrate from non-endemic to endemic areas constitute a high-risk group. Recently, a marked increase in the occurrence of the disease has been observed among unvaccinated ecotourists and sport-fishermen.

Until recently, surveillance of human yellow fever in the Americas relied almost exclusively on histopathological examinations of liver specimens from fatal cases. In recent years, however, an IgM capture immunoassay (MACELISA) for detection of yellow fever antibodies in the sera has been introduced in all

countries of the enzootic area, and is now being widely utilized. Because this method is readily available and easy to use, it has been used to detect most of the cases reported in the Region since 1998. The introduction of this test also has contributed to the increase in the number of suspected cases that are investigated and the detection of cases of less severe forms of the disease, which, in turn, resulted in lowering the case fatality rates due to yellow fever virus infection, as observed mainly in Peru, Bolivia, and Brazil.

Vaccination is the only way to prevent jungle yellow fever. The strategy to promote vaccination through fixed and mobile units, which has been used since the introduction of yellow fever vaccine in the 1940s, is being replaced. According to PAHO's recommendations, yellow fever vaccine is now being incorporated in routine childhood immunization schedules. Catch-up campaigns aimed at reaching more than 80% of the resident population in risk areas are recommended, and have already been implemented by some countries. By 2000, Bolivia, Brazil, French Guiana, Guyana, Trinidad and Tobago, and Venezuela had introduced, at least in the enzootic areas, routine immunization of children. In 1998, Guyana carried out a mass vaccination that reached 85% of the country's population. Between 1997 and 2000, Brazil vaccinated 54 million people and is planning to continue this activity to reach high vaccination coverage of all age groups in the enzootic areas. Vaccination of migrant laborers and nature lovers, who are the most vulnerable population groups, remains a logistical problem.

The rapid dissemination of *Aedes aegypti*, the urban vector of yellow fever, to many urban centers that lie within enzootic areas raises a serious concern about the urbanization of yellow fever. Outbreaks reported between 1997 and 2000 in Bolivia, Brazil, Ecuador, and Peru have occurred in areas close to or already infested by *A. aegypti*, which further raises the risk of re-urbanization of the disease in the Region. This problem is compounded by the presence of *Aedes albopictus*, which is gradually approaching Brazil's enzootic areas of yellow fever. This mosquito efficiently transmits the virus under laboratory conditions and, given its capacity to infest both urban and forested areas, could serve as a bridge between the selvatic and urban settings. Due to rapid transportation means, it is conceivable that a person in the incubation period of the disease could arrive in a distant urban center infested with *A. aegypti*, thus making it possible to infect the mosquito and initiate an urban epidemic. The fact that two foreign tourists were presumably infected in forests near Manaus, Brazil, in 1996, and died after returning to their countries, highlights the importance of vaccination for travelers who visit enzootic yellow fever areas. A similar situation was observed during the outbreak that occurred in early 2000, in Goiás State, in central Brazil, when tourists who were infected in the area developed the disease in the country's highly populated cities, such as Brasília, Rio de Janeiro, São Paulo, and Campinas, some of them infested by *Aedes aegypti*.

## Hepatitis B

Worldwide, an estimated 350 million people are chronic carriers of hepatitis B, which kills about 900,000 people a year (240). Approximately 45% of the world's population live in areas where chronic hepatitis B virus infection is highly endemic (e.g.,  $\geq 8\%$  of the population are HbsAg-positive), 43% live in areas of intermediate endemicity (2–7% HbsAg positivity), and 12% live in areas of low endemicity ( $< 2\%$  HbsAg positivity). In the Americas, 300,000 new cases of acute hepatitis B infection are estimated to occur annually (241). Overall, the Americas is considered to have low to intermediate endemicity of hepatitis B virus (HBV) infection, i.e., an HBsAg prevalence less than or equal to 5%. Studies from several countries in the Region, however, revealed considerable heterogeneity in the number of carriers, which varied by both geographical and ethnic distribution (242). The Amazon Basin is hyper-endemic for hepatitis B, with prevalence levels of 8.0% (243). Field studies in several Caribbean countries, including Belize, Haiti, and Saint Kitts, have reported HBsAg prevalences  $> 4\%$ .

The World Health Organization has recommended that all countries add hepatitis B vaccine to their national immunization schedules (244). Most countries in the Americas have introduced hepatitis B vaccine, either as a monovalent vaccine or as a combination vaccine (e.g., in the pentavalent form with *Haemophilus influenzae* b and DPT). Some countries, such as Argentina, Chile, and the Dominican Republic, are vaccinating high risk groups, such as health care workers. Countries with areas of medium to high endemicity, such as Brazil, Ecuador, and Peru, have developed special immunization efforts to vaccinate populations at high risk. Since 1996, Peru has targeted children living in areas of high and medium endemicity. In 1999, Peru extended vaccination against hepatitis B for all children living in low socioeconomic areas.

Vaccination coverage with three doses of hepatitis B vaccine has been steadily improving. However, compared to coverage for three doses of DTP, coverage for three doses of hepatitis B vaccine is lower than expected in some countries (Table 56). National immunization managers must evaluate this carefully, to determine the cause of lower than anticipated coverage levels.

Routine surveillance for hepatitis B has not been well implemented in most countries. However, surveillance for fever and icteric illness in Peru and Brazil includes hepatitis B. In Bolivia, sentinel hospital surveillance is being implemented to measure disease burden.

## New Vaccine Introduction

A major topic of debate over the past few years has been the sustainable introduction of new and/or combined vaccines in the routine immunization schedule. Attention has focused on introducing those vaccines that have already been available on the market for the past 15 years, including measles-mumps-rubella

(MMR) vaccine, hepatitis B vaccine, and newer vaccines such as *Haemophilus influenzae* type b (Hib) vaccine and combination vaccines. The availability and use of combination vaccines, such as DTP+Hib, DTP+HB, and DTP/HB+Hib, simplifies the administration of vaccine antigens against major childhood diseases. In addition, infants and children need to receive fewer injections and must make fewer visits to health centers, and it also increases compliance and coverage (245).

The rapid inclusion of a new vaccine against *Haemophilus influenzae* type b (Hib) by most of the Region's countries has once again shown the Americas in a leadership role in recognizing the importance of vaccines and their impact upon introduction in the regular immunization programs (246). A regional surveillance system developed to monitor bacterial pneumonia and meningitis is providing feedback on the impact that Hib vaccination is having on meningitis. In some countries, a sharp decrease of invasive Hib isolates has been observed (247, 248). Preliminary results from case-control studies in Brazil and Colombia indicate there has been an important reduction in the bacterial pneumonias (defined by X-ray) due to vaccination with Hib.

The availability of new ways of delivering multiple antigens, such as combined vaccines, has further facilitated the rapid incorporation of Hib and hepatitis B vaccines.

## Generating Information for the Introduction of New Vaccines

Important lessons for the incorporation of other new vaccines were learned when Hib was introduced in the Region. These lessons can be applied to the introduction of other, new vaccines that are either under development or that have recently been included in the immunization programs of industrialized countries. Regional and country-specific information on disease and disease burden that clearly shows the impact of vaccination on lives and costs saved is critical for evaluating the introduction of new vaccines.

PAHO has continued to support the countries as they establish a network of sentinel hospitals that are linked to the public health laboratories and epidemiological units of the ministries of health to monitor bacterial pneumonia and meningitis. This system began in 1993 in Argentina, Brazil, Chile, Colombia, Mexico, and Uruguay, and has gradually expanded to include Cuba, the Dominican Republic, and Peru (249–251). In 1998, at a meeting in Managua, Nicaragua, a surveillance system based on a network of sentinel hospitals was proposed for bacterial pneumonia and meningitis, specifically those due to *S. pneumoniae*, *H. influenzae*, and *N. meningitidis*. The system provides information on prevalent pneumococcal serotypes responsible for invasive diseases in children and their antimicrobial susceptibility patterns; the impact of vaccination on Hib diseases; and, in the near future, the status of meningococcal serogroups responsible for diseases in the Region. A regional quality control system validates the information being generated by the countries; it operates through three subregional centers in Brazil, Colombia, and Mexico and is connected to the National Centre for Streptococcus in Alberta,

Canada, and the Haemophilus Reference Unit for the Public Health Laboratory Service in the United Kingdom.

More recently, surveillance has been improved in order to establish a bridge with ongoing clinical trials of pneumococcal vaccines using standard diagnostic criteria. The system will use the X-ray interpretation as the confirmatory criterion for bacterial pneumonia. Parallel cost-effectiveness studies are being conducted that will generate comparative costs for different interventions. This critical information will be available in countries for decision-makers to act upon.

A similar approach is being followed for rotavirus vaccines and the same network of sentinel hospitals will be involved in monitoring rotavirus diseases, thereby strengthening hospitals' laboratory and diagnostic capabilities.

### Immunization Programs in the Americas Reach Out to other Age Groups

In recent years, and as a result of better knowledge of the epidemiological situation of diseases and the development of new strategies for the prevention of diseases such as the prevention of influenza in groups at high risk of death by this infection and its complications, national immunization programs of various countries have expanded their areas of work. Vaccination strategies have been developed aimed at other age groups, including adolescents and adults against measles and rubella, women of childbearing age against tetanus, health personnel against hepatitis B, and chronic patients and the elderly against influenza.

In 2001, vaccination campaigns have been carried out against influenza in Brazil and in Chile, where approximately 1.5 million people were vaccinated. Vaccination coverage in the target population groups that included persons over 65 years of age, chronic patients, and health staff, reached levels of 98.5%, 95.5%, and 93.1%, respectively. In 2001, Brazil carried out a vaccination campaign against influenza among persons older than 60 years, which reached 10.7 million people and attained a coverage level of 82.1%.

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TABLE 1. Resistance of isolates of species of *Salmonella* to certain antimicrobials,<sup>a</sup> selected Latin American countries, 1996–2000.

Country	Ampicillin						Chloramphenicol													
	1996		1997		1998		1999		2000		1996		1997		1998		1999		2000	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Argentina	333	34.0	415	35.0	678	49.0	634	45.0	469	27.0	333	4.0	415	5.0	678	4.0	634	6.0	469	4.0
Bolivia	c	c	c	c	c	c	396	45.4	602	47.1	c	c	c	c	c	c	396	7.8	602	9.9
Brazil	994	3.9	1,345	2.2	1,735	1.8	1,521	3.7	1,598	2.8	994	5.2	1,345	1.8	1,735	1.8	1,521	2.4	1,598	3.9
Caribbean <sup>b</sup>	c	c	c	c	117	13.0	143	13.0	179	13.4	c	c	c	c	117	10.0	143	5.0	179	12.3
Chile	c	c	c	c	c	c	c	c	504	5.6	c	c	c	c	c	c	c	c	504	4.4
Colombia	c	c	92	36.0	105	26.0	127	19.7	152	16.4	c	c	92	4.3	105	3.0	127	3.1	152	1.3
Costa Rica	c	c	c	c	c	c	c	c	87	5.3	c	c	c	c	c	c	c	c	97	d
Mexico	163	29.4	501	6.1	1,634	7.8	1,722	6.0	1,722	6.0	163	25.0	501	4.5	1,634	1.6	1,722	6.0	1,722	6.0
Nicaragua	c	c	c	c	c	c	c	c	97	2.1	c	c	c	c	c	c	c	c	97	d
Paraguay	c	c	c	c	130	12.3	148	11.0	134	7.0	c	c	c	c	130	3.1	148	3.0	134	1.0
Peru	30	3.3	48	d	88	1.2	97	4.1	125	2.4	30	d	48	d	88	1.2	97	d	125	d
Venezuela	80	d	163	4.3	182	5.5	124	3.2	136	5.1	80	d	163	4.3	182	1.6	124	0.8	136	0.7

Country	Trimethoprim-sulfamethoxazole									
	1996		1997		1998		1999		2000	
	n	%	n	%	n	%	n	%	n	%
Argentina	333	4.0	415	5.0	678	4.0	634	6.0	469	4.0
Bolivia	c	c	c	c	c	c	396	7.8	602	9.9
Brazil	994	5.2	1,345	1.8	1,735	1.8	1,521	2.4	1,598	3.9
Caribbean <sup>b</sup>	c	c	c	c	117	10.0	143	5.0	179	12.3
Chile	c	c	c	c	c	c	c	c	504	4.4
Colombia	c	c	92	4.3	105	3.0	127	3.1	152	1.3
Costa Rica	c	c	c	c	c	c	c	c	87	d
Mexico	163	25.0	501	4.5	1,634	1.6	1,722	6.0	1,722	6.0
Nicaragua	c	c	c	c	c	c	c	c	97	d
Paraguay	c	c	c	c	130	3.1	148	3.0	134	1.0
Peru	30	d	48	d	88	1.2	97	d	125	d
Venezuela	80	d	163	4.3	182	1.6	124	0.8	136	0.7

<sup>a</sup>In Brazil, 3.2% (n=994), 1.5% (n=1,345), and 0.6% (n=1,375) resistance to ciprofloxacin was found in 1996, 1997, and 1998, respectively.<sup>b</sup>Barbados, Jamaica, Saint Lucia, Trinidad and Tobago.<sup>c</sup>In that year, there was no surveillance of resistance to antimicrobials.<sup>d</sup>No resistance to the antibiotic.

TABLE 2. Resistance of isolates of species of *Shigella* to certain antimicrobials,<sup>a</sup> selected Latin American countries, 1996–2000.

Country	Chloramphenicol																			
	Ampicillin						Trimethoprim-sulfamethoxazole													
	1996		1997		1998		1999		2000		2000									
n	%	n	%	n	%	n	%	n	%	n	%									
Argentina	1,047	74.0	1,081	77.0	1,443	83.0	2,271	76.0	1,956	80.0	1,047	48.0	1,081	57.0	1,443	58.0	2,271	52.0	1,956	58.0
Brazil	42	88.8	48	61.2	71	56.3	48	45.6	37	63.3	42	77.7	48	67.7	71	56.3	48	21.7	37	48.6
Caribbean <sup>b</sup>	c	c	c	c	56	30.0	68	38.0	54	27.8	c	c	c	c	56	23.0	68	32.0	54	18.5
Chile	c	c	c	c	c	c	c	c	270	85.9	c	c	c	c	c	c	c	c	270	71.5
Colombia	c	c	55	56.0	71	73.0	67	65.2	172	58.1	c	c	55	40.0	71	62.0	67	53.7	172	32.0
Costa Rica	47	56.0	87	50.0	100	63.0	109	53.0	c	c	47	25.0	87	44.0	100	19.0	109	8.0	c	c
Cuba	c	c	c	c	c	c	c	c	100	85.0	c	c	c	c	c	c	c	c	100	50.0
Ecuador	c	c	c	c	c	c	c	c	141	69.7	c	c	c	c	c	c	c	c	141	65.7
Mexico	c	c	35	80.0	211	77.7	123	78.0	123	78.0	c	c	35	62.8	211	25.1	123	39.0	123	39.0
Nicaragua	c	c	c	c	c	c	c	c	41	87.8	c	c	c	c	c	c	c	c	41	41.5
Paraguay	c	c	c	c	c	c	c	c	366	49.0	c	c	c	c	c	c	c	c	366	19.0
Peru	26	88.5	56	32.1	109	85.3	207	58.7	244	73.4	26	15.4	56	71.4	109	55.9	207	76.0	244	66.8
Venezuela	c	c	383	49.1	394	50.5	519	55.9	c	c	c	c	383	26.8	394	28.2	519	33.1	c	c

<sup>a</sup>In Costa Rica, 2.0% (n=47) resistance to ciprofloxacin was found in 1996 and 1.0% (n=109) resistance to ciprofloxacin was found in 1999, and in Ecuador, 1.9% (n=141) resistance to ciprofloxacin was found in 2000.

<sup>b</sup>Barbados, Jamaica, Saint Lucia, Trinidad and Tobago.

<sup>c</sup>In that year, there was no surveillance of resistance to antimicrobials.

TABLE 3. Cholera cases reported in the Americas, 1991–2000.

Country	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Total, 1991–2000
Region of the Americas	396,533	358,169	210,965	127,185	75,685	21,025	17,760	57,104	8,137	2,667	1,275,230
Argentina	—	553	2,080	889	188	474	637	12	1	1	4,835
Belize	—	159	135	6	19	26	2	28	12	—	387
Bolivia	206	22,260	10,134	2,710	3,136	2,847	1,632	466	—	—	43,391
Brazil	2,103	37,572	60,340	51,324	4,954	1,017	2,881	2,571	3,233	715	166,710
Canada	...	...	...	...	...	...	—	—	—	5 <sup>a</sup>	5
Chile	41	73	32	1	—	1	4	24	—	—	176
Colombia	16,800	13,287	609	996	1,922	4,428	1,508	442	42	—	40,034
Costa Rica	—	12	14	37	24	19	1 <sup>b</sup>	—	—	—	107
Ecuador	46,284	31,870	6,883	1,785	2,160	1,059	65	3,724	90	27	93,947
El Salvador	947	8,106	6,573	11,739	2,923	182	—	8	134	631 <sup>a</sup>	31,243
French Guiana	1	16	2	...	...	...	...	—	—	—	19
Guatemala	3,664	15,861	30,821	16,779	7,970	1,568	1,263	5,970	2,077	178	86,151
Guyana	—	556	66	—	—	—	...	—	—	—	622
Honduras	17	407	4,013	5,049	4,717	708	90	306	56	15	15,378
Mexico	2,690	8,162	10,712	4,059	16,430	1,088	2,356	71	9	5	45,582
Nicaragua	1	3,067	6,631	7,881	8,825	2,813	1,283	1,437	545	12	32,495
Panama	1,178	2,416	42	9	—	—	—	—	—	—	3,645
Paraguay	—	—	3	—	—	4	—	—	—	—	7
Peru	322,562	210,836	71,448	23,887	22,397	4,518	3,483	41,717	1,546	934	703,328
Suriname	—	12	—	—	—	—	—	—	—	—	12
United States	26	102	18	34	20	5	4 <sup>c</sup>	15 <sup>d</sup>	6 <sup>c</sup>	4 <sup>b</sup>	234
Venezuela	13	2,842	409	—	—	268	2,551	313	386	140	6,922

<sup>a</sup>Two imported cases.<sup>b</sup>One imported case.<sup>c</sup>Three imported cases.<sup>d</sup>Eight imported cases.

Source: Ministries of health of the countries. Only countries that reported cases are included.

TABLE 4. Characteristics of the cholera epidemic and selected indicators for countries affected by the epidemic in the Region of the Americas.

Country	Year of highest incidence	Incidence rate in the indicated year	Cases reported in the indicated year <sup>a</sup>	1998 per capita GNP (US\$, current value) <sup>b</sup>	Population below the poverty line (%) <sup>b</sup>	Population with access to drinking water 1998 (%) <sup>b</sup>	Life expectancy at birth 1995–2000 (years) <sup>b</sup>	Infant mortality rate per 1,000 live births, around 1998 <sup>b</sup>
Peru	1991	1,495.5	322,562	2,440	49.0	75.4	69.1	43.0
Ecuador	1991	450.9	46,284	1,520	35.0	70.3	70.0	44.8
Guatemala	1993	325.7	30,821	1,640	58.0	80.3	64.8	49.0
Bolivia	1992	315.1	22,260	1,010	...	73.5	62.4	68.0
El Salvador	1994	211.5	11,739	1,850	48.3	59.3	69.7	35.0
Nicaragua	1995	199.4	8,825	370	50.3	66.5	68.6	45.2
Panama	1992	95.2	2,416	2,990	30.2	86.8	74.0	11.2
Honduras	1994	91.9	5,049	740	50.0	80.9	70.0	36.0
Belize	1992	78.7	159	2,660	35.0	76.0	75.1	28.5
Guyana	1992	68.3	556	780	43.0	92.9	65.3	22.2
Colombia	1991	48.0	16,800	2,470	17.7	76.4	71.2	11.2
Brazil	1993	38.9	60,340	4,630	17.4	93.6	67.3	37.3
Mexico	1995	18.0	16,430	3,840	10.1	88.6	72.6	15.7
Venezuela	1992	13.6	2,842	3,530	31.3	86.3	72.9	21.5
Argentina	1993	6.1	2,080	8,030	25.5	78.6	73.4	19.1
Costa Rica	1994	1.1	37	2,770	11.0	97.6	76.4	11.8
Chile	1992	0.5	73	4,990	20.5	94.2	75.3	10.4

<sup>a</sup>Source: PAHO. Special Program for Health Analysis. *Basic Indicators 2000*.<sup>b</sup>Source: Ministries of health of the countries.TABLE 5. Reported cases of hantavirus pulmonary syndrome in the Region of the Americas, by country, 1993–2001.<sup>a</sup>

Country	Total, 1993–2001	1993	1994	1995	1996	1997	1998	1999	2000	2001
Total for the Region	1,106	51	40	44	36	114	155	183	216	267
Argentina	310	—	—	—	—	47	61	76	52	74
Bolivia	10	—	—	—	—	1	1	1	2	5
Brazil	167	3	—	1	3	—	11	26	54	69
Canada	30	—	8	3	3	7	6	2	1	—
Chile	204	—	—	1	3	30	35	26	31	78
United States	255	48	32	24	22	23	33	33	34	6
Panama	28	—	—	—	—	—	—	3	21	5
Paraguay	74	—	—	15	5	4	5	4	15	26
Uruguay	27	—	—	—	—	2	3	12	6	4

<sup>a</sup>Up to December 2001.

TABLE 6. Reported cases of tuberculosis and positive smears (alcohol-acid-fast bacilli) in 1998 and 1999, and percentage difference, by country, Region of the Americas.

Country	Total cases of tuberculosis			Positive smears		
	1998	1999	Difference (%)	1998	1999	Difference (%)
Argentina	12,276	11,871	-3.2	5,186	5,762	11.1
Bolivia	10,132	9,272	-8.4	6,750	6,506	-3.6
Brazil	84,194	78,628	-6.6	38,809	41,434	6.7
Chile	3,668	3,429	-6.5	1,576	1,679	6.5
Colombia	9,155	10,999	20.0	6,969	8,329	19.5
Costa Rica	694	745	7.3	562	567	0.9
Cuba	1,304	1,111	-14.8	744	720	-3.2
Dominican Republic	4,263	5,320	24.7	2,164	2,936	35.6
Ecuador	9,184	7,027	-23.4	6,455	5,149	-20.2
El Salvador	1,700	1,623	-4.5	1,071	1,023	-4.4
Guatemala	3,059	2,820	-7.8	2,255	2,264	3.9
Haiti	9,770	9,125	-6.6	6,442	6,750	4.7
Honduras	4,916	4,264	-13.2	2,311	2,367	2.4
Jamaica	121	115	-4.9	80	92	15.0
Mexico	21,514	19,802	-7.9	12,622	13,452	6.5
Nicaragua	2,604	2,558	-1.7	1,648	1,564	-5.0
Panama	1,479	1,365	-7.7	1,393	1,178	-15.4
Paraguay	1,858	2,115	13.8	850	963	13.2
Peru	43,723	41,730	-4.5	27,707	24,511	-11.5
Suriname	74	93	25.6	42	37	-11.9
Trinidad and Tobago	192	152	-20.8	98	86	-8.1
United States	18,361	17,531	-4.5	6,630	6,252	-5.7
Uruguay	668	627	-6.1	374	384	2.6
Venezuela	6,273	5,760	-8.1	3,450	3,670	6.3
Total	251,775	238,082	-5.4	136,436	137,675	9.0

TABLE 7. Groups of countries according to estimated incidence rate of tuberculosis, Region of the Americas, 2000.

More than 85 per 100,000 population	Between 50 and 84 per 100,000 population	Between 25 and 49 per 100,000 population	Fewer than 24 per 100,000 population
Bolivia	Argentina	Belize	Canada
Dominican Republic	Bahamas	Mexico	Chile
Ecuador	Brazil	Uruguay	Costa Rica
Haiti	Colombia	Venezuela	Cuba
Honduras	El Salvador		English-speaking Caribbean <sup>a</sup>
Peru	Guatemala		Puerto Rico
	Guyana		United States
	Nicaragua		
	Panama		
	Paraguay		
	Suriname		

<sup>a</sup>All the countries of the English-speaking Caribbean are in the group with rates of less than 24 per 100,000 population.

TABLE 8. Primary resistance and resistance to multiple anti-tuberculosis drugs in countries with studies, 1994–2000.

Country	Isoniazid (%)	Rifampicin (%)	Streptomycin (%)	Ethambutol (%)	PR <sup>a</sup> (%)	MDR <sup>b</sup> (%)
Argentina <sup>c</sup>	7.8	5.1	7.6	3.1	12.5	4.6
Bolivia <sup>c</sup>	10.2	6.0	9.8	5.0	23.9	1.2
Brazil <sup>c</sup>	5.9	1.1	3.6	0.1	8.6	0.9
Colombia <sup>d</sup>	3.4	0.1	5.6	0.3	15.6	1.5
Canada <sup>d</sup>	7.9	1.1	5.1	1.3	10.5	1.1
Chile <sup>e</sup>	3.8	0.7	7.4	0.0	9.0	0.4
Cuba <sup>d</sup>	0.7	0.0	3.9	0.4	4.6	0.0
Dominican Republic <sup>c</sup>	19.8	16.2	21.1	3.6	40.6	6.6
Nicaragua <sup>d</sup>	9.4	1.8	8.7	0.7	15.6	1.2
Peru <sup>d</sup>	9.0	4.0	11.7	2.6	18.0	3.0
Puerto Rico <sup>d</sup>	6.9	3.1	5.6	3.1	11.3	2.5
United States <sup>d</sup>	8.0	1.7	5.9	1.6	12.0	1.2
Uruguay <sup>e</sup>	0.4	0.4	0.8	0.0	1.7	0.0
Venezuela <sup>d</sup>	1.8	0.5	2.7	0.5	7.5	0.5

<sup>a</sup>Primary resistance to one or more drugs (does not include the combination of Rifampicin + Isoniazid).

<sup>b</sup>Resistance to Isoniazid and Rifampicin.

<sup>c</sup>*Anti-Tuberculosis Drug Resistance in the World*. (The WHO/IUATLD Global Project on Anti-tuberculosis Drug Resistance Surveillance). Geneva, 1997. (WHO/TB/97.229)

<sup>d</sup>*Anti-Tuberculosis Drug Resistance in the World. Report No. 2. Prevalence and Trends*. (The WHO/IUATLD Global Project on Anti-tuberculosis Drug Resistance Surveillance). Geneva. (WHO/CDS/TB/2000.278)

<sup>e</sup>National tuberculosis control programs.

TABLE 9. Application and coverage of the DOTS strategy in the countries of the Region, by incidence of tuberculosis, 2000.

Level of incidence of tuberculosis	DOTS coverage >90%	DOTS to be strengthened	DOTS in expansion	DOTS to be implemented
High incidence	Peru	Bolivia	Dominican Republic Ecuador Haiti Honduras	Guyana Suriname
Average incidence	Chile Nicaragua Venezuela Belize	Guatemala	Argentina Brazil Colombia El Salvador Mexico Panama Paraguay	
Low incidence	Cuba Puerto Rico United States Uruguay		Costa Rica	Canada English-speaking Caribbean



TABLE 10. Leprosy situation in Latin America, by country, 1999.

Country	Recorded cases	Prevalence rate per 10,000 population	New cases	Detection rate per 10,000 population	MDT coverage (%)
Argentina	2,427	0.66	544	0.15	100.0
Bolivia	268	0.33	29	0.04	95.9
Brazil <sup>a</sup>	60,000	3.57	33,394	1.99	...
Colombia	1,974	0.47	600	0.14	100.0
Costa Rica	157	0.40	12	0.03	47.1
Cuba	597	0.53	333	0.30	99.8
Dominican Republic	390	0.47	294	0.35	97.7
Ecuador	284	0.23	144	0.12	100.0
El Salvador	54	0.09	6	0.01	...
Guatemala	50	0.05	5	0.01	100.0
Haiti <sup>b</sup>	2,095	2.59	38	0.05	...
Honduras	7	0.01	...	...	...
Mexico	1,850	0.19	282	0.03	81.9
Nicaragua	179	0.36	139	0.28	100.0
Panama	41	0.15	8	0.03	...
Paraguay	654	1.22	451	0.84	100.0
Peru	180	0.07	63	0.02	100.0
Uruguay	15	0.05	11	0.03	100.0
Venezuela	1,383	0.58	773	0.33	99.7
Latin America	72,605	1.45	37,126	0.74	...

MDT: multi-drug therapy.

<sup>a</sup>Estimated data.

<sup>b</sup>Data subject to revision.

Sources: 1) Pan American Health Organization, Leprosy Information System; 2) World Health Organization; 3) Population: Pan American Health Organization. *Health Situation in the Americas. Basic indicators 1999.*

TABLE 11. Reported cases of dengue in the Americas, by country, 1996–2000.

Country	Year				
	1996	1997	1998	1999	2000
Latin America					
Argentina	—	—	822	3	1,700
Bolivia	52	539	49	43	73
Brazil	175,818	254,109	535,388	204,201	231,471
Colombia	33,155	24,290	63,182	20,336	22,775
Costa Rica	2,307	14,267	2,628	6,040	4,907
Cuba	—	3,012	—	—	138
Dominican Republic	89	608	3,049	1,088	3,462
Ecuador	5,189	3,871	4,606	2,901	22,937
El Salvador	790	423	1,688	626	3,248
Guatemala	3,679	5,385	4,655	3,617	9,006
Haiti	...	...	...	...	...
Honduras	5,047	11,873	22,218	17,835	13,642
Mexico	36,538	53,541	23,639	14,875	21,715
Nicaragua	2,792	3,126	13,592	11,150	7,317
Panama	811	2,628	2,717	2,783	317
Paraguay	—	—	—	1,164	24,282
Peru	6,395	1,357	988	554	5,486
Puerto Rico	4,655	6,955	17,241	4,993	2,433
Venezuela	9,180	33,654	37,586	26,716	21,101
English and French Caribbean					
Anguilla	1	—	—	12	3
Antigua and Barbuda	12	7	4	2	8
Aruba	10	—	—	130	76
Bahamas	—	—	336	—	—
Barbados	130	199	852	696	744
Belize	—	141	8	3	4
Bermuda	—	—	—	3	—
British Virgin Islands	—	—	1	—	3
Cayman Islands	—	—	2	1	—
Curaçao	—	—	7	5	10
Dominica	3	—	1	1	15
French Guiana	364	851	534	88	186
Grenada	6	22	4	85	27
Guadeloupe	186	—	—	41	60
Guyana	—	—	42	—	19
Jamaica	46	15	1,551	24	25
Martinique	430	235	44	268	171
Montserrat	3	—	—	—	9
Saint Kitts and Nevis	6	—	—	1	5
Saint Lucia	65	12	1	3	—
Saint Vincent and the Grenadines	190	3	88	8	5
Suriname	677	90	1,151	695	1,073
Trinidad and Tobago	3,983	784	3,120	1,265	2,066
Turks and Caicos Islands	—	—	—	—	—
Total	292,609	421,997	741,794	322,256	400,519

...No data available.

TABLE 12. Reported cases of dengue hemorrhagic fever in the Americas, by country, 1996–2000.

Country	Year				
	1996	1997	1998	1999	2000
Latin America					
Argentina	—	—	—	—	—
Bolivia	—	—	—	—	—
Brazil	69	35	105	70	59
Colombia	1,757	3,950	5,171	1,093	1,819
Costa Rica	—	8	—	117	4
Cuba	—	205	—	—	—
Dominican Republic	17	96	176	29	58
Ecuador	—	—	—	—	3
El Salvador	1	—	2	70	411
Guatemala	19	6	2	2	42
Haiti	...	...	...	...	...
Honduras	—	12	18	69	314
Mexico	1,456	980	372	220	50
Nicaragua	49	68	432	749	636
Panama	—	—	1	1	3
Paraguay	—	—	—	—	—
Peru	—	—	—	—	—
Puerto Rico	24	62	173	34	24
Venezuela	1,680	6,300	5,723	2,688	2,186
English and French Caribbean					
Anguilla	—	—	—	—	—
Antigua and Barbuda	—	—	—	—	—
Aruba	—	—	—	—	—
Bahamas	—	—	—	—	—
Barbados	—	—	—	8	—
Belize	—	—	1	—	—
Bermuda	—	—	—	—	—
British Virgin Islands	—	—	—	—	—
Cayman Islands	—	—	—	—	—
Curaçao	—	—	—	1	—
Dominica	—	—	2	—	—
French Guiana	6	6	1	—	4
Grenada	—	—	—	—	—
Guadeloupe	—	—	—	—	1
Guyana	—	—	—	—	—
Jamaica	—	—	42	—	—
Martinique	14	15	—	—	—
Montserrat	—	—	—	—	—
Saint Kitts and Nevis	—	—	—	—	—
Saint Lucia	—	1	1	—	—
Saint Vincent and the Grenadines	—	—	—	—	—
Suriname	—	—	11	—	4
Trinidad and Tobago	—	39	136	65	49
Turks and Caicos Islands	—	—	—	—	—
Total	5,092	11,783	12,369	5,216	5,667

... No data available.

TABLE 13. Epidemiological situation in 21 countries with active malaria programs, year 2000.

Countries by geographic subregion	Slides				In low-, moderate-, and high-risk areas					
	In moderate- and high-risk areas		In low-, moderate-, and high-risk areas		Species of parasite		Species of parasite			
	Population (thousands)	Examined	Positive	API	Cases caused by P. falciparum and associated cases	AFI	Cases caused by P. vivax	AVI	Cases caused by P. malariae	Mortality (preliminary data)
Mexico	42,778	1,347,966	7,332	0.17	131	0.00	7,259	0.17	—	—
Central America										
Belize	153	18,559	1,486	9.71	20	0.13	1,466	9.58	—	...
Costa Rica	518	33,366	1,534	2.96	12	0.02	1,867	3.60	—	—
El Salvador	2,257	110,975	670	0.30	...	—	...	—	...	...
Guatemala	2,161	200,577	47,308	21.89	1,474	0.68	50,171	23.22	36	...
Honduras	4,502	160,092	34,736	7.72	1,467	0.33	36,676	8.15	—	...
Nicaragua	2,310	299,164	20,381	8.82	1,369	0.59	22,645	9.80	—	4
Panama	2,430	149,702	1,036	0.43	45	0.02	991	0.41	—	—
Latin Caribbean										
Dominican Republic	95	73,896	536	5.64	693	7.29	4	0.04	—	6
Haiti	...	...	...	...	...	...	...	...	...	...
Non-Latin Caribbean										
French Guiana	18	35,450	3,416	189.78	3,051	169.50	657	36.50	—	—
Guyana	104	...	24,028	231.04	12,324	118.50	11,694	112.44	—	...
Suriname	28	...	12,321	440.04	10,648	380.29	1,673	59.75	811	10
Brazil	8,856	2,331,282	586,990	66.28	131,616	14.86	478,212	54.00	932	192
Andean Area										
Bolivia	3,570	143,990	31,468	8.81	2,446	0.69	28,932	8.10	—	4
Colombia	4,922	502,204	105,516	21.44	37,563	7.63	69,612	14.14	—	41
Ecuador	3,671	...	86,467	23.55	48,974	13.34	55,624	15.15	—	...
Peru	4,069	1,401,394	67,539	16.60	20,618	5.07	47,690	11.72	—	20
Venezuela	730	195,898	26,049	35.68	5,491	7.52	24,829	34.01	1	24
Southern Cone										
Argentina	947	4,720	393	0.41	1	0.00	439	0.46	—	—
Paraguay	2,131	92,707	6,826	3.20	—	0.00	6,853	3.22	—	—
Total	86,250	7,101,942	1,066,032	12.36	277,943	3.22	847,294	9.82	1,780	301

API: annual parasite index.

AFI: annual falciparum index.

AVI: annual vivax index: positive slides per 1,000 inhabitants.

TABLE 14. Annual malaria morbidity in the Region of the Americas, 1985–2000.

Year	Population		Slides			Incidence rate <sup>a</sup>	
	Total	In malarious areas	Examined	Positive	PSI	Total	In malarious areas
1985	665,777	259,838	9,485,203	910,917	9.6	136.8	350.6
1986	662,983	263,371	10,070,388	950,570	9.4	143.4	360.9
1987	672,941	268,217	9,764,285	1,018,864	10.4	151.4	379.9
1988	703,370	280,758	10,092,472	1,120,040	11.1	159.2	398.9
1989	715,994	285,394	9,638,847	1,113,764	11.6	155.6	390.3
1990	698,741	278,600	9,459,912	1,045,808	11.1	149.7	375.4
1991	721,256	281,124	9,732,930	1,230,671	12.6	170.6	437.8
1992	725,564	289,948	9,373,323	1,187,316	12.7	163.6	409.5
1993	739,561	289,584	9,633,125	983,536	10.2	133.0	339.6
1994	763,305	231,323	8,261,090	1,114,147	13.5	146.0	481.6
1995	774,712	248,978	9,022,226	1,302,791	14.4	168.2	523.3
1996	786,055	298,128	8,601,272	1,139,776	13.3	145.0	382.3
1997	793,582	306,521	9,037,999	1,075,445	11.9	135.5	350.9
1998	803,546	308,323	9,184,633	1,289,741	14.0	160.5	418.3
1999	818,273	298,453	10,174,427	1,207,479	11.9	147.6	404.6
2000	796,231	282,639	10,210,730	1,140,329	11.2	143.2	403.5

<sup>a</sup>Per 100,000 population.

PSI: Positive slide index—percentage of positive slides among those examined.

TABLE 15. Comparison of actions for the passive and active detection of malaria cases, by country, 2000.

Country/Subregion	Passive detection of cases						Active detection of cases					
	Health centers and hospitals			Volunteer collaborators			Epidemiological investigation and follow-up of cases			Epidemiological investigation and follow-up of cases		
	Examined	Positive	PR	Examined	Positive	PR	Examined	Positive	PR	Examined	Positive	PR
Mexico	927,885	2,368	0.26	420,081	1,172	0.28	655,603	1,460	0.22	655,603	1,460	0.22
Central America <sup>a</sup>												
Costa Rica	4,118	605	14.69	1,621	159	9.81	55,522	1,115	2.01	55,522	1,115	2.01
El Salvador	63,250	410	0.65	7,478	802	10.72	4,525	17	0.38	4,525	17	0.38
Guatemala	52,312	11,695	22.36	141,054	32,487	23.03	29,181	4,286	14.69	29,181	4,286	14.69
Honduras	...	...	...	175,577	35,122	20.00	...	...	...	...	...	...
Nicaragua	297,304	13,648	4.59	199,969	10,038	5.02	12,092	328	2.71	12,092	328	2.71
Panama	19,643	265	1.35	293	31	10.58	122,083	657	0.54	122,083	657	0.54
Latin Caribbean <sup>a</sup>												
Dominican Republic	63,382	361	0.57	18,040	100	0.55	173,300	383	0.22	173,300	383	0.22
Non-Latin Caribbean <sup>a</sup>												
Suriname	64,941	12,995	20.01	...	...	...	1,502	137	9.12	1,502	137	9.12
Andean Area <sup>a</sup>												
Bolivia	81,958	20,512	25.03	23,100	5,482	23.73	38,932	5,474	14.06	38,932	5,474	14.06
Ecuador	521,250	100,581	19.30	23,578	4,017	17.04	...	...	...	...	...	...
Peru	1,398,255	69,726	4.99	...	...	...	...	...	...	...	...	...
Venezuela	127,819	21,907	17.14	...	...	...	156,953	8,414	5.36	156,953	8,414	5.36
Southern Cone												
Argentina	1,728	199	11.52	154	58	37.66	6,110	183	3.00	6,110	183	3.00
Paraguay	10,850	1,369	12.62	47,214	3,941	8.35	38,962	1,543	3.96	38,962	1,543	3.96
Total	3,634,695	256,641	7.06	1,058,159	93,409	8.83	1,294,765	23,997	1.85	1,294,765	23,997	1.85

PR: Positivity rate.

<sup>a</sup>Information not available for Belize, Brazil, Colombia, French Guiana, and Guyana.

TABLE 16. National budget and extra-budgetary contributions to malaria control programs in the Americas, by country, 1997–2000.

Country	1997			1998			1999			2000		
	National budget for malaria (US\$)	Contributions, loans, other	National budget for malaria (US\$)	Contributions, loans, other	National budget for malaria (US\$)	Contributions, loans, other	National budget for malaria (US\$)	Contributions, loans, other	National budget for malaria (US\$)	Contributions, loans, other		
Argentina	...	...	...	...	...	...	...	...	...	...	...	
Bolivia	57,471	...	660,189	46,898	...	133,431	...	...	845,764	...	944,187	
Brazil	28,488,629	9,480,618	30,188,891	...	30,307,650	...	...	...	44,766,876	...	2,477,870	
Colombia	8,307,692	...	11,661,290	...	9,930,000	...	...	...	9,950,000	...	...	
Costa Rica	109,999	36,373	3,597,000	389	4,750,000	...	...	...	3,380,000	...	...	
Dominican Republic	1,010,976	107,809	1,430,963	208,548	1,495,527	...	...	...	1,410,013	...	157,238	
Ecuador	2,516,464	274,859	573,136	...	1,453,583	...	...	...	...	...	...	
El Salvador	4,031,982	...	4,357,798	...	3,000,000	...	...	...	...	...	...	
Guatemala <sup>a</sup>	3,957,307	1,139	1,359,775	52,857	730,232	...	...	...	702,703	...	...	
Haiti	...	...	...	41,462	...	...	...	...	...	...	...	
Honduras	1,936,481	...	1,859,022	...	149,558	...	...	...	2,597,868	...	3,605,010	
Mexico	19,403,038	...	14,117,650	...	15,349,724	...	...	...	17,652,182	...	...	
Nicaragua	...	...	...	...	4,101,657	...	...	...	333,333	...	...	
Panama	5,505,232	...	5,171,984	...	5,161,509	...	...	...	5,066,318	...	...	
Paraguay	8,270,231	...	7,501,159	...	4,338,457	...	...	...	1,932,103	...	...	
Peru	3,308,104	...	2,927,417	...	4,996,471	...	...	...	1,900,915	...	58,572	
Venezuela	...	...	1,632,134	...	761,868	...	...	...	5,411,675	...	960,000	
Subtotal	86,903,606	9,900,798	87,038,408	350,154	86,659,667	...	...	...	95,949,750	...	8,202,877	
Guyana	551,724	20,000	640,093	...	772,000	...	...	...	1,000,000	...	...	
Belize	461,600	58,000	440,174	...	...	...	...	...	...	...	...	
French Guiana	...	...	...	...	...	...	...	...	...	...	...	
Suriname	...	...	106,236	...	...	...	...	...	65,778	...	...	
Subtotal	1,013,324	78,000	1,186,503	...	772,000	...	...	...	1,065,778	...	...	
All countries	87,916,930	9,978,798	88,224,911	350,154	87,431,667	...	...	...	97,015,528	...	8,202,877	
All sources	97,895,728	88,575,065	91,169,246	...	105,218,405	...	...	...	...	...	...	

<sup>a</sup>Guatemala, 1999: Budget information pertains to only 5 of the 25 health areas.

TABLE 17. Screening for *T. cruzi* in blood banks; selected countries in Latin America, 1998–2000.

Country	1998			1999			2000		
	No. donations	Screened (%)	Prevalence (%)	No. donations	Screened (%)	Prevalence (%)	No. donations	Screened (%)	Prevalence (%)
Argentina	a	a	a	810,259	100	5.5	804,018	100	4.4
Bolivia	a	a	a	20,628	23.18	45.5			
Brazil	a	a	a	1,663,857	100	0.8	1,827,937	100	0.6
Chile	a	a	b	218,371	87	0	218,371	91	0.6
Colombia	425,359	99.7	1.1	353,991	99.89	1	398,000	99.8	0.7
Costa Rica	57,239	7	1.4	93,518	7	b	59,218	5.8	1.9
Cuba	598,974	b	b	578,239	b		574,320	...	...
Dominican Republic	52,087	b	0.8	56,649	18.73	0	60,885	...	...
Ecuador	110,619	72	0.1	103,448	90.35	0.1	82,237	91.5	0.1
El Salvador	67,147	100	1.9	67,224	100	2.5	76,096	100	2.5
Guatemala	38,789	100	0.2	31,939	100	0.8	25,482	97.9	0.8
Honduras	a	a	a	40,933	99.36	2.0	38,328	99.9	1.5
Mexico	a	a	a	1,092,741	13.18	0.4	1,234,414	14.7	0.6
Nicaragua	43,713	93	0.4	45,000	100	0.3	50,581	74.2	0.0
Panama	42,109	5.6	0.3	43,921	17	1.4	44,496	29	0.6
Paraguay	41,443	99.4	4.1	45,597	99.8	4.7	45,597	99.7	4.7
Peru	241,790	70	0.2	311,550	99.8	0.1	332,800	100	0.2
Uruguay	116,626	100	0.4	116,626	100	0.4	116,548	100	0.6
Venezuela	262,295	100	0.8	302,100	100	0.6	323,860	100	0.5

Source: Ministries of health.

<sup>a</sup>Information unavailable at PAHO.<sup>b</sup>No screening conducted.

... No data available.



TABLE 18. Estimates of population at risk of lymphatic filariasis and infected individuals, by country, 2001.

Country	Population	Population at risk	Population at risk (%)	Estimated number of infected persons
Brazil	172,559,000	3,000,000	1.7	49,000
Dominican Republic	8,507,000	1,500,000	17.6	100,000
Haiti	8,270,000	1,000,000	12.1	200,000
Guyana	763,000	650,000	85.1	59,000
Suriname	419,000	400,000	95.5	2,000
Trinidad and Tobago	1,300,000	40,000	3.1	8,000
Costa Rica	4,112,000	41,000	0.9	3,700
Total	195,930,000	6,631,000	3.4	421,700

Sources: Pan American Health Organization. Lymphatic Filariasis Elimination in the Americas. Report. I. Regional Program Managers Meeting, Dominican Republic, 9–11 August, 2000. Washington, DC: PAHO; 2000. Pan American Health Organization. Health Situation in the Americas. Basic Indicators 2001. Special Program for Health Analysis; Washington, DC: PAHO; 2001.

TABLE 19. Estimates of population and communities at risk of onchocerciasis and endemic foci in the Americas, by country, 2001.

Country	Population at risk	Communities at risk	High-risk communities <sup>a</sup>	Endemic foci
Mexico	210,155	670	39	• Oaxaca • Chiapas
Guatemala	200,000	552	45	• Huehuetenango • Sololá/Suchitepéquez/Chimaltenango • Escuintla • Santa Rosa
Colombia	1,270	1	0	• López de Micay
Ecuador	24,151	119	42	• Esmeraldas
Venezuela	99,366	609	80	• North central: Aragua, Carabobo, Cojedes, Guárico, Miranda and Yaracuy • Northeast: Anzoátegui, Monagas, and Sucre
Brazil	9,067	18	5	• South: Amazonas • Amazonas • Roraima

Source: Onchocerciasis Elimination Program for the Americas (OEPA). *X Conferencia Interamericana sobre Oncocercosis (IACO 2000)*. Relatoría. Guayaquil, Ecuador, 7–9 de Noviembre, 2000. OEPA/PAHO/OMS; 2000.

<sup>a</sup> Hyperendemic communities.

TABLE 20. Mortality rates and percentage of deaths from diseases targeted by the IMCI strategy in children under 5 years of age, 16 countries of Latin America and the Caribbean with more than 10,000 births per year, 1999.

Country	Under 5		Under 1		1 to 4	
	Rate <sup>a</sup>	% <sup>b</sup>	Rate <sup>c</sup>	% <sup>b</sup>	Rate <sup>a</sup>	% <sup>b</sup>
Argentina	50.8	13.3	192.5	11.6	15.7	24.2
Brazil	100.8	24.0	372.8	20.5	33.6	45.3
Chile	35.8	17.6	159.2	16.5	9.2	23.6
Costa Rica	31.0	11.6	122.3	10.5	8.9	17.7
Cuba	26.8	16.2	92.2	14.3	10.5	22.5
Dominican Republic	46.0	19.3	150.6	15.4	19.9	36.3
Ecuador	164.2	36.3	649.2	30.7	73.5	52.1
El Salvador	118.6	42.2	524.4	42.5	14.6	39.7
Guyana	239.6	45.1	702.0	43.5	99.3	49.1
Jamaica <sup>d</sup>	...	11.6	116.4	7.7	...	34.7
Nicaragua	101.0	31.4	449.2	26.5	34.4	57.4
Panama	114.9	28.8	318.4	20.9	63.2	56.0
Paraguay	117.3	39.0	627.7	33.8	41.7	60.0
Peru	152.3	37.0	505.8	33.0	59.3	51.0
Uruguay	52.7	17.8	214.6	16.5	14.1	25.4
Venezuela	182.1	40.7	671.2	35.4	66.2	63.9

<sup>a</sup> Rates per 100,000 population in the age group.

<sup>b</sup> Percentage of total deaths from defined causes.

<sup>c</sup> Rates per 100,000 live births.

<sup>d</sup> No information is available on the 1–4-year age group or children under 5 years for 1999, so rates cannot be calculated.

TABLE 21. Mortality rates and percentage of deaths from diarrhea and from pneumonia and influenza in children under 5 years of age in 19 countries of the Americas, 1995 and 1999.

Country	Diarrheal diseases					Pneumonia and influenza				
	1995		1999		Percentage change in rate	1995		1999		Percentage change in rate
	Rate	%	Rate	%		Rate	%	Rate	%	
Total	30.8	7.8	18.4	5.3	-40.3	40.7	10.3	24.0	7.0	-41.0
Argentina	12.0	2.4	6.9	1.7	-42.7	25.6	5.2	14.7	3.6	-42.9
Brazil	45.1	8.3	26.9	5.6	-40.4	48.7	8.9	28.7	6.0	-41.0
Canada <sup>a, b</sup>	0.1	0.1	0.3	0.3	217.4	2.2	1.6	1.5	1.3	-28.7
Chile	3.1	1.2	1.7	0.8	-44.8	29.9	11.5	23.5	10.8	-21.4
Colombia <sup>a</sup>	26.5	8.5	23.2	7.8	-12.5	32.3	10.4	29.1	9.8	-9.7
Costa Rica	12.3	3.9	9.9	3.7	-19.1	16.5	5.3	11.2	4.1	-32.4
Cuba	5.4	2.3	3.3	2.0	-38.9	16.6	7.2	8.7	5.2	-47.5
Dominican Republic	64.9	11.4	37.3	6.9	-42.6	72.5	12.8	56.1	10.4	-22.6
Ecuador	64.9	11.4	37.3	6.9	-42.6	72.5	12.8	56.1	10.4	-22.6
El Salvador	74.1	23.1	40.7	13.7	-45.0	60.0	18.7	44.9	15.1	-25.3
Guyana <sup>c</sup>	153.0	21.3	111.6	20.8	-27.1	52.5	7.3	69.4	12.9	32.2
Mexico	41.6	8.3	24.0	5.8	-42.3	73.9	14.7	33.2	8.0	-55.0
Nicaragua	87.1	21.5	35.1	10.7	-59.6	58.3	14.4	23.9	7.3	-58.9
Panama	29.1	6.7	31.0	7.4	6.5	19.9	4.6	26.3	6.3	32.2
Paraguay	40.2	13.2	33.6	10.6	-16.6	44.5	14.5	47.0	14.9	5.8
Peru	61.1	9.8	14.9	4.0	-75.6	153.3	24.7	72.3	19.6	-52.8
United States	1.1	0.6	0.2	0.1	-84.4	3.2	1.8	2.4	1.4	-24.7
Uruguay	11.2	2.3	8.2	2.5	-26.7	23.5	4.9	20.7	6.3	-12.1
Venezuela	88.6	16.5	68.7	15.2	-22.5	40.5	7.5	28.5	6.3	-29.6

Rates per 100,000 population in the age group; percentage of total deaths.

<sup>a</sup> 1995 and 1998 data.

<sup>b</sup> There were two deaths from diarrhea in 1995 and six in 1999.

<sup>c</sup> 1994 and 1999 data.

TABLE 22. Estimated number of people living with HIV and AIDS in the Americas as of late 1999.

Region	Year in which first case of AIDS was reported	Adults and children with HIV/AIDS	Prevalence rate in adults <sup>a</sup>	HIV positive adults	Deaths in adults and children	Principal mechanisms of HIV transmission
Latin America	Beginning of the epidemic <sup>b</sup>	1,300,000	0.5%	25%	48,000	MSM, IDU, heterosexual
Argentina	1982	130,000	0.69	27,000	1,800	IDU
Belize	1986	24,000	2.01	590	170	Heterosexual
Bolivia	1984	4,200	0.10	680	380	MSM
Brazil	1980	540,000	0.57	130,000	18,000	Heterosexual, MSM
Chile	1984	15,000	0.19	2,600	1,000	IDU, MSM
Colombia	1983	71,000	0.31	10,000	1,700	MSM
Costa Rica	1983	12,000	0.54	2,800	750	MSM
Ecuador	1984	19,000	0.29	2,700	1,400	MSM
El Salvador	1984	20,000	0.60	4,800	1,300	Heterosexual
Guatemala	1984	73,000	1.38	28,000	3,600	Heterosexual
Guyana	1987	15,000	3.01	4,900	900	Heterosexual
Honduras	1985	63,000	1.92	29,000	4,200	Heterosexual
Mexico	1983	150,000	0.29	22,000	4,700	MSM
Nicaragua	1987	4,900	0.20	1,200	360	Heterosexual
Panama	1984	24,000	1.54	9,400	1,200	Heterosexual
Paraguay	1985	3,000	0.11	520	220	IDU, MSM
Peru	1983	48,000	0.35	12,000	4,100	MSM
Suriname	1983	3,000	1.26	950	210	Heterosexual
Uruguay	1983	6,000	0.33	1,500	150	IDU, MSM
Venezuela	1983	62,000	0.49	92,000	2,000	MSM
Caribbean	Beginning of the epidemic <sup>b</sup>	360,000	2.3%	35%	30,000	Heterosexual, MSM
Bahamas	1985	6,900	4.13	2,200	500	Heterosexual
Barbados	1984	1,800	1.17	570	130	Heterosexual
Cuba	1986	1,950	0.03	450	120	Heterosexual
Dominican Republic	1983	130,000	2.80	59,000	4,900	Heterosexual
Haiti	1983	210,000	5.17	67,000	23,000	Heterosexual
Jamaica	1982	9,900	0.71	3,100	650	Heterosexual
Trinidad and Tobago	1983	7,800	1.05	2,500	530	Heterosexual
North America	1980	900,000	0.6%	20%	20,000	MSM, IDU, heterosexual
Total		2,560,000			98,000	

IDU: injection drug user.

MSM: men who have sex with men.

<sup>a</sup> Percentage of adults (aged 15-49) with HIV in late 2000 divided by 1999 population.

<sup>b</sup> Based on the report of the first case of AIDS, it is calculated that the epidemic began in the late 1970s or early 1980s.

Source: UNAIDS. *Report on the Global HIV/AIDS Epidemic*; June 2000.

TABLE 23. Number of people receiving antiretroviral treatment in Latin America and the Caribbean, in late 2000.

Country	People receiving antiretroviral treatment	Cases of AIDS reported since the start of the epidemic <sup>a</sup>
Argentina	16,303	19,959
Bahamas	...	3,556
Barbados	12	1,227
Belize	200	410
Bolivia	...	229
Brazil	90,805	215,810
Chile	1,582	3,740
Colombia	5,000	7,274
Costa Rica	800	2,120
Cuba	500	1,135
Dominican Republic	...	5,440
Ecuador	...	1,559
El Salvador	...	2,985
Guatemala	650	4,233
Guyana	...	1,615
Haiti	...	8,902
Honduras	225	11,789
Jamaica	...	4,442
Mexico	15,254	50,713
Nicaragua	...	351
Panama	440	3,647
Paraguay	220	469
Peru	...	10,539
Suriname	...	550
Trinidad and Tobago	...	3,384
Uruguay	740	1,719
Venezuela	...	7,546

<sup>a</sup> National AIDS programs of Latin America and the Caribbean.

*Sources:*

- Draft estimate of antiretroviral drug use in developing countries (December 1, 2001). Office of HIV/AIDS. WHO, Geneva, Switzerland.
- Wheeler D, Arathoon E, Pitts M, *et al.* Availability of HIV care in Central America. *JAMA* 2001;286(7):853-860.
- Horizontal Technical Cooperation Group. I HIV/AIDS Forum, Brazil 2000.

TABLE 24. Antiretroviral drugs available during the first quarter of 2000 in Central America.

Country	Ministry of Health	Social security	Mother-to-child transmission		
			Ministry of Health	Social security	Private pharmacies
Guatemala	None	Zidovudine, lamuvidine, stavudine, didanosine, zalcitabine, ritonavir, indinavir, nelfinavir	Zidovudine	Zidovudine	Zidovudine, lamuvidine, stavudine, didanosine, zalcitabine, ritonavir, indinavir, nelfinavir, efavirenz
Belize	None	None	None	None	None
El Salvador	None	Zidovudine	Zidovudine, sometimes	Zidovudine	Zidovudine, lamuvidine, stavudine, didanosine, zalcitabine, ritonavir, indinavir, nelfinavir, saquinavir, efavirenz
Honduras	None	None	None	None	Zidovudine, lamuvidine, didanosine, zalcitabine, ritonavir, indinavir, nelfinavir, efavirenz
Nicaragua	None	None	None	None	Zidovudine, lamuvidine, stavudine, didanosine, zalcitabine, ritonavir, indinavir, nelfinavir
Costa Rica	None	Zidovudine, lamuvidine, stavudine, didanosine, indinavir, nelfinavir, efavirenz	None	Zidovudine and combination therapy if the patient is symptomatic	Zidovudine, lamuvidine, stavudine, didanosine, zalcitabine, ritonavir, indinavir, nelfinavi, saquinavir, efavirenz
Panama	Zidovudine	Zidovudine, lamuvidine, stavudine, didanosine, indinavir, nelfinavir	Zidovudine	Zidovudine	Zidovudine, lamuvidine, stavudine, didanosine, zalcitabine, ritonavir, indinavir, nelfinavir, saquinavir, efavirenz

Source: Wheeler D, Arathoon E, Pitts M, *et al.* Availability of HIV care in Central America. *JAMA* 2001;286(7):853-860.

TABLE 25. Estimated numbers of new cases of sexually transmitted infections in Latin America and the Caribbean, late 1997 (in thousands).

Subregion	Syphilis	Gonorrhea	Chlamydia	Trichomoniasis	Total
Central America	173	435	550	1,090	2,248
Brazil	948	2,465	2,961	5,865	12,239
Non-Latin Caribbean	70	135	190	382	777
Latin Caribbean	239	555	756	1,513	3,063
Southern Cone	165	800	962	1,907	3,834
Mexico	538	1,399	1,681	3,330	6,948
Andean Area	795	1,487	2,212	4,401	8,895
Total	2,928	7,276	9,312	18,488	38,004

Source: WHO Office of HIV/AIDS and Sexually Transmitted Infections and the PAHO Regional Program on AIDS/Sexually Transmitted Infections.

Note: The estimates are based on methodologies published in Gerbase *et al.* Global prevalence and incidence estimates of selected curable STIs. *Sexually Transmitted Infections* 1998;74 (Suppl. 1):S12-16.

Table 26. Principal disasters in the Americas, 1997–2000.

Country	Date	Event	Dead	Injured	Affected <sup>a</sup>	Information <sup>b</sup>
Argentina	March 2000	Floods	21	...	36,000	Northeast
Argentina	May 2000	Floods	15	40	50,000	Province of Buenos Aires
Argentina	August 2000	Eruption of Copahue volcano	...	...	...	Province of Neuquén
Bahamas	September 1999	Hurricane Floyd	1	...	300,000	Category 4 (Saffir-Simpson)
Belize	September 2000	Hurricane Keith	14	570	72,000	San Pedro Island, Caulker Caye
Bolivia	May 1998	Earthquake	105	150	18,000	Aiquile. Magnitude 5.6 and 6.8
Brazil	January 2000	Floods	28	...	70,000	States of Rio de Janeiro, Alagoas, and Pernambuco
Brazil	1998	Floods	28	...	37,000	State of São Paulo
Brazil	1998	Drought	...	...	...	1,429 affected municipalities
Brazil	1998	Forest fire	...	...	...	Brazilian forest
Brazil	1999	Floods	37	...	...	State of São Paulo
Caribbean	September 1998	Hurricane Georges	235	...	296,637	Countries: Antigua and Barbuda, Saint Kitts and Nevis, British Virgin Islands, Montserrat, and Anguilla. Category 4 (Saffir-Simpson)
Eastern Caribbean	November 1999	Hurricane Lenny	7	...	...	Countries: Antigua and Barbuda, Saint Kitts and Nevis, Dominica, Grenada, and Saint Vincent and the Grenadines. Category 5
Western Caribbean	October 1999	Hurricane José	2	...	...	Countries: Antigua and Barbuda and Netherlands Antilles
Central America	October 1998	Hurricane Mitch	18,591	12,942	2,000,000	Countries: Honduras, Nicaragua, El Salvador, Guatemala Category 5 (Saffir-Simpson)
Chile	June 1997	Floods	22	...	65,800	Region IV
Chile	October 1997	Earthquake	8	98	40,000	Armenia. Magnitude 6.2
Colombia	January 1999	Earthquake	1,185	8,523	745,000	Northern part of the country
Colombia	January 2000	Floods	47	16	300,000	Departments of Santander, Putumayo, and Nariño
Colombia	May 2000	Floods, mudslides	96	...	500,000	Damage to agriculture, water supply
Costa Rica	May 1997	Drought	...	...	199,279	Magnitude 6.7
Costa Rica	June 1999	Earthquake	...	...	...	Most severely affected localities: Casablanca, Santiago de las Vegas, Batabanó, Tapaste, Melena del Sur, Nueva
Cuba	October 1999	Hurricane Irene	4	...	228,067	Gerona, Isla de la Juventud

Table 26. Principal disasters in the Americas, 1997–2000. (continued)

Country	Date	Event	Dead	Injured	Affected <sup>a</sup>	Information <sup>b</sup>
Ecuador	August 1998	Earthquake	3	40	1,250	Bahia de Caráquez
Ecuador	October 1998	Eruption of Guagua Pichincha volcano	...	...	...	Province of Pichincha
Ecuador	September 1999	Activity of Tungurahua volcano	...	...	2,200	Provinces of Tungurahua and Chimborazo
Ecuador	October 1999	Eruption of Guagua Pichincha volcano	...	...	1,500	The town of Lloa evacuated
Ecuador	October 1999	Eruption of Tungurahua volcano	...	...	25,000	The city of Baños and other communities evacuated
Ecuador	April 2000	Floods	34	32	...	Central Region
Ecuador	1997	Drought	...	...	34,000	Province of Loja
El Salvador	January 2001	Earthquakes	1,259	8,964	1,639,173	Magnitude: January 7.6, February 6.6
Guatemala	June 1999	Earthquake	...	...	...	Department of Itzabal
Haiti	November 2000	Floods	14	...	...	Northern part of the country, 300 dwellings destroyed
Honduras	May 1997	Drought	...	...	...	Choluteca, Valle La Paz, Intibuca, Lempira: damage to agriculture
Latin America	October 1997	El Niño phenomenon	820	843	...	Countries: Peru, Ecuador, Brazil, Mexico, Argentina, & Bolivia
Latin America	January 1998	El Niño phenomenon	600	...	580,000	Countries: Peru, Ecuador, Brazil, Mexico, Argentina, & Bolivia
Mexico	October 1997	Hurricane Pauline	230	200	750,000	States of Oaxaca and Guerrero
Mexico	September 1998	Hurricane Isis	2	...	1,660	Sea of Cortez: 769 dwellings affected
Mexico	September 1999	Earthquake	31	160	17,500	Oaxaca. Magnitude 7.4
Mexico	October 1999	Floods	636	60	530,000	Towns submerged
Mexico	April 2000	Drought	...	...	30,000	Puebla
Mexico	May 1997	Earthquake	...	...	...	Departments of Leon, Chinandega, Madriz: agricultural losses
Nicaragua	May 1999	Drought	...	...	290,000	Municipalities of Chinandega and Chichigalpa
Nicaragua	May 1999	Eruption of San Cristobal volcano	...	...	...	State of Sucre-Cariacó. Magnitude 6.9
Venezuela	July 1997	Earthquake	80	683	15,000	States of Vargas, Falcón, Miranda, Yaracuy, and the Federal
Venezuela	December 1999	Floods	20,000	2,700	366,000	District

<sup>a</sup> Affected: includes people temporarily or permanently displaced from their homes, needing assistance with food, or suffering financial difficulties as a consequence of a natural disaster.

<sup>b</sup> Information: includes the most seriously affected provinces or countries, the intensity or magnitude of the event, and other information on its impact.

TABLE 27. Consequences of El Niño in the periods 1982–1983 and 1997–1998<sup>a</sup>.

Country	Dead 1982–1983	Dead 1997–1998	Injured 1997–1998	Missing 1997–1998
Argentina	...	16	...	...
Bolivia	50	43	400	40
Colombia	...	3	...	10
Chile	2	2	...	...
Ecuador	220	208	116	42
Peru	380	354	746	112
Paraguay	65	65	...	...

<sup>a</sup> Cumulative to 30 April 1998.

TABLE 28. Impact of Hurricane Mitch on Central America, by country, as of 4 December 1998.

Country	Dead	Missing	Injured	Homeless	Dwellings affected	Bridges affected	Schools affected	Water services affected	Health centers affected
Honduras	6,600	8,052	11,998	1,393,669	70,000	99	2,624	1,683	68
Nicaragua	2,863	970	388	368,261	41,430	63	328	88	506
El Salvador	239	29	...	28,452	10,372	10	326	10	15
Guatemala	268	121	280	105,055	21,000	121	311	60	...
Belize	...	...	276	...	...	...	...	...	...
Costa Rica	5	4	...	...	965	69	39	...	1
Total	9,975	9,176	12,942	1,895,437	143,767	362	3,628	1,841	590

Source: Office for the Coordination of Humanitarian Affairs (OCHA). Situation Report No. 14.

TABLE 29. Infectious disease situation in Central America before and after Hurricane Mitch.

Country and disease	Total cases (January–October 1998)	Weekly average number of cases (January–October)	Total cases (November 1998)	Weekly average number of cases (November 1998)
<b>Cholera</b>				
Guatemala	2,530	59	1,941	485
Nicaragua	675	16	387	95
Honduras	0	0	18	4
El Salvador	0	0	7	2
<b>Leptospirosis</b>				
Nicaragua	Some outbreaks reported		540	135
Guatemala, Belize, and El Salvador			0	Some suspicious cases reported
<b>Dengue</b>				
Honduras	18,214		Moderate increase of cases	
Nicaragua	11,626		No increase of cases reported	

Source: Pan American Health Organization. *Epidemiological Bulletin*, Vol. 19, No. 4.



TABLE 30. Number of outbreaks of foodborne disease and number of cases of illness and deaths, by country in Latin America and the Caribbean, 1997–2000.

Country	Outbreaks	Cases	Deaths
Argentina	143	3,120	4
Bahamas	54	6,725	0
Barbados	1	3	0
Brazil	432	10,701	4
Colombia	1	19	0
Costa Rica	1	4	0
Cuba	1,239	47,213	13
Chile	3	46	0
Dominican Republic	62	1,681	0
Ecuador	26	1,192	12
El Salvador	13	249	0
Mexico	461	9,889	41
Nicaragua	90	988	0
Panama	12	101	1
Paraguay	56	934	0
Peru	83	3,849	31
Trinidad and Tobago	27	160	1
Uruguay	87	1,646	1
Venezuela	193	5,322	9
Total	2,984	93,842	117

Source: PAHO. Regional Information System for the Epidemiological Surveillance of Foodborne Diseases (SIRVETA)

TABLE 31. Number of reported cases of human rabies, by subregion and country, Region of the Americas, 1980–2000.

Country/subregion	Annual average		
	1980–1989	1990–1999	2000
Andean Area	79.0	65.9	18
Bolivia	11.1	10.3	9
Colombia	14.3	5.2	1
Ecuador	21.5	21.6	3
Peru	26.4	26.6	4
Venezuela	5.7	2.2	1
Southern Cone	4.2	4.5	1
Argentina	0.8	0.2	0
Chile	0.8	0.1	0
Paraguay	3.4	4.2	1
Uruguay	0	0	0
Brazil	84.8	40.9	26
Central America	32.4	18.2	8
Belize	0.5	0	0
Costa Rica	0	0	0
El Salvador	16.4	8.9	1
Guatemala	8.0	7.0	6
Honduras	5.4	1.1	1
Nicaragua	2.1	1.0	0
Panama	0	0.2	0
Mexico	62.0	30.6	4
Latin Caribbean	6.1	4.8	2
Cuba	0	0.5	1
Dominican Republic	4.0	1.2	0
Haiti	2.2	3.1	1
North America	1.0	2.7	6
Canada	0	0	1
United States	1.0	2.7	5
Total	269.6	167.6	65

Source: PAHO. Regional Information System for the Epidemiological Surveillance of Rabies in the Americas (SIRVERA).

TABLE 32. Number of cases of canine rabies by subregion and country in Latin America and the Caribbean, 1990–2000.

Country/subregion	Annual average		2000
	1990–1994	1995–1999	
Andean Area	2,649	1,229	613
Bolivia	1,115	254	358
Colombia	162	101	66
Ecuador	708	502	79
Peru	574	247	54
Venezuela	90	125	56
Southern Cone	336	466	57
Argentina	61	10	4
Chile	1	0	0
Paraguay	274	456	53
Uruguay	0	0	0
Brazil	669	1,072	761
Central America	623	379	179
Belize	1	7	0
Costa Rica	0	0	0
El Salvador	92	138	35
Guatemala	144	163	126
Honduras	342	52	18
Nicaragua	44	19	0
Panama	0	0	0
Mexico	4,803	669	244
Latin Caribbean	107	97	104
Cuba	28	34	34
Dominican Republic	28	27	31
Haiti	51	36	39
Total	9,187	3,912	1,958

Source: PAHO. Regional Information System for the Epidemiological Surveillance of Rabies in the Americas (SIRVERA).

TABLE 33. Number of cases of rabies in animals, by wild and domesticated species, in Canada and the United States of America, 1997–2000.

Species	Canada				United States			
	1997	1998	1999	2000	1997	1998	1999	2000
Wild	108	321	440	585	7,899	7,324	6,407	6,796
Raccoon	–	1	14	48	4,300	3,502	2,872	2,778
Skunk	46	233	355	404	2,040	2,272	2,076	2,223
Bat	32	56	42	72	958	992	989	1,240
Fox	30	28	24	55	448	435	384	453
Other	–	3	5	6	153	123	86	102
Domesticated	28	51	60	78	610	602	585	488
Dog	9	11	10	24	126	113	100	99
Cat	5	8	4	8	300	282	277	248
Bovine	13	29	39	36	122	116	135	82
Other	1	3	7	10	62	91	73	59
Total	136	372	500	663	8,509	7,926	6,992	7,284

Source: PAHO. Regional Information System for the Epidemiological Surveillance of Rabies in the Americas (SIRVERA).

TABLE 34. Cases of leptospirosis in humans, selected Latin American and Caribbean countries, 1996–2000.

Country	1996	1997	1998	1999	2000
Argentina	...	14	75	30	57
Brazil	5,579	3,298	3,449	3,643	4,128
Chile	...	...	4	1	...
Colombia	...	...	...	100	200
Costa Rica	29	27	26	312	156
Cuba	1,449	1,085	979	898	553
Ecuador	1	3	398	29	63
Haiti	64	38	...	...	...
Paraguay	...	...	4	4	6
English-speaking Caribbean	...	310	369	...	11
Total	7,122	4,775	5,304	5,017	5,174

Source: Ministries of health.

TABLE 35. Number of cases of plague, by country and year, Region of the Americas, 1996–2000.

Country	1996	1997	1998	1999	2000
Bolivia	26	1	5	–	–
Brazil	1	16	4	6	2
Ecuador	–	14	–	–	–
Peru	23	39	1	22	17
United States	5	4	9	9	6
Total	55	74	19	37	25

Source: Ministries of health of the countries.

TABLE 36. Prevalence of risk factors for noncommunicable diseases (%), according to national risk factor surveys, selected countries in the Americas.

Country	Tobacco use			Alcohol use			Cholesterol ( $\geq 200$ mg/dL)			Sedentary lifestyle			Obesity (BMI $\geq 30$ )		
	Males	Females	Both	Males	Females	Both	Males	Females	Both	Males	Females	Both	Males	Females	Both
Barbados	34.6	6.9	18.0	24.0	9.6	17.9	—	—	—	87.6	78.4	82.9	8.6	22.6	16.8
Canada	31.5	26.3	28.9	13.0	4.0	9.0	—	—	—	54.0	60.0	57.0	...	...	48.0
Colombia	26.8	11.3	...	—	—	—	24.8	28.3	—	72.0	85.0	—	—	—	—
Cuba	48.1	26.2	36.8	7.1	1.4	4.0	—	—	—	25.7	39.8	32.9	6.0	11.1	7.6
United States	25.3	21.0	22.9	—	—	17.0	19.0	22.0	21.0	—	—	78.0	—	—	23.0

Sources: Barbados—Risk Factor Survey, 1992; Canada—National Population Health Survey, 1996; Colombia—Second National Study on Risk Factors for Noncommunicable Diseases, 1999; Cuba—National Risk Factor Survey, 1995; United States of America—NHANES, 1988–1994.

TABLE 37. Prevalence of risk factors for cardiovascular disease in men, Mexico City, 1996.

	Men		Women		Total	
	No.	%	No.	%	No.	%
Sedentary lifestyle	229	51.9	278	71.8	507	60.8
Overweight and obesity <sup>a</sup>	137	31.1	152	38.7	289	34.6
Waist/hip ratio <sup>b</sup>	75	17.0	115	29.3	190	22.3
Smoking	187	42.7	68	17.6	255	30.9
1–5 cigarettes daily	111	25.3	55	14.2	166	20.1
6–15 cigarettes daily	59	12.5	10	2.6	69	8.4
>16 cigarettes daily	17	3.9	3	0.7	20	2.4
Alcohol consumption						
<2 drinks daily	9	2.0	1	0.3	10	1.2
>2 drinks daily	9	2.0	0	0.0	9	1.1

<sup>a</sup> Body mass index >27.0.

<sup>b</sup> Waist/hip ratio: men, 1.0; women, 0.80.

Source: Yamamoto-Kimura L, Zamora-Gonzalez J, Huerta-Alvarado S, Fajardo-Gutierrez A, Cardoso-Saldaña G, Posadas-Romero C. High blood pressure and cardiovascular risk factors in an adult population of Mexico City. Characteristics of the studied population. *Arch Med Res* 1996;27(2):213–222.1.

TABLE 38. Prevalence (%) of obesity, diabetes, hypertension, and lack of exercise, by educational level and sex, and odds ratio, Bolivia, 1998.

Risk factor	Education					
	Non-elemental <sup>a</sup>		Technical/University		Odds ratio (CI-95%)	
	Males	Females	Males	Females	Males	Females
Obesity	16.2	35.1	14.7	23.0	1.1 (0.8–1.4)	1.3 (1.1–1.4)
Diabetes	9.0	9.3	5.7	5.4	1.3 (1.1–1.6)	1.7 (1.7–1.8)
Hypertension	26.7	20.1	17.8	11.4	1.4 (1.1–1.6)	1.3 (1.2–1.4)
Lack of exercise	47.7	82.6	24.8	53.8	1.9 (1.5–2.2)	2.0 (1.7–2.3)

<sup>a</sup> Without any education or with elementary education only.

Source: Barceló A, Daroca MC, Ribera R, Duarte E, Zapata A, Vohra M. Diabetes in Bolivia. *Rev Panam Salud Publica/Pan Am J Public Health* 2001;10(5):318–323.

TABLE 39. Age standardized prevalence (%) of tobacco use, alcohol use, and lack of exercise, by social class, Cottia, Brazil, 1995.

Social class	Tobacco use		Alcohol		Lack of exercise	
	Males	Females	Males	Females	Males	Females
I	45	40.7	9.9	0	47.2	18.9
II	38	18.4	11.9	0	40.1	40.9
III	42	26.4	12.2	0.9	36.3	30.9
IV	43	13.6	18.2	0.7	40	42.4
Total	40.4	23.9	14.7	0.7	39.2	35.9

Source: Martins IS, Coelho LT, Casajus MI, Okani ET. Smoking, consumption of alcohol and sedentary life style in population grouping and their relationships with lipemic disorders. *Rev Saude Publica* 1995;29(1):38–45.

Notes: I, employer/owner; II, small-business owner; III, employee; IV, underemployed.

TABLE 40. Results of the hypertension prevalence (%) study<sup>a</sup> in the adult population, Latin America and the Caribbean, 1988–2000.

Country	Population/year	Sample size	Ages	Adjusted rates (%) <sup>b,c</sup>		
				Males	Females	Both
North America						
Canada	National sample, 1997	23,129	18–74	24.0 (23.2–24.7)	15.3 (14.7–16.0)	19.6 (19.1–20.2)
Mexico	Mexico City, 1998	825	20+	17.2 (13.7–20.7)	24.9 (20.5–29.2)	21.0 (18.2–23.8)
	Rural Durango, 1998	5,802	20+	15.6 (13.7–17.6)	22.5 (21.2–23.7)	19.0 (18.0–20.0)
United States	Mexico City, 1999	2,282	35–64	18.0 (15.6–20.5)	9.7 (8.1–11.3)	13.9 (12.4–15.3)
	National sample, 1988–1994	7,407	18+	26.2 (24.7–27.6)	21.6 (20.2–22.9)	23.9 (22.9–24.8)
	Non-Latin Blacks	1,086	18+	31.5 (28.6–34.3)	27.2 (24.5–29.8)	29.3 (27.4–31.2)
	Non-Latin Whites	5,281	18+	20.9 (19.3–22.4)	16.0 (14.6–17.4)	18.4 (17.4–19.5)
Caribbean						
Barbados	Urban, 1995	810	25–74	25.9 <sup>d</sup>	28.2 <sup>b</sup>	
Cuba	Cienfuegos, 1997	1,633	15+	45.9 <sup>d</sup>	41.5 <sup>b</sup>	37.5 (34.0–41.1)
Jamaica	Urban, 1995	818	25–74	18.0 <sup>d</sup>	27.2 <sup>b</sup>	
Saint Lucia	Urban, 1995	1,079	25–74	24.1 <sup>d</sup>	27.4 <sup>b</sup>	
South America						
Bolivia	Four cities, 1998	2,533	25+	24.5 (21.9–27.1)	19.1 (17.1–21.0)	21.8 (20.2–23.4)
Chile	Valparaiso, 1997	3,120	25–64	10.3 (8.7–11.9)	11.4 (9.9–12.0)	10.9 (9.8–12.0)
	Mapuches, 1998	1,948	30+	9.1 (7.1–11.0)	11.9 (10.0–13.7)	10.5 (9.1–11.8)
Ecuador	Four cities, 2000	10,605	15+	28.5 (27.0–29.9)	24.8 (23.8–25.8)	26.6 (25.8–27.5)
Paraguay	National sample, 1995	9,876	20–74	36.1 (35.0–37.3)	43.9 (42.1–45.7)	40.0 (39.0–41.0)
Venezuela	Maracaibo, 1997	7,424	20+	49.7 (48.1–51.3)	34.1 (32.6–35.6)	41.9 (40.8–43.0)

<sup>a</sup>Diastolic blood pressure,  $\geq 90$  mmHg, or systolic blood pressure,  $\geq 140$  mmHg, or taking anti-hypertension medication.

<sup>b</sup>Adjusted for age and sex, using the global population by direct method (Segi M. *Cancer mortality for selected sites in 24 countries (1950-57)*. Sendai: Tohoku University, School of Medicine: 1960).

<sup>c</sup>Confidence interval, 95%.

<sup>d</sup>Crude rate.

Sources: Joffres MR, Ghadirian P, Fodor JG, Petrasovits A, Chockalingam A, Hamet P. Awareness, treatment and control of hypertension in Canada. *Am J Hypertens* 1997;10:1097–1102. Yamamoto-Kimura L, Zamora-Gonzalez J, Garcia de la Torre G, Cardoso-Saldaña G, Fajardo-Gutierrez A, Ayala-Barajas C, et al. Prevalence of high blood pressure and associated coronary risk in an adult population of Mexico City. *Arch Med Res* 1998;29(4):341–349. Guerrero-Romero JF, Rodríguez Morán M. Prevalencia de hipertensión arterial y factores asociados en la población rural marginada. *Salud Publica Mex* 1998;40:339–346. González-Villalpando, et al. Prevalence of hypertension in a Mexican population according to the Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure. *J Cardiovasc Risk* 1999;6:177–181. Burt VL, Whelton P, Roccella EJ, Brown C, Cutler JA, Higgins M, et al. Prevalence of hypertension in the US adult population. Results from the Third National Health and Nutrition Examination Survey, 1988–1991. *Hypertension* 1995;25(3):305–313. Forrester T, Wilks R, Bennett F, McFarlane-Anderson N, Mcgee D, Cooper R, et al. Obesity in the Caribbean. En: CIBA Foundation Symposium. *The origins and consequences of obesity*. New York: Wiley; 1996:17–31. (Symposium 201). Orduñez PO, et al. Hypertension in Cuba: evidence of narrow black-white difference. *J Hum Hypertens* 1998;12:111–116. Barceló A. Diabetes and hypertension in the Americas. *West Indian Med J* 2000;49(4):262–265. Vega J, et al. Prevalencia de hipertensión arterial en Valparaíso. Resultados de la encuesta de base del programa CARMEN. *Rev Med Chil* 1999;127:729–738. Stockins BF; Larenas GY; Charles HM; Standen DI; Espinoza OM, Illesca MP; et al. Niveles de lípidos y de presión arterial en población mapuche de la Región de la Araucanía, en Chile. *Rev Med Chil* 1998;126:1291–1299. Cornejo C, et al. Prevalence of arterial hypertension in the urban adult population of Ecuador: Quito, Guayaquil, and Cuenca — the PREHTAE study. *CVD Prevention* 2000;3:47–58. Ramirez MO, et al. Paraguayan national blood pressure study: prevalence of hypertension in the general population. *J Hum Hypertens* 1995;9:891–897. Sulbaran TA; Vegas AM; Calmon GE. Aspectos epidemiológicos de la hipertensión arterial en la población adulta del Municipio de Maracaibo. *Inves Clin* 1997;38(Sup 2):3–11.

TABLE 41. Results of the study showing the prevalence (%) of hypertension<sup>a</sup>, ages 35–64 years, selected populations in Latin America and the Caribbean, 1988–2000.

Country	Population/year	Adjusted rates (%) <sup>b,c</sup>		
		Males	Females	Both sexes
North America				
Canada	National sample, 1997	31.0	21.0	26.0
Mexico	Rural Durango, 1998	18.3	27.4	22.8
	Mexico City, 1999	18.0	9.7	13.9
United States	National sample, 1988–1994	35.6	30.1	32.8
	Non-Hispanic Blacks	42.6	38.4	40.5
	Non-Hispanic Whites	28.6	21.7	25.1
Caribbean				
Cuba	Cienfuegos, 1997			47.6
South America				
Bolivia	Four cities, 1998	26.3	20.3	23.3
Chile	Valparaíso, 1997	13.7	15.7	14.7
	Mapuches, 1998	12.5	16.6	14.5
Ecuador	Four cities, 2000	37.7	34.6	36.1
Paraguay	National sample, 1995	46.0	52.2	49.1
Venezuela	Maracaibo, 1997	49.7	34.1	41.9

<sup>a</sup> Diastolic blood pressure,  $\geq 90$  mmHg, or systolic blood pressure,  $\geq 140$  mmHg, or taking anti-hypertension medication.

<sup>b</sup> Adjusted for age and sex using the world population by the direct method (Segi M. *Cancer mortality for selected sites in 24 countries (1950–57)*. Sendai: Tohoku University, School of Medicine; 1960).

<sup>c</sup> Confidence interval, 95%.

Sources: Joffres MR, Ghadirian P, Fodor JG, Petrasovits A, Chockalingam A, Hamet P. Awareness, treatment and control of hypertension in Canada. *Am J Hypertens* 1997;10:1097–1102. Guerrero-Romero JF, Rodríguez Morán M. Prevalencia de hipertensión arterial and factores asociados en la población rural marginada. *Salud Publica Mex* 1998;40:339–346. González-Villalpando, et al. Prevalence of hypertension in a Mexican population according to the Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure. *J Cardiovasc Risk* 1999;6:177–181. Burt VL, Whelton P, Roccella EJ, Brown C, Cutler JA, Higgins M, et al. Prevalence of hypertension in the US adult population. Results from the Third National Health and Nutrition Examination Survey, 1988–1991. *Hypertension* 1995;25(3):305–313. Orduñez PO, et al. Hypertension in Cuba: evidence of narrow black-white difference. *J Hum Hypertens* 1998;12:111–116. Barceló A. Diabetes and hypertension in the Americas. *West Indian Med J* 2000;49(4):262–265. Vega J, et al. Prevalencia de hipertensión arterial en Valparaíso. Resultados de la encuesta de base del programa CARMEN. *Rev Med Chil* 1999;127:729–738. Stockins BF; Larenas GY; Charles HM; Standen DI; Spinoza OM, Illesca MP; et al. Niveles de lípidos and de presión arterial en población mapuche de la Región de la Araucanía, en Chile. *Rev Med Chil* 1998;126:1291–1299. Cornejo C, et al. Prevalence of arterial hypertension in the urban adult population of Ecuador: Quito, Guayaquil, and Cuenca — the PREH-TAE study. *CVD Prevention* 2000;3:47–58. Ramirez MO, et al. Paraguayan national blood pressure study: prevalence of hypertension in the general population. *J Hum Hypertens* 1995;9:891–897. Sulbaran TA; Vegas AM; Calmon GE. Aspectos epidemiológicos de la hipertensión arterial en la población adulta del Municipio de Maracaibo. *Inves Clin* 1997;38(Sup 2):3–11.

TABLE 42. Prevalence (%) of cardiovascular risk factors among hypertensives and among persons with normal blood pressure, four Bolivian cities, 1999.

Factor	Hypertensives	Non-hypertensives
Overweight <sup>a</sup>	80.0	55.3
Centripetal obesity <sup>b</sup>	48.5	38.9
Smoked 20+ cigarettes per day	2.1	0.7
Physical inactivity	60.3	49.8

<sup>a</sup> Body mass index,  $\geq 25$ .

<sup>b</sup> Waist-hip ratio,  $>1.0$  in men and  $>0.85$  in women.

Source: Barceló A, Daroca MC, Ribera R, Duarte E, Zapata A, Vohra M. Diabetes in Bolivia. *Rev Panam Salud Publica/Pan Am J Public Health* 2001;10(5):318–323.

TABLE 43. Survey results showing the prevalence (%) of diabetes among adults, selected countries in the Americas, 1988–2000.

Subregion/country	Population/year	Sample size (No.)	Age (yrs.)	Adjusted rates (%) <sup>a, b</sup>		
				Male	Female	Both
North America						
Canada	Native, RD, 1995	131	30–64	16.3 (7.9–24.7)	16.3 (9.0–23.6)	
	Native, LS, 1995	168	30–64	23.9 (12.9–34.9)	48.6 (38.4–58.8)	
Mexico	Mexico City, 1992	646	35–64	11.9 (8.0–17.2)	17.9 (13.5–23.5)	14.9 (11.9–18.6)
	Mexico City, 1994	805	20–90	8.7 (5.7–12.8)	12.0 (8.6–16.4)	10.4 (8.1–13.3)
United States	All groups, 1988–1994	2,844	40–74	14.7 (12.8–16.5)	13.1 (11.4–14.8)	13.9 (12.6–15.2) <sup>c</sup>
	Non-Hispanic Whites		40–74	13.9 (11.3–16.5)	11.5 (9.1–13.9)	12.7 (11.0–14.5) <sup>c</sup>
	Non-Hispanic Blacks		40–74	19.5 (15.3–23.7)	20.1 (15.9–24.4)	19.8 (16.8–22.8) <sup>c</sup>
	Mexican Americans		40–74	24.0 (19.4–28.6)	27.5 (22.6–32.3)	25.7 (22.4–29.1) <sup>c</sup>
Caribbean						
Barbados	Bridgetown, 1993	464	40–79	15.9 (10.6–22.9)	16.9 (12.5–22.3)	16.4 (13.1–20.5)
Cuba	Havana, 1998	250	25+	–	–	11.8 (8.3–16.3)
Guadeloupe	Mouter, <i>et al.</i> , 1992		18+	–	–	5.8 <sup>d</sup>
Jamaica	Jamaican, 1995	2,109	15+	–	–	11.1 (9.7–12.3) <sup>e</sup>
	Spanish Town, 1999	1,303	25+	9.5 (7.0–12.0)	15.7 (13.2–18.3)	12.6 (10.8–14.4) <sup>f</sup>
South America						
Argentina	La Plata, 1995	809	20–74	–	–	5.0 <sup>d</sup>
Bolivia	Four cities, 1998	2,500	25+	8.2 (6.5–9.9)	9.1 (7.6–10.5)	8.6 (7.5–9.7) <sup>c</sup>
Brazil	Urban Brazil, 1992	21,847	30–69	7.5 <sup>f</sup>	7.6 <sup>f</sup>	7.6 <sup>e</sup>
	Rio de Janeiro, 1996	2,051	30–69	5.7 (4.2–7.3)	9.4 (7.8–11.1)	7.6 (6.4–8.7) <sup>c</sup>
	São Paulo, Issei, 1996	238	40–79	–	–	12.8 <sup>f</sup>
	São Paulo, Nisei, 1996	292	40–79	–	–	16.2 <sup>f</sup>
Chile	Valparaíso, 1999	3,120	25–64	4.0 <sup>c</sup>	3.8 <sup>d</sup>	3.9 <sup>d</sup>
	Mapuche Indians, 2000	319	20+	3.2 <sup>c</sup>	4.5 <sup>d</sup>	
Colombia	Urban, 1993	670	30+	7.7 (4.2–13.0)	8.7 (4.8–14.6)	8.2 (5.4–12.0)
Paraguay	Urban, 1998	1,094	20–74	7.2 (4.9–10.6)	7.1 (5.6–9.1)	7.2 (5.9–8.8)
Peru	Urban-rural, 1997	598	18+	–	–	4.8 (3.2–7.0)
Venezuela	Urban, 1997	669	30+	–	–	4.4

<sup>a</sup>Standardized, using the world population (Segi M. *Cancer mortality for selected sites in 24 countries (1950-57)*. Sendai, Tohoku University, School of Medicine; 1960).

<sup>b</sup>Confidence interval, 95%, based on the Poisson distribution.

<sup>c</sup>Confidence interval, 95%, based on normal distribution.

<sup>d</sup>Crude rates.

<sup>e</sup>Standardized by age.

<sup>f</sup>Standardized by the authors.

Sources: Delisle HF, Rivard M, Ekoe JM. Prevalence estimates of diabetes and other cardiovascular risk factors in the two largest Algonquin Community of Quebec. *Diabetes Care* 1995;18(9):1255–1259. Stern MP, Gonzalez C, Mitchell BD, Villapando E, Haffner SM, Hazuda HP: Genetic and environmental determinants of type II diabetes in Mexico City and San Antonio. *Diabetes* 1992;41:484–492. Posadas-Romero C, Yamamoto-Kimura L, Lerman-Garber I, Zamora-Gonzalez J, Fajardo-Gutierrez A, Velazquez L, *et al.* The prevalence of NIDDM and associated coronary risk factors in Mexico City. *Diabetes Care* 1994;17(12):1441–1448. Harris MI, Flegal KM, Cowie CC, Eberhard MS, Goldstein D, Little RR, *et al.* Prevalence of diabetes, impaired fasting glucose, and impaired glucose tolerance in US adults. The Third National Health and Nutrition Examination Survey, 1988–1994. *Diabetes Care* 1998;21(4):518–524. Foster C, Rotimi C, Fraser H, Sundarum C, Liao Y, Gibson E, *et al.* Hypertension, diabetes, and obesity in Barbados: findings from a recent population-based survey. *Ethn Dis* 1993;3(4):404–412. Díaz-Díaz O, Hernández M, Collado F, Seuc A, Márquez A. Prevalencia de diabetes mellitus y tolerancia a la glucosa alterada, sus cambios en 20 años en una comunidad de Ciudad de la Habana. (Resumen) Primera reunión científica conjunta GLED/EDEG. Programa Científico. Buenos Aires, Argentina 1999. Mouter JP, Kangambeza-Nouvier P, Donnet JP, Pileire B, Echeve E, Patterson AW. Diabetes mellitus and public health in Guadeloupe. *West Indian Med J* 1990;39:139. Ragoobirsingh D, Lewis-Fuller E, Morrison EY. The Jamaican Diabetes Survey. A protocol for the Caribbean. *Diabetes Care* 1995;18(9):1277. Wilks R, Rotimi C, Bennett F, McFarlane-Anderson N, Kaufman JS, Anderson SG, *et al.* Diabetes in the Caribbean: results of a population survey from Spanish Town, Jamaica. *Diabeti Med* 1999;16:875–883. Hernández RE, Cardonet LJ, Libman C, Gagliardino JJ. Prevalence of diabetes in an urban population of Argentina. *Diabetes* 1984;33:18–20. Barceló A, Daroca MC, Ribera R, Duarte E, Zapata A, Vohra M. Diabetes in Bolivia. *Rev Panam Salud Publica/Pan Am J Public Health* 2001;10(5):318–323. Malerbi DA, Franco LJ. The Brazilian Cooperative Group on the Study of Diabetes Prevalence. Multicenter study of the prevalence of diabetes mellitus and impaired glucose tolerance in the urban Brazilian population aged 30–69 year. *Diabetes Care* 1992;15(11):1509. Oliveira JEP, Milech A, Franco LJ. The prevalence of diabetes in Rio de Janeiro, Brazil. *Diabetes Care* 1996;19(6):663–665. Franco LJ. Diabetes in Japanese-Brazilian: influence of the acculturation process. *Diabetes Res Clin Pract* 1996;34(Suppl):S51–S55. Jadue L, Vega J, Ecobar MC, Delgado I, Garrido C, Lastra P, *et al.* Factores de riesgo para las enfermedades no transmisibles: metodología y resultados globales de la encuesta de base CARMEN. *Rev Med Chil* 1999;127:1004–1013. Pérez-Bravo F, Carrasco E, Santos JL, Calvillan M, Larenas G, Albala C. Prevalence of type 2 diabetes and obesity in rural Mapuche population from Chile. *Nutrition* 2001;236–238. Aschner P, King H, Triana de Torrado M, Marina Rodríguez B. Glucose intolerance in Colombia. A population-based survey in an urban community. *Diabetes Care* 1992;16(1):90. Jiménez JT, Palacios M, Cañete F, Barrio Canal LA, Medina U, Figueredo R, *et al.* Prevalence of diabetes mellitus and associated cardiovascular risk factors in an adult urban population in Paraguay. *Diabet Med* 1998;15:334–338. Seclen S, Leey J, Villena A, Herrera B, Menacho JC, Carrasco A, *et al.* Prevalencia de diabetes mellitus, hipertensión arterial, hipercolesterolemia y obesidad, como factores de riesgo coronario y cerebrovascular en población adulta de la costa, sierra y selva del Perú. Lima, Perú, 1997. Nucete HJ, Mendoza SG, Romero P, Somoza B, Zepa A. Diabetes mellitus en algunas poblaciones del estado de Mérida, Venezuela. *Acta Cient Venez* 1980;31:588–592.



TABLE 44. Adjusted prevalence rates<sup>a</sup> (per 100 population) of diabetes among people 40–64 years old, selected Latin American and Caribbean countries, 1993–1999.

Country	Reference/year	Sex			Ratio F/M
		Males	Females	Both	
Mexico	Mexico City, 1994	13.4	20.9	17.1	1.6
United States	All groups, 1988–1994	12.8	11.2	12.0	0.9
	Non-Hispanic Whites	12.2	9.3	10.8	0.8
	Non-Hispanic Blacks	18.1	17.8	18.0	1.0
	Mexican Americans	22.2	25.4	23.8	1.1
Barbados	Bridgetown, 1993	15.4	13.8	14.6	0.9
Jamaica	Spanish Town, 1999	14.3	20.4	17.4	1.4
Argentina	La Plata, 1995	3.9	2.4	3.2	0.6
Bolivia	Four cities, 1998	10.3	12.4	11.4	1.2
Brazil	Rio de Janeiro, 1996	7.1	11.6	9.3	1.6
Chile	Santiago, 1983	11.8	7.6	9.7	0.6
Colombia	Urban, 1993	9.2	10.1	9.7	1.1
Paraguay	Urban, 1998	8.4	9.6	9.0	1.1

<sup>a</sup>Truncated rate adjusted using the world population by the direct method (Segi M. *Cancer mortality for selected sites in 24 countries (1950-57)*. Sendai, Tohoku University, School of Medicine; 1960).

Sources: Posadas-Romero C, Yamamoto-Kimura L, Lerman-Garber I, Zamora-Gonzalez J, Fajardo-Gutierrez A, Velazquez L, *et al*. The prevalence of NIDDM and associated coronary risk factors in Mexico City. *Diabetes Care* 1994;17(12):1441–1448. Harris MI, Flegal KM, Cowie CC, Eberhard MS, Goldstein D, Little RR, *et al*. Prevalence of diabetes, impaired fasting glucose, and impaired glucose tolerance in US adults. The Third National Health and Nutrition Examination Survey, 1998–1994. *Diabetes Care* 1998;21(4):518–524. Foster C, Rotimi C, Fraser H, Sundarum C, Liao Y, Gibson E, *et al*. Hypertension, diabetes, and obesity in Barbados: findings from a recent population-based survey. *Ethn Dis* 1993;3(4):404–412. Wilks R, Rotimi C, Bennett F, McFarlane-Anderson N, Kaufman JS, Anderson SG, *et al*. Diabetes in the Caribbean: results of a population survey from Spanish Town, Jamaica. *Diabet Med* 1999;16:875–883. Hernandez RE, Cardonet LJ, Libman C, Gagliardino JJ. Prevalence of diabetes in an urban population of Argentina. *Diabetes* 1984;81:18–20. Barceló A, Daroca MC, Ribera R, Duarte E, Zapata A, Vohra M. Diabetes in Bolivia. *Rev Panam Salud Publica/Pan Am J Public Health* 2001;10(5):318–323. Oliveira JEP, Millech A, Franco LJ. The prevalence of diabetes in Rio de Janeiro, Brazil. *Diabetes Care* 1996;19(6):663–665. Jadue L, Vega J, Ecobar MC, Delgado I, Garrido C, Lastra P, *et al*. Factores de riesgo para las enfermedades no transmisibles: metodología y resultados globales de la encuesta de base CARMEN. *Rev Med Chile* 1999;127:1004–1013. Aschner P, King H, Triana de Torrado M, Marina Rodríguez B. Glucose intolerance in Colombia. A population-based survey in an urban community. *Diabetes Care* 1992;16(1):90. Jiménez JT, Palacios M, Cañete F, Barrio Canal LA, Medina U, Figueredo R, *et al*. Prevalence of diabetes mellitus and associated cardiovascular risk factors in an adult urban population in Paraguay. *Diabet Med* 1998;15:334–338.

TABLE 45. Ischemic heart disease mortality rate, by age and sex, selected countries in the Americas, 1995.

Country	Age groups									
	35-44		45-54		55-64		65-74		≥75	
	M	W	M	W	M	W	M	W	M	W
Canada	19.0	4.0	78.3	18.6	267.1	84.5	701.2	296.0	2,242.5	1,612.2
United States	24.9	6.9	103.5	29.1	301.6	116.4	753.6	365.2	2,392.8	1,924.7
Barbados	10.0	5.0	36.4	16.7	142.9	90.0	550.0	255.6	766.7	800.0
Argentina	19.9	4.5	80.7	17.3	202.9	50.3	430.1	155.0	991.5	685.3
Chile	11.1	3.0	50.1	16.3	172.5	67.0	494.8	221.7	1,577.4	1,162.3
Costa Rica	15.0	6.8	66.2	26.7	233.0	102.2	569.8	364.9	2,112.5	1,551.6
Trinidad and Tobago	37.8	19.5	200.0	76.8	564.7	408.3	1,141.7	773.1	2,392.3	2,064.7
Mexico	20.8	7.4	63.6	25.7	183.4	90.6	442.0	272.5	1,449.9	1,272.4
Cuba	32.4	11.1	112.3	46.5	297.9	181.1	793.1	543.6	2,718.0	2,370.5
Venezuela	33.6	16.8	117.0	48.1	359.9	156.4	753.1	425.1	2,189.3	1,855.6

Source: PAHO, Special Program for Health Analysis, Technical Information System, 1995.

TABLE 46. Mortality from cardiovascular disease (rates per 100,000 population aged 20 years and older, adjusted by age), by years of schooling and sex, Chile, 1994-1996.

Years of schooling	Men		Women	
	Rate	Risk ratio	Rate	Risk ratio
Ischemic heart disease				
None	85.5	1.2	78.8	2.3
1-8	99.8	1.4	79.9	2.3
9-12	129.4	1.8	69.5	2.0
13 or more	73.9	1.0	34.3	1.0
Cerebrovascular disease				
None	84.5	2.6	93.6	3.4
1-8	75.4	2.3	72.4	2.7
9-12	70.5	2.1	59.3	2.2
13 or more	32.9	1.0	27.4	1.0

Source: Robles S, Vega J, Corber S. Noncommunicable disease and risk factors surveillance. In: Pan American Health Organization. *Equity and health: views from the Pan American Sanitary Bureau*. Washington, DC: PAHO: 2001:76-84. (Occasional Publication 8).

TABLE 47. Estimated incidence and mortality from malignant neoplasms, all ages (per 100,000 population), by cancer site and sex, selected countries in the Americas, 2000 (age standardized to the world population<sup>a</sup>).

Country	Cervix uteri						Breast						Stomach						Lung						Colon						Prostate					
	Female			Male			Female			Male			Female			Male			Female			Male			Female			Male			Female			Male		
	Inci- dence	Mor- tality		Inci- dence	Mor- tality		Inci- dence	Mor- tality		Inci- dence	Mor- tality		Inci- dence	Mor- tality		Inci- dence	Mor- tality		Inci- dence	Mor- tality		Inci- dence	Mor- tality		Inci- dence	Mor- tality		Inci- dence	Mor- tality							
Argentina	14.20	7.60		64.70	21.60		12.80	10.20		5.40	4.30		40.80	36.20		8.30	7.40		27.90	14.50		18.90	9.90		29.40	17.70		29.40	17.70							
Barbados	30.40	13.60		79.50	25.50		21.00	17.10		6.50	5.40		15.90	14.40		3.40	3.00		28.20	14.80		21.80	11.10		87.40	60.60		87.40	60.60							
Canada	8.20	2.80		81.80	22.70		9.10	6.40		4.20	3.20		55.10	50.40		30.20	25.00		40.70	16.40		29.80	11.60		83.90	17.10		83.90	17.10							
Chile	29.20	10.60		38.00	12.70		38.70	30.10		15.30	12.70		23.00	20.30		8.10	7.00		13.80	7.00		14.20	7.10		31.70	19.90		31.70	19.90							
Costa Rica	25.00	12.10		28.30	11.70		51.80	45.40		23.60	19.70		15.50	15.10		5.40	5.60		10.80	6.90		10.80	7.30		27.50	16.00		27.50	16.00							
Cuba	23.80	10.60		34.30	15.60		9.60	8.40		5.20	4.30		47.20	42.80		17.70	15.60		15.10	11.40		17.50	12.40		31.30	22.10		31.30	22.10							
Mexico	40.50	17.10		38.40	12.20		16.50	13.20		12.30	9.80		24.50	22.10		9.10	8.20		9.30	4.70		9.00	4.60		27.60	16.60		27.60	16.60							
Trinidad & Tobago	33.30	15.00		64.50	20.60		10.90	8.70		8.80	6.90		14.90	13.20		4.80	4.30		17.10	8.50		18.80	9.70		50.70	32.30		50.70	32.30							
United States	7.80	3.30		91.40	21.20		7.60	4.50		3.60	2.30		58.60	53.20		34.00	27.20		40.60	15.90		30.70	12.00		104.30	17.90		104.30	17.90							
Venezuela	38.30	15.20		36.00	11.60		22.00	17.50		12.50	10.00		21.80	19.40		10.40	9.20		11.50	5.80		12.00	6.10		30.90	18.20		30.90	18.20							

<sup>a</sup>World population as used by IARC (Segi M. Cancer mortality for selected sites in 24 countries (1950-57). Sendai, Tohoku University, School of Medicine; 1960).

Note: Rates were standardized and estimated using national incidence and mortality data and local regional incidence data, when available.

Source: PAHO/GLOBOCAN 2000.

TABLE 48. Prevalence of human papillomavirus types in cancer specimens, selected countries in Latin America, circa 1995.

Country	No. of invasive carcinomas screened for HPV	Any HPV (%)	HPV 16 (%)	HPV 18 (%)
Argentina	57	94.7	59.6	14.0
Bolivia	49	91.8	34.7	4.1
Brazil	46	87.0	52.2	8.7
Chile	80	92.5	45.0	5.0
Colombia	38	94.7	52.6	7.9
Cuba	45	93.3	57.8	6.7
Panama	73	93.3	46.6	15.1
Paraguay	117	94.0	54.7	11.1

Source: Bosh X, Manos M, Muñoz N, Sherman M, Jansen A, Peto J, et al. International Biological Study on Cervical Cancer (IBSCC) Study Group. Prevalence of human papillomavirus in cervical cancer: worldwide perspective. *J Natl Cancer Inst* 1995;87(11):796–802.

TABLE 49. Prevalence of human papillomavirus, selected Caribbean countries, 1988–1999.

Country	Specimen type	No. of specimens screened	Any HPV (%)	HPV 16 (%)	HPV 18 (%)
Barbados, 1993	Genital carcinomas	20	90.0	65.0	0.0
Jamaica, 1996	CIN3 and invasive carcinomas	39	92.0	36.0	8.0
Trinidad and Tobago, 1988	Exfoliated cervical cells	328	6.7	3.6	0.6
Suriname, 1999	Cervical carcinomas	130	82.0	49.0	19.0

Sources: Prussia PR, Schegget J, Smits HL. Detection of oncogenic HPV DNA by consensus polymerase chain reaction methods in genital carcinomas in twenty women in Barbados. *West Indian Med J* 1993;42(4):144–146. Rattray C, Strickler HD, Escoffrey C, et al. Type specific prevalence of human papillomavirus DNA among Jamaican colposcopy patients. *J Infect Dis* 1996;173:718–721. Lewis MJ. Human papillomavirus infections and other risk factors as determinants of cervical intraepithelial neoplasia in Trinidad and Tobago [doctoral thesis]. Baltimore: Johns Hopkins University, 1988. Krul EJ, Van De Vijver MJ, Schuurin E, et al. Human papillomavirus in malignant cervical lesions in Suriname, a high risk country, compared to the Netherlands, a low risk country. *Int J Gynecol Cancer* 1999;9(3):206–211.

TABLE 50. Proportion of women aged 15–49 years who have had a Pap smear within the last 12 months, selected countries in the Americas, 1993–1998.

Country	Year	Percentage
El Salvador	1993	72.7
	1998	79.2
Honduras	1996	55.4
Jamaica	1997	15.3
Nicaragua	1998	20.5
Paraguay	1996	49.1
Peru	1996	42.9
Dominican Republic	1996	44.8
Trinidad and Tobago	1987	35.4

Source: Pan American Health Organization, based on Health and Fertility Survey.

TABLE 51. Responses (%) on attitudes and cultural norms toward violence, ACTIVA study survey, 1997.

Question/ respondent attitude	Bahia, Brazil n = 633	Cali, Colombia n = 1,061	Caracas, Venezuela n = 506	Madrid, Spain n = 506	Rio de Janeiro, Brazil n = 484	San José, Costa Rica n = 479	San Salvador, El Salvador n = 576	Santiago, Chile n = 567
Think street children should be incarcerated	28.2	17.5	15.6		33.7	17.2	17.7	10
Believe corporal punishment is necessary for their children	28.4	31.8	7.3	8.1	7.6	16.3	15.3	6
Think they can take justice on themselves	37.7	27.8	38.5	16.2	19.8	41.5	21.9	23.6
Carry a gun for protection	13.5	22.7	16.8	22.6	25.8	31.4	16.8	22.6
Would like to own a firearm	28.2	28.6	34.1	10.8	21.9	23.9	23.5	29.9
Do not own and do not want to own a firearm	63.8	65.3	50.7	77.7	71.6	61.2	66.8	59

TABLE 52. Countries ranked according to level of registered mortality due to motor vehicle accidents, selected countries of the Americas, 2000.

Rate (per 100,000)	Countries
Very high 20.0–57.5	Bahamas, Belize, Bolivia, El Salvador, Guatemala, Turks and Caicos Islands
High 15.0–19.9	Antigua and Barbuda, Aruba, Bermuda, Brazil, Colombia, Cuba, Dominican Republic, Panama, Puerto Rico, Saint Lucia, Saint Kitts and Nevis, United States, Venezuela
Medium 10.0–14.9	Argentina, Chile, Costa Rica, Dominica, Ecuador, Cayman Islands, Jamaica, Martinique, Mexico, Suriname, Trinidad and Tobago, Uruguay
Low 5.0–9.9	Netherlands Antilles, Barbados, Canada, Virgin Islands (US), Montserrat, Nicaragua, Paraguay, Peru
Very low (possible underreporting) <5.0	Grenada, Guyana, Haiti, Honduras, Virgin Islands (UK), Saint Vincent and the Grenadines

Source: Classification based on data from SHA, Basic indicators, 2000.

TABLE 53. Assessment of the national capabilities for the prevention and management of hypertension, diabetes, and cervical cancer, 34 countries in the Americas, by subregion, 2001.

	Mexico, Central America, and Spanish- speaking Caribbean n (%)	CARICOM n (%)	South America n (%)	All countries n (%)
Total responses	11	14	9	34
Hypertension				
Guidelines	6 (54.5)	4 (28.6)	6 (66.7)	16 (47.1)
Essential equipment and Facilities in PHC centers for diagnosis/monitoring of	8 (72.7)	13 (92.9)	8 (88.9)	29 (85.3)
Diabetes				
Guidelines	6 (54.5)	5 (35.7)	7 (77.8)	18 (52.9)
Essential equipment and Facilities in PHC centers for diagnosis/monitoring of	7 (63.6)	13 (92.9)	6 (66.7)	26 (76.5)
Cervical cancer				
Guidelines	8 <sup>a</sup> (72.7)	7 (50)	8 (88.9)	23 (67.6)
Essential equipment and Facilities in PHC centers for diagnosis/monitoring of	9 (81.8)	9 (64.3)	7 (77.8)	25 (73.5)
All three priority conditions				
Guidelines	5 (45.5)	3 (21.4)	6 (66.7)	14 (41.2)
Essential equipment and facilities in PHC centers for diagnosis/monitoring of	7 (63.6)	9 (64.3)	6 (66.7)	22 (64.7)

<sup>a</sup>In El Salvador, the cervical cancer management guide is being developed.

Source: Alwan A, Maclean D, Mandit A. *Assessment of national capacity for noncommunicable diseases prevention and control. Report of a global survey.* Geneva: World Health Organization; 2001.

Notes:

Mexico, Central America, and Spanish-speaking Caribbean includes Mexico, Cuba, Haiti, Nicaragua, Honduras, Costa Rica, Panama, Belize, Guatemala, the Dominican Republic, and El Salvador.

CARICOM includes Trinidad and Tobago, Bahamas, Jamaica, Guyana, Anguilla, Montserrat, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Grenada, Netherlands Antilles, Aruba, and Dominica.

South America includes Brazil, Chile, Paraguay, Argentina, Uruguay, Bolivia, Ecuador, Peru, and Venezuela.

All countries includes the three groups.

TABLE 54. Measles cases, by country and year, Region of the Americas, 1997–2001.<sup>a</sup>

Subregion and country	Cases per year				
	1997	1998	1999	2000	2001
<b>Andean Area</b>					
Bolivia	7	1,004	1,441	122	0
Colombia	67	61	44	1	1
Ecuador	0	0	0	0	2
Peru	95	10	12	1	0
Venezuela	27	4	0	22	113
Brazil	52,284	2,781	908	36	1
<b>Central America and Panama</b>					
Belize	0	0	0	0	0
Costa Rica	26	27	23	0	0
El Salvador	0	0	0	0	2
Guatemala	8	1	0	0	0
Honduras	5	0	0	0	0
Nicaragua	0	0	0	0	0
Panama	0	0	0	0	0
<b>Caribbean</b>					
Anguilla	0	0	0	0	0
Antigua and Barbuda	0	0	0	0	0
Bahamas	1	0	0	0	0
Barbados	0	0	0	0	0
British Virgin Islands	0	0	0	0	0
Cayman Islands	0	0	0	0	0
Dominica	0	0	0	0	0
French Guiana	116	2	0	0	0
Grenada	0	0	0	0	0
Guyana	0	0	0	0	0
Jamaica	0	2	0	0	0
Montserrat	0	0	0	0	0
Saint Kitts and Nevis	0	0	0	0	0
Saint Lucia	0	0	0	0	0
Saint Vincent and the Grenadines	0	0	0	0	0
Suriname	0	0	0	0	0
Trinidad and Tobago	1	0	0	0	0
Turks and Caicos Islands	0	0	0	0	0
<b>Latin Caribbean</b>					
Cuba	0	0	0	0	0
Dominican Republic	1	14	274	254	113
Haiti	0	3	0	992	158
Mexico	0	0	0	30	3
<b>North America</b>					
Bermuda	0	0	0	0	0
Canada	579	12	29	206	33
United States	138	100	100	85	108
<b>Southern Cone</b>					
Argentina	125	10,229	313	6	0
Chile	58	6	31	0	0
Paraguay	143	70	0	0	0
Uruguay	2	6	34	0	0
<b>Total</b>	<b>53,683</b>	<b>14,332</b>	<b>3,209</b>	<b>1,755</b>	<b>534</b>

<sup>a</sup> 2001 data as of 17 November 2001.

Source: Country reports.

TABLE 55. Reported cases and deaths from yellow fever, selected countries of the Americas, 1985–2000.

Country	1985–1996		1997		1998		1999		2000	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Bolivia	454	340	63	47	57	39	68	33	8	6
Brazil	217	100	3	3	34	15	76	28	85	40
Colombia	63	51	5	4	1	–	2	2	3	2
Ecuador	53	37	31	4	4	4	3	1	2	1
French Guiana	–	–	–	–	1	1	–	–	–	–
Peru	1,517	948	44	20	165	49	56	33	6	3
Venezuela	2	1	–	–	15	4	1	1	–	–
Total	2,306	1,477	146	78	277	112	206	98	104	52

Source: Country reports.

TABLE 56. Vaccination coverage for three doses of hepatitis B and DTP vaccines, selected countries of the Americas, 1999.

Country	DPT3	HB3
Colombia	75%	81%
Brazil	83%	83%
Costa Rica	85%	83%
Anguilla	88%	96%
Montserrat	90%	99%
Cayman Islands	85%	99%
Mexico	96%	96%
Cuba	98%	94%

Source: Country reports.



FIGURE 1. Cholera case-fatality rate, by percentage of rural population in Peru's departments, 1991–1993.

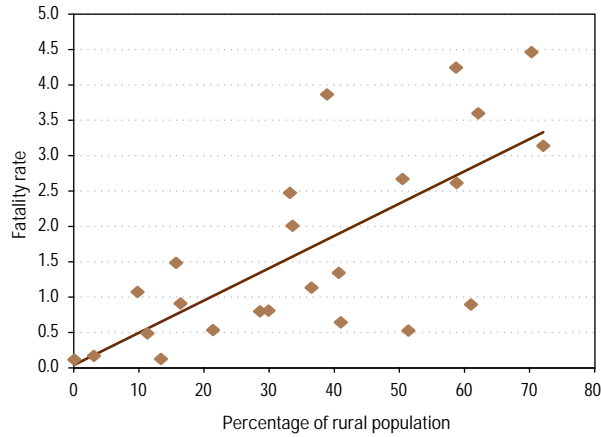


FIGURE 2. Cholera incidence rate, by per capita gross national product, by country.

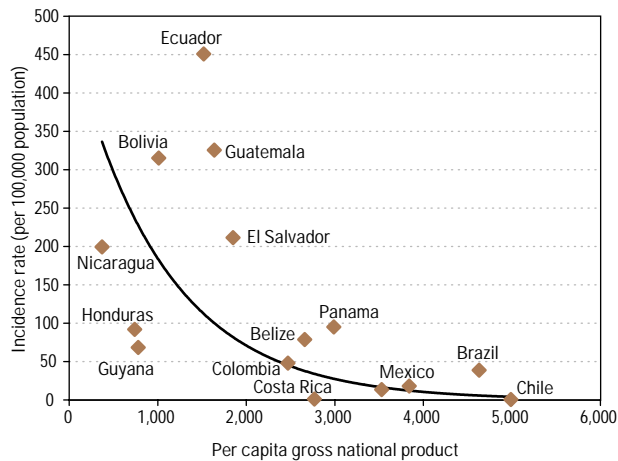
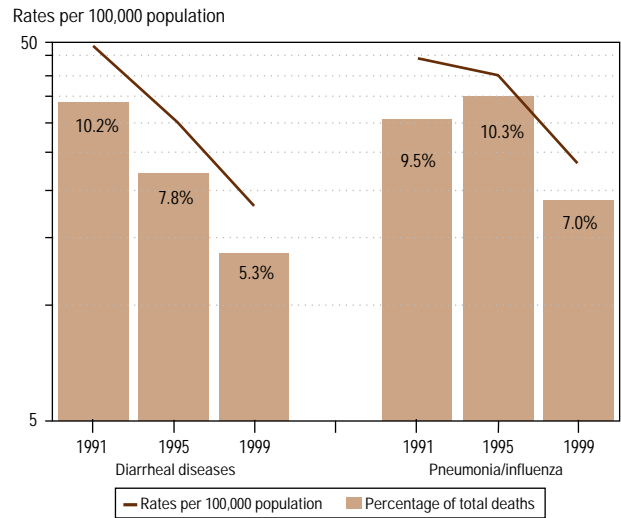
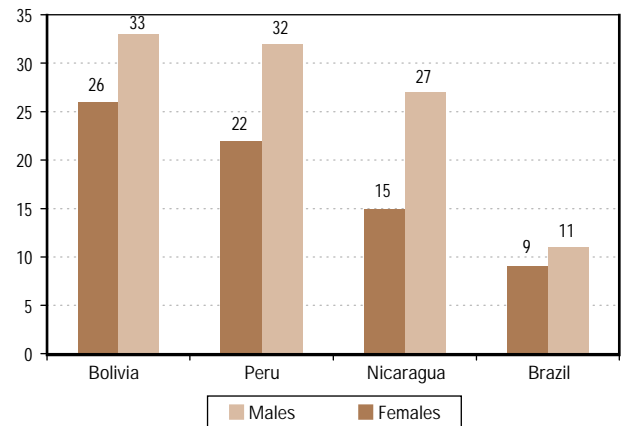


FIGURE 3. Trends in mortality rates from diarrhea and from pneumonia and influenza in children under 5, 19 countries of the Americas with 10,000 births per year<sup>a</sup> (rates per 100,000 population and percentage of total deaths).



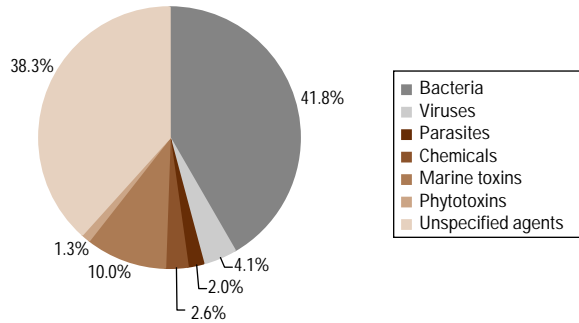
<sup>a</sup> The countries are listed in Table 21.

FIGURE 4. Percentage of young people between 15 and 19 years old, both sexes, who do not know of any method of protection against HIV, four countries of the Americas, 1996–1999.



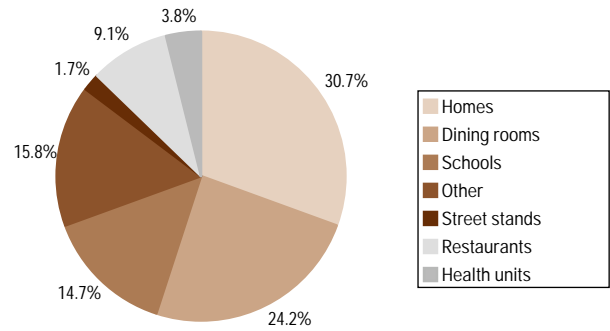
Source: National Demographic and Reproductive Health Surveys in Bolivia, Peru, Nicaragua, and Brazil.

FIGURE 5. Outbreaks of foodborne diseases by etiological agent, Latin America and the Caribbean, 1997–2000.



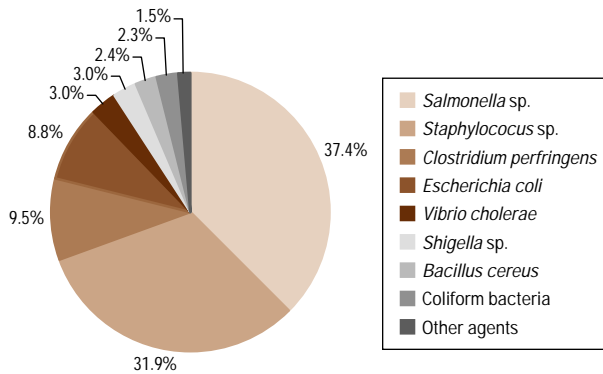
Source: PAHO. Regional Information System for the Epidemiological Surveillance of Foodborne Diseases (SIRVETA).

FIGURE 7. Outbreaks of foodborne diseases caused by bacterial agents, by place where food was consumed, Latin America and the Caribbean, 1997–2000.



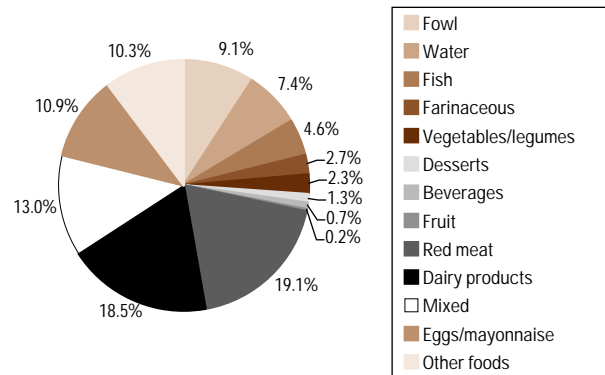
Source: PAHO. Regional Information System for the Epidemiological Surveillance of Foodborne Diseases (SIRVETA).

FIGURE 6. Outbreaks of foodborne diseases, by bacterial agent, Latin America and the Caribbean, 1997–2000.



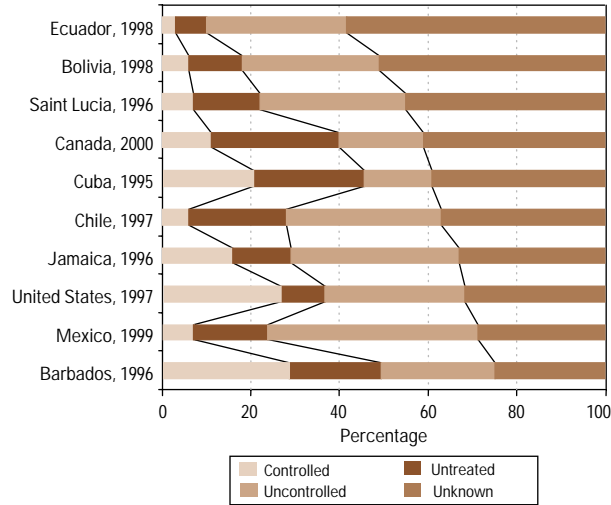
Source: PAHO. Regional Information System for the Epidemiological Surveillance of Foodborne Diseases (SIRVETA).

FIGURE 8. Outbreaks of foodborne diseases caused by bacterial agents, by type of food, Region of the Americas, 1997–2000.



Source: PAHO. Regional Information System for the Epidemiological Surveillance of Foodborne Diseases (SIRVETA).

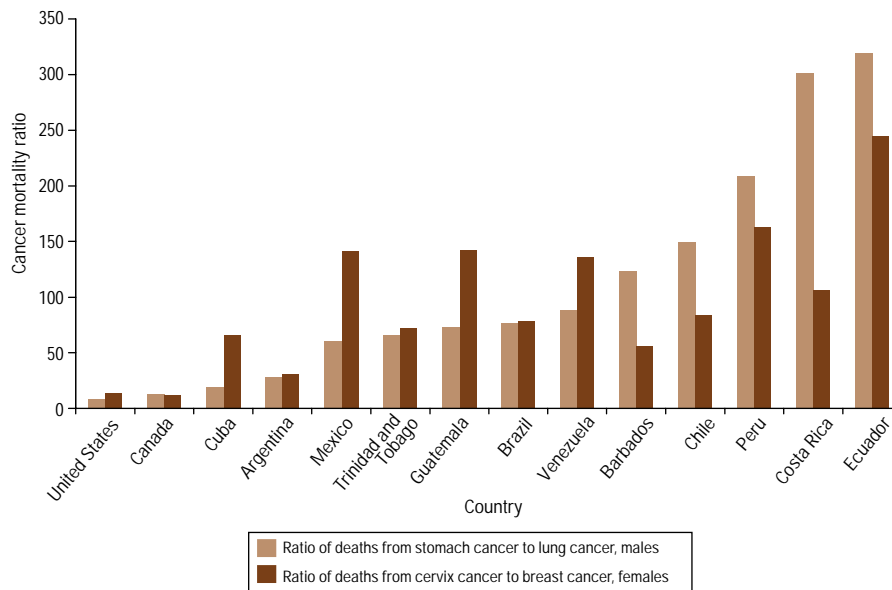
FIGURE 9. Percentage of hypertensives diagnosed, treated, or controlled, selected countries of the Americas, 1996–2000.



Note: Controlled: hypertension under treatment, systolic blood pressure <140. Uncontrolled: hypertension under treatment, systolic blood pressure >139 and diastolic blood pressure <89. Untreated: diagnosed but not treated. Unknown: newly diagnosed.

Sources: Orduñez PO, *et al.* Hypertension in Cuba: evidence of narrow black-white difference. *J Hum Hypertens* 1998; 12:111-116; American Heart Association. *Heart and stroke facts statistics*. Dallas: AHA; 1993; King H, Aubert RE, Herman WH. Global Burden of Diabetes, 1995-2025. *Diabetes Care* 1998;21:1414-1431; The Diabetes Epidemiology Research International (DERI) Study. DERI Mortality Study Group. International analysis of insulin-dependent diabetes mellitus mortality: a preventable mortality perspective. *Am J Epidemiol* 1996;142(6):612-618.

FIGURE 10. Indicators of the transition in cancer mortality, selected countries of the Americas, 2000.



Source: PAHO/Globocan 2000.

FIGURE 11. Average consumption of defined daily doses (DDD) of morphine (per 1,000,000 population), selected countries of the Americas, 1995–1999.

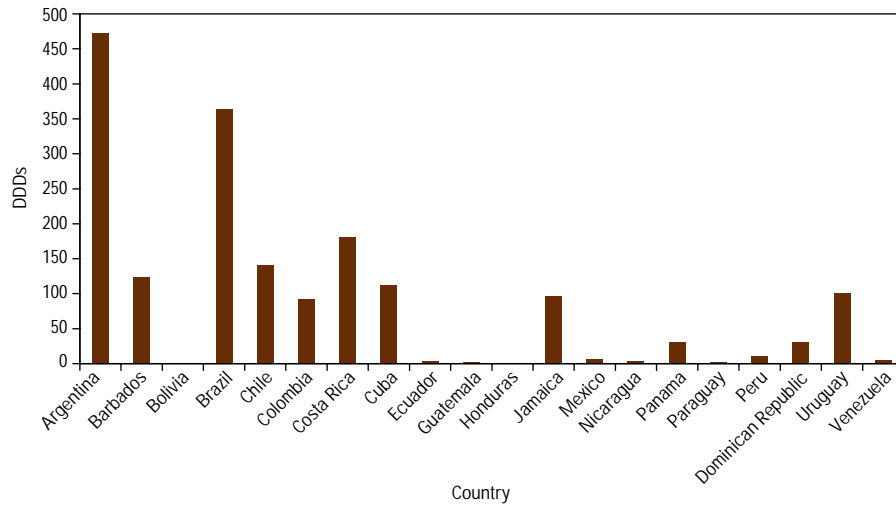
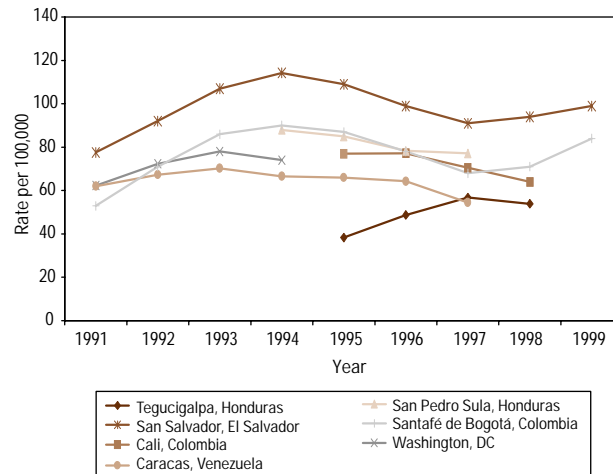
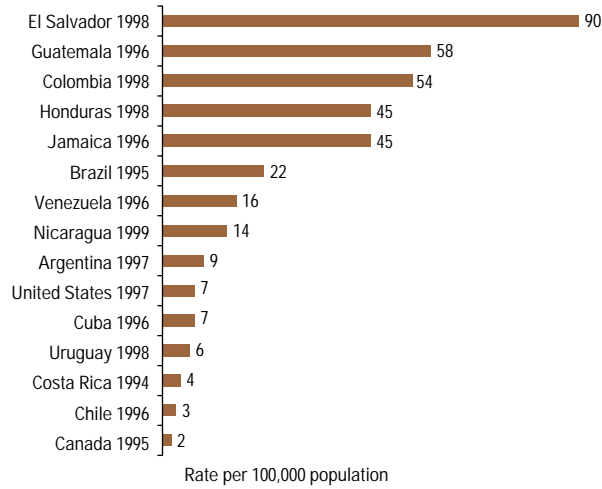


FIGURE 12. Homicide rates (per 100,000 population), selected cities in the Americas, 1991–1999.



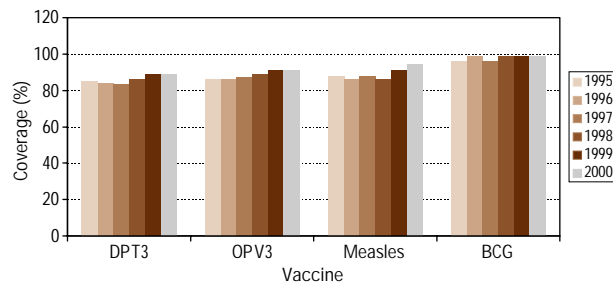
Sources: Tegucigalpa, Honduras, Policía Nacional de Honduras. San Pedro Sula, Honduras, Policía Nacional de Honduras. San Salvador, El Salvador, Fiscalía General de la Republica. Santafé de Bogotá, Colombia, Medicina Legal 1990, estimaciones. Cali, Colombia, Medicina Legal 1990–1997. Desepaz, Alcaldía de Cali 1998–1999. District of Columbia. WISQRS (Web-Based Injury Statistics Query and Reporting System) CDC <http://www.cdc.gov>. Caracas, Venezuela, Estadística Delictiva/Ministerio de Justicia, División de Estadística del CTPJ Cálculos

FIGURE 13. Mortality rate from homicide (per 100,000 population), selected countries of the Americas.



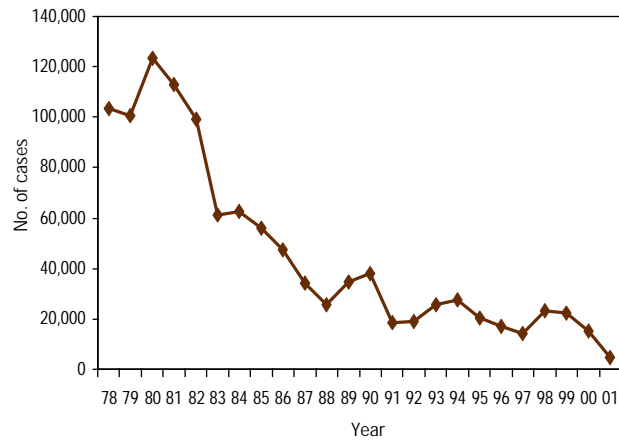
Sources: Cruz JM, González LA, Romano LE & Sisti E. 1998 *La Violencia en El Salvador en los años noventa. Magnitud, costos y factores posibilitadores*. Instituto de Opinión Pública. Universidad Centro Americana José Simeón Cañas. BID, Documentos de Trabajo, R-338, Washington, DC, Oct. 1998. (Fuente: Fiscalía General de la República). Centro Nacional de Referencia sobre Violencia. 1998 Instituto de Medicina Legal y Ciencias Forenses. *Lesiones de causa externa, Bogotá, Colombia*. (Datos propios del IMLCF). Mendoza C. 1999 Diagnóstico de la violencia en Guatemala. Centro de Investigaciones Económicas Nacionales. Guatemala. (Fuente: Instituto Nacional de Estadísticas de Guatemala). Gordon G, Durant T, Ward E, Lewis-Bell K & Ashley D. 1999. *Understanding the state of accidental and violence-related injuries in Jamaica*. Study report. Rodas A. 2000. *Informe al Comité Interinstitucional Nacional de Prevención de la Violencia*. Tegucigalpa. Honduras. (Fuente: Instituto Hondureño de Medicina Forense). Dirección Nacional de Política Criminal. 1998 *Homicidios dolosos en la ciudad de Buenos Aires*. Buenos Aires: Ministerio de Justicia. Centers for Diseases Prevention and Control, Atlanta, GA, USA. <http://www.cdc.gov> 1999. Gordon JE. The epidemiology of accidents. *Am J Public Health*, 1949;39:504-515.

FIGURE 14. Vaccination coverage of children under 1 year old, Region of the Americas,<sup>a</sup> 1995–2000.



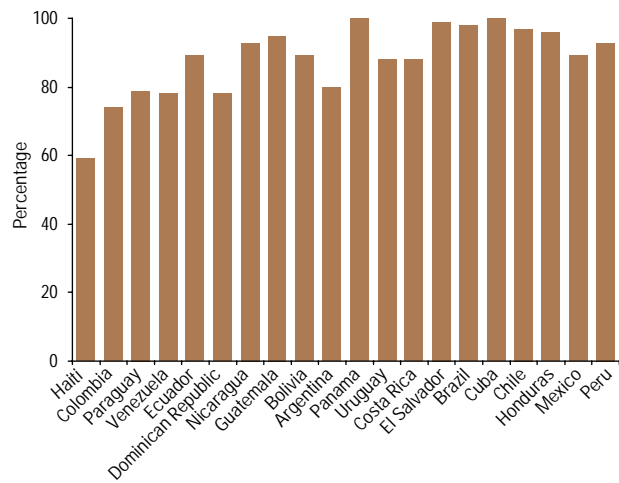
<sup>a</sup> Excludes Canada and the United States.  
Source: Country data.

FIGURE 15. Number of cases of pertussis, Region of the Americas, 1978–2001.<sup>a</sup>



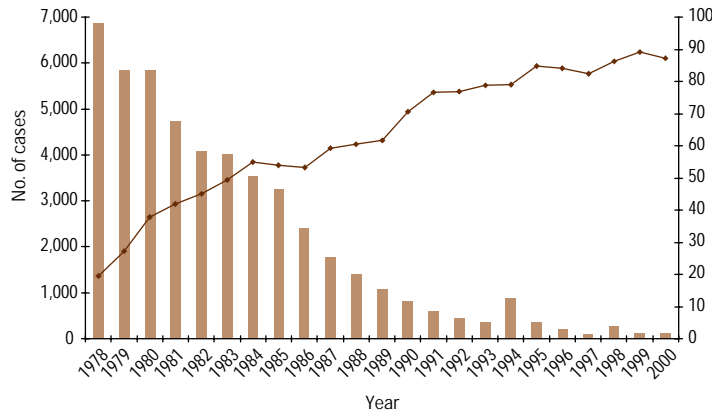
Source: PAHO, Division of Vaccines and Immunization.  
<sup>a</sup>Data up to 30 June.

FIGURE 16. Immunization coverage (%) in children under 1 year old, selected countries of the Americas, 2000.



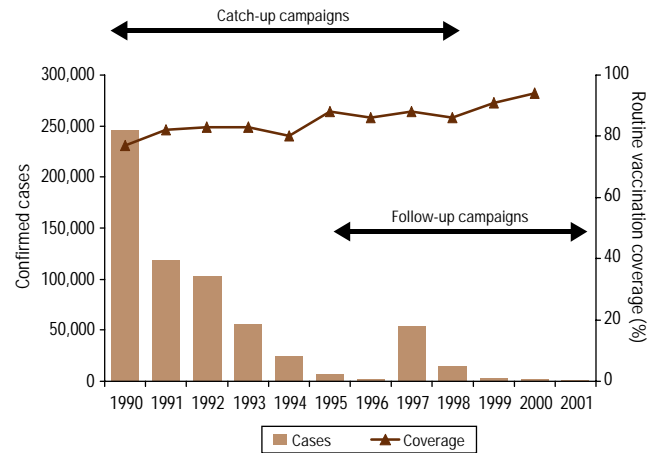
Source: PAHO, Division of Vaccines and Immunization.

FIGURE 17. Vaccination coverage with DPT3 in children under 1 year old, and number of registered cases of diphtheria, by year, Region of the Americas, 1978–2000.



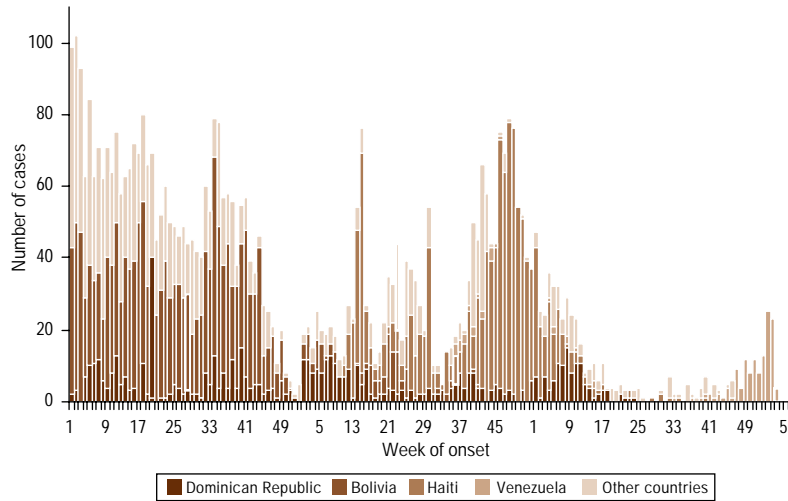
Source: PAHO, Division of Vaccines and Immunization.

FIGURE 18. Vaccination coverage and number of registered cases of measles, Region of the America, 1990–2001.



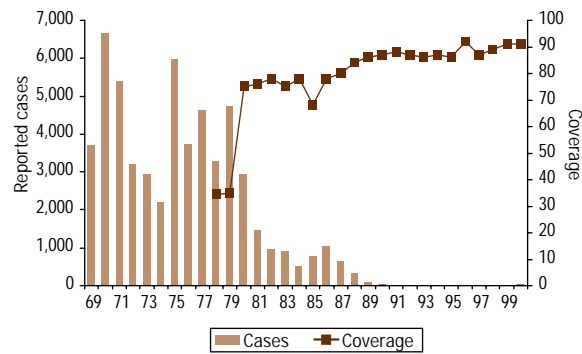
Source: PAHO, data sent by the countries, updated 29 January 2002.

FIGURE 19. Confirmed measles cases by onset week, Region of the Americas, 1999–2001.



Source: PAHO, data sent by the countries, updated 29 January 2002.

FIGURE 20. Vaccination coverage<sup>a</sup> with OPV3 and incidence of paralytic poliomyelitis, Region of the Americas, 1969–2000.



Source: PAHO, Division of Vaccines and Immunization.  
<sup>a</sup>Coverage data for children under 1 year old.





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# VII. HEALTH RESOURCES AND TECHNOLOGY

*The collective defense of health is a near-constant concern of the American States, and it is mainly in order to improve sanitation that these scientific exchanges are carried out...*

Dr. Justo F. González,  
Delegate of the Republic of Uruguay  
Seventh Pan American Sanitary Conference, Havana, Cuba, 1924

## HUMAN RESOURCE DEVELOPMENT

Human resources are a critical factor for generating changes in the health systems that will satisfy the population's needs and demands. Human resources have been mostly overlooked by health sector policy reform agendas, however, and only now are they being treated as a priority.

This issue is a matter of constant concern to health authorities; major problems persist, such as human resource distribution, migration, and low wages, as well as inequities and imbalances between staff training and the needs of the health service system. Moreover, the health system's institutional capability to manage human resources cannot cope with the problems of health service employees, let alone ensure that institutional conditions are in place so that personnel can contribute effectively, with quality, and productivity toward those services' objectives.

Reform processes superimposed new problems to existing ones (1). Existing problems include the health sector's high degree of participation within the economically active population (EAP) and the high percentage of State expenditures destined for health personnel; imbalances in health personnel availability; inequities in the geographic distribution of resources; imbalances in the makeup of health equipment; poorly developed information systems; and poor integration between training and services. New problems include decentralization and break up of responsibilities; a flexible labor market and pervasively precarious working conditions; the demands of new regulations; productivity incentives and society's demand for better quality; changes in educational opportunities; and training challenges to cope with reforms.

## Persistent Imbalances

The health sector's labor force constitutes a high proportion of the EAP, and it has a pronounced participation of women, who—given the current employment crisis—are likely to be greatly affected (Table 1).

Table 2 shows the significant differences in the availability of health professionals among countries. In the case of physicians, availability varies widely, from 58 physicians per 10,000 population in Cuba to around 3 per 10,000 in some Caribbean countries and Bolivia; the figure for the Region as a whole in 1999 was 19.8 per 10,000 population. A concentration of professionals in the most developed cities occurs in most of the Region's countries. The situation in the interior of countries for which there is available information is of an extremely uneven distribution of health care professionals. Such is Brazil's case, where the national average is 14.4 physicians per 10,000 population, but the figure is only 6 per 10,000 population in the north, 8 per 10,000 in the northeast, and 21 per 10,000 in the southeast. In Colombia, where 57.3% of the physicians are general practitioners, 26.4% of them work in Bogotá, the country's capital. In Guatemala's rural areas there is only one physician for every four who work in urban areas. Argentina also experiences extremes: the capital, Buenos Aires, has one physician for every 95 persons, but in Tierra del Fuego there is one physician for every 962 persons. In the 1990s, the general trend showed little change in the ratio of physician per persons.

The situation of nurse professionals varied significantly over the period. In 45% of the 44 countries for which information exists, the ratio of nurses per 10,000 population increased (2). In

1999, the ratio was 40.5 nurses per 10,000 population, ranging from about 1 per 10,000 in Haiti and Paraguay to 97 in the United States of America.

The availability of dentists in the Region is low, and they mainly practice in urban areas. This situation is aggravated by the fact that in most Latin American countries there are few training opportunities for technical and support staff (dental technicians, dental hygienists, dental assistants), which raises the cost of dentistry and reduces the possibility of expanding oral health coverage. In 1999, the ratio for the Region was 5.5 dentists per 10,000 population, ranging from 0.1 per 10,000 in Haiti to 12.6 in Uruguay.

Little information is available on other groups of professionals responsible for providing health services, which limits the ability to gauge and analyze trends. In fact, the development of information systems on human resources in the field of health is insufficient, and existing systems are often fragmented and lack continuity. According to a PAHO survey conducted in 18 of the Region's countries, 8 countries have information systems on human resources, but only 3 are automated. As the provision of health services was decentralized to the local level, this situation worsened, because some of the central information systems that monitored the countries' situation were dismantled.

A lack of coherence between available training and actual needs of health service provision continues to exist. Despite progress made in integrating teaching in service, professional profiles differ from the occupational profiles required to provide health services to the population. Moreover, the curricular content is fragmented, and an excessive amount of time is spent on clinical aspects rather than on public health matters. Hospitals continue to be the main source of training.

### **New Problems**

An examination of the stagnation and undesirable effects of many national reform processes has highlighted the fact that structural changes cannot be introduced into the health systems unless they go hand in hand with programmed efforts to modify the capabilities, organization, and attitude of the main actors involved—the health workers.

In 1999, PAHO, along with the International Labor Organization (ILO), and the Economic Commission for Latin America and the Caribbean (ECLAC) launched the Human Resources Observatory, an initiative designed to gather information on structural changes in the human resource function in the Region's countries. Within the framework of the initiative, in the first months of 2001, PAHO conducted a survey of those responsible for this function within the health authorities of 18 countries. The survey yielded an overview of the responsibilities and the structure of units that conduct human resources policy and regulate human resources in the health sector, regardless of the unit's name, position, or degree of deconcentration it had in a given country.

The following are aspects of the reform effort that have a reciprocal effect on health workers and on the management of human resources in the health services.

#### *Decentralization and Administrative Changes*

Organizational changes in the health sector manifest themselves in various modalities and levels of decentralization, in the separation of functions between those responsible for financing and those producing services, and in a redefinition of responsibilities of the various levels providing health care. This requires that the local level have a greater technical and administrative responsibility, as well as better problem-solving capabilities and autonomy in human resource management.

Health professionals must cope with changes in labor contract negotiations; the main contracting parties, in turn, must deal with mechanisms that have been created to establish wages and salaries, workloads, and training. There also is greater demand for quality and productivity in health services, both by management and by the population itself; this higher demand is played out within a framework of direct competition between the public and private sector, which produces changes in work processes and imposes greater demands on health personnel.

Furthermore, in a manifestation of a growing participatory trend, recent legislation has widened users' opportunities to have a hand in the management of health services. This entails more training for users, and creates a different relationship between users and health professionals. Moreover, it raises new demands for the health worker, who faces a user increasingly aware of his or her duties and rights.

The above-mentioned survey showed that most of the 18 countries covered had some decentralized decision-making for human resources, particularly the largest countries with the greatest regional diversity within their borders, such as Argentina, Brazil, Chile, Colombia and Venezuela (Table 3).

#### *Employment Flexibility*

The search for employment flexibility, as an essential way for cutting labor costs and creating competitive conditions, is one of today's personnel management paradigms in the economy as a whole and in the health sector in particular. A growing tendency to set up flexible labor contracts, often within rigid regulatory frameworks, was clearly identified in most of the Region's countries. As a result, many countries reformed their regulatory mechanisms in 1990–2000 to allow for changes in public service labor regulations (see Table 4).

In the health sector, this flexibility is coupled with serious budgetary restrictions. For instance, the information produced by the Human Resources Observatory shows that Brazil has more than 15 employment modalities in the public sector. In addition, within the framework of decentralization to the municipalities, increasingly flexible ways of contracting (temporary, "on spec," etc.) are seen.

In Costa Rica, new legal provisions (official document on general guidelines for the restructuring processes, 1994–1998) and labor and administrative laws applicable to companies, have created conditions whereby staff can be dismissed on the basis of “reductions in force due to absolute lack of funds” if the measure affects 60% of the employees; to outsource security, laundry, and cleaning services; and to “define and establish alternative contract methods, new systems for enhancing the flexibility of labor conditions and payment methods.” All this occurs within the framework of administrative commitments and modalities for purchasing cooperative health services (3).

The case of Peru illustrates the use of flexible ways to contract staff as a way to implement service recovery policies, increase coverage, and promote ways to attain community self-management. In 2000, some 10,000 people had flexible work contracts, many of which did not entitle them to any benefits.

The investigation on reform of the health sector and its implications for nursing practice, regulation, and education, which covered five countries, shows that in Argentina, Brazil, Colombia, Mexico, and the United States nurses work more with less staff; see patients who are sicker in shorter time frames; have limited materials, equipment, and support services; must increase their technological knowledge; must deal with better informed, more educated users who make greater demands; and must go elsewhere to practice (patient’s home, workplace, schools, cooperative services, or private practice groups that provide services to institutions). Research also points to the fact that more flexible contracting methods are coupled with staff transfer, interinstitutional migration, and reduced labor stability and security problems.

The complexity of this situation raises the following questions. Is it possible to improve the quality of care under such conditions? Can the objectives of increased productivity be achieved under precarious working conditions? What is the future of employment in already reformed systems? What will happen to monetary-incentive systems under more flexible conditions? Can greater flexibility be sustained in this kind of service? What is the impact of changes on doctor-patient relationships?

#### *Regulation of Health Training and Practice*

One of the central State reform tracks that most of the countries have adopted is the deregulation of critical processes, many of which deal with human resources. In the health services, this deregulation affects the above-mentioned labor flexibility, as well as corporate mechanism changes that influence the makeup of working teams, the composition and areas of responsibility of health professions, and professional autonomy.

As the State has gradually withdrawn from its standard-setting function, leaving the market to act as an automatic regulatory mechanism, shortcomings of “automatism” have become clear, as well as the need to have the State assume this responsibility again. In the health sector, regulation is complex. Regulatory models tend to include mechanisms that define process characteristics,

such as professional practice or education and the technical standards that professionals must attain. To this end, means such as market-entry (which includes licensing or certification), or career-entry (entrance exam or similar test), monitoring of professional competence, labor market structure, and payment mechanisms are used. Overall, the Region’s countries, with the notable exception of Mexico, have insufficient and conflicting regulation; some countries, such as Panama, have no regulation at all.

In terms of regulating the training of health professionals, the countries confront a double crisis. On the one hand, nearly all of them lack coordination of responsibilities between ministries of health and ministries of education, which leads to an insufficient regulation of higher and technical education. And in some cases, the situation is even more complex, because activities in the same field are undertaken by nongovernmental organizations (as observed in Chile and Mexico with the training of specialists).

On the other hand, the difficulty can result from the rigidity of legal frameworks that preclude players from regulating education, or to political and technical weaknesses of specialized agencies or those responsible for personnel matters within ministries or jurisdictional entities. In many cases, ministries of health have experienced an erosion of their human resource development units, the disappearance of regulatory mechanisms (residency commissions, for instance), and an inability to negotiate or to reach agreements with corporations, which they once had.

Currently there is widespread concern over the search for frameworks and mechanisms for regulating professional practice and improving existing practice (such as in Chile, Jamaica, and Mexico). Although not widely known, there have been many instances of professional certification, as well as fewer cases of specialty or professional competence recertification (4).

As a result of the growing opportunities for higher education in the private sector, accreditation requirements for higher education programs and institutions have gradually been put in place. In Colombia, for instance, voluntary accreditation of university programs is becoming compulsory, both because certification confers a positive image and because of the benefits obtained from the accreditation process. Of the 18 countries surveyed, 13 (72%) accredit programs or higher education institutions through mechanisms that aim to guarantee the quality of training processes (Table 5).

The following institutional evaluation processes deserve mention: Cuba’s Ministry of Higher Education has, for the last 10 years, applied an evaluation system for the country’s higher education centers that includes self-evaluation and external evaluation every three or four years; Chile’s High Council of Education, acting within the framework of the Constitutional Organic Education Act must grant permission to every higher education center and any of its programs (academic tracks) to operate in the country; Argentina’s Secretariat of University Policy, within the Ministry of Education, has in place a self-assessment process for the country’s universities, with support from the World Bank’s

higher education reform project; Colombia's National Council for Accreditation, operating under Law 30 of 1992 that determines the organization of the higher education public service, has gradually introduced institutional self-assessment.

Within the framework of program (academic track) assessment and accreditation, two experiences deserve mention. First, Chile's High Council of Education has been charged with evaluating and accrediting any new program (academic track) created any of the country's "new" higher education centers (new programs offered by "old" universities are exempt); second, Brazil's Coordination of Higher Level Staff Improvement (CAPES) has evaluated national postgraduate programs for over 20 years.

In 15 of the 18 surveyed countries, the universities are directly responsible for granting professional degrees. In the remainder, the ministries of health and of education, and professional associations, share this responsibility. Recertification is still incipient, and few countries (Argentina, Costa Rica, Honduras, Jamaica, Mexico, Peru, and Venezuela) have mechanisms in place to be able to guaranteeing a degree's validity after it has been awarded (Table 5).

The State's withdrawal from its regulatory functions has made it difficult to build the institutional capability required for regulation. A survey conducted in 2001 showed that, although national health authorities have human resource departments or units, many have limited regulatory jurisdiction or the ministry of health internal training functions are circumscribed (Table 6).

The dynamics of regulation efforts in countries that participate in building subregional integration blocs is an interesting case in point. In the case of MERCOSUR, for example, it is clear that participating countries must establish common regulations, if they are to cope with the new market that emerges as borders open. The main issues to be regulated include differences in admission criteria to institutions that train and award degrees to professionals, control of professional practice, migration processes and their impact on labor markets. A treaty on the free movement of professionals among the countries has been in force since 1997.

### Productivity Incentive Systems

The implementation and evaluation of productivity incentive systems is another requirement shared by most of the countries of the Americas. This matter is relevant not only because it is widespread, but also because of its consequences on staff's effective performance and contribution towards the improvement of the productivity of the services. Several countries, such as Brazil, Chile, Mexico, and Peru, have reported experiences in productivity incentives; others—Costa Rica, Ecuador, El Salvador, Jamaica, and Panama—are evaluating the use of such systems.

Defining and measuring productivity are two of the most dynamic and controversial issues in health management. Another key element is the sustainability of incentive systems, as well as their real impact on health care. Past and present experiences must be compared and evaluated in order to learn from them and

guide decisions to modify existing incentive systems or introduce new ones.

This is no easy task, given the complexity and conflicting nature of the incentives issue. Brazil's experience in this regard is a good example: the State of Minas Gerais' hospital foundation put in place a system of "rewards for service efficiency," which was officially regulated by state law (5). This management strategy aimed to restore the worker's commitment to the institution and offer fairer salaries, promote the option of a full working day, reward skilled labor (compensating for onerous work and making adequate new staff available to the labor market), and put an end to the stagnation and invulnerability of officials who shield themselves behind traditional contracts.

The evaluation confirmed that results-based pay (or conditional incentives) leads to positive changes in the level of production and productivity of services, even if it is not sustained over time. It also corroborated that these alternatives may be used as part of a broader, long-term organizational development strategy, not merely as isolated elements aimed at achieving specific and short-term productivity improvements.

### Changes in Education Opportunities

Today, the education issue poses two major challenges: education to prepare professionals and technicians and education to improve the performance of permanent staff. Despite reforms made to the Region's higher education systems in the 1990s, the direction of training did not substantively change, because reforms targeted changes in work hours, curricular flexibility, and the promotion of new teaching modalities, rather than harmonizing training proposals to the needs of each country's health system.

Given the tendency in professional schools to tackle curricular reforms as their main reform strategy, it is up to other players to call for the evaluation and improvement of educational quality, the regulation of educational offerings with a greater institutional commitment to continuing education (and its coordination with regulatory mechanisms such as certification and recertification), and the reclassification or professionalization of auxiliary and technical staff. The influence of reforms on the higher education sector has led to an explosive growth in higher education and technical training institutions and centers; in many cases (such as Colombia's) this has resulted in the overproduction of certain professions or technical staff, and forced universities to compete among themselves for placing their students.

Moreover, growth in higher education offerings (which accounts for almost 70% of the new programs created in the last decade) is almost exclusively based on the generation of private educational opportunities, because many countries have deregulated their higher education systems. This is one of the main reasons why many countries began to promote the accreditation of higher education programs in the health sciences.

The current medical labor market, characterized by glutted urban job markets and a trend towards a fragmented and technological practice model, have demonstrated the importance of having suitable systems to train specialists. The results of a survey carried out in some of the Region's countries show a tendency towards official accreditation of medical specialists, although many countries delegate authority in this area to professional associations, following the Anglo-Saxon model (Table 7).

The greater complexity of health care models and the technological evolution of health care, as well as the glutting of labor markets for traditional health care professions, have broadened the training and work of technology professions, often through an uncontrolled expansion of private training offerings. The education of permanent staff in nearly every country has significantly changed as a result of these reforms. To support decentralization efforts and the implementation of new organizational and management modalities, widespread, local-impact projects have been developed in response to new occupational profiles and the skills these profiles require. The projects, in turn, have required that other educational paradigms and new modalities of program and plan management be adopted; they also have sparked a burgeoning training market.

This helps to explain the adoption of educational management methods such as competitive funds (Chile, Costa Rica, and Peru), the creation of academic networks to support projects (Brazil, Peru), international and national bidding, modalities of distance education and through workshops. It is important to assess these experiences in terms of process, results, and impact.

Some experiences are unique, as is Cuba's, whose health care model is mainly made up of family doctors responsible for primary health care. Brazil, through the Family Health Training Axes, has tried to narrow the gap between what training offers and what health services need, coordinating work in the field of medicine and nursing and with training entities and public health services.

As a way to evaluate the processes for training health professionals in service, within the framework of sector reforms, PAHO's Human Resources Development Program conducted a study on the status of educational components in projects related to the health sector's reform processes (6). The study shows that training processes have helped to increase the competence and skills of health workers and have resulted in favorable institutional changes in the services themselves (for instance, improving health care quality, increasing coverage, improving the work environment), in addition to helping to attain specific objectives of the sector's reform projects in which they were included. Nevertheless, the training component has not helped to formulate human resource policies in the countries, and this is a critical aspect for guaranteeing the sustainability and continuity of training processes under way. The obstacles identified in the development of training within the various projects implemented in the studied countries deal with problems in the management process itself, as well as with political and economic determining

factors that affect the development of training and its end results. The study validates the strategy of continuous education as key for educating public service officials.

## HEALTH FACILITIES

Health services are provided in various facilities, ranging from physical installations using fairly basic equipment to technologically complex, specialized hospitals. Other facilities provide support for the health care network and the community. Sometimes, health care is provided in establishments originally designed for other purposes, such as schools or community centers.

Complete information on the various kinds of health care establishments in the Americas is not available, because there is no systematically collected, basic information on health resources and data on health establishments is difficult to consolidate, owing to the fact that categories and denominations vary from country to country. In general, there is more information on public sector establishments than private ones.

### Hospital and Outpatient Care Facilities

There are more than 25,000 hospitals in the Region of the Americas (Table 8). According to information for 2000 or the last year available, there are 3.2 hospitals per 100,000 population in the Region, and a total of 2.8 beds per 1,000 population (7–9). Central America has fewer hospitals (1.5 per 100,000) and fewer beds (1.4 per 1,000), roughly half the Region's average. Hospital availability in the Andean Area also is low (2.7 per 100,000), as is bed availability (1.5 per 1,000). The Southern Cone, on the other hand, has nearly double the Region's hospital availability (6.1 per 100,000) and greater bed availability (3.5 per 1,000).

In general, number of beds is a better indicator of the availability of specialized health care resources than is number of hospitals, since the latter differ widely, with their number of beds fluctuating from under 10 to more than 3,000. According to 1997 information from PAHO's Hospital Directory for Latin America and Caribbean Directory of Hospitals (7), two-thirds of the Region's hospitals have fewer than 50 beds (Figure 1), whereas most of the remaining hospitals have between 50 and 200 beds. And, while there are very few hospitals (1.4%) with more than 500 beds, because of their size they represent 15.4% of the total number of beds in the Region.

Hospitals are usually classified according to their ownership or the population they serve. According to the first criteria, they are classified as either public or private. The main public sector hospitals come under the ministries or secretariats of health. In 16 countries in the Region, more than 90% of the hospital beds belong to public hospitals (7). In some countries, social security hospitals represent an important percentage, as is the case with Costa Rica's Social Security Fund (which most of the country's

hospitals come under) and the Mexican Social Security Institute, which accounts for more than one-third of the country's hospitals and approximately one-third of the beds (7).

Bed availability is associated, among other factors, with a country's socioeconomic development. Figure 2 illustrates the variation in the availability of beds per 1,000 population in some Latin American and Caribbean countries (with more than 500,000 population and with available information), by per capita gross domestic product adjusted for the currency's purchasing power parity (PPP) for 2000 (10). The availability of beds in countries whose per capita GDP adjusted for PPP is under US\$ 1,000, ranges from 0.5 and 1.5 per 1,000 population, but the availability of beds climbs to 3.0 per 1,000 population when per capita GDP adjusted for PPP is over US\$ 3,000.

According to PAHO's core data for 2001 (11), there are 156,551 outpatient health care centers in Latin America and the Caribbean, for a ratio of 3.0 establishments per 10,000 population (Table 9). Availability is greater in the Andean Area and in the Southern Cone, and lower in the non-Latin Caribbean. This subregion's ratio of hospitals and hospital beds per 1,000 population exceed the Region's average, probably because outpatient care there is mainly provided in hospitals. There are 41,000 outpatient health care centers in Brazil; 34,000 in Colombia; and slightly fewer than 18,000 in Mexico. It should be noted that these establishments do not cover all outpatient health care, since some outpatient care is provided in external departments or clinics in hospitals, in other sorts of informal facilities, or in facilities with other purposes, such as schools. Furthermore, outpatient health care centers often include one or more beds for patient observation, temporary stay, deliveries, or minor surgery, which gradually makes the facility rank somewhere between an outpatient center and a hospital.

### Engineering and Maintenance of Health Facilities

The health sector's reform processes usually include an investment component for the recovery, modernization, and equipping of public network health establishments, especially in hospitals, depending on the degree of deterioration and physical, functional, and technological obsolescence of the network in question. However, the countries do not have enough up-to-date information on the state of the physical and technological infrastructure of health services. The steps taken to cope with the potential Y2K problem included gathering information on equipment, mainly in the public sector (12). The information indicated that: 1) there was scant sectoral and institutional capability to maintain facilities and equipment, a situation compounded by the rapid development and incorporation of new technologies and the weak level of after-sales technical service for new equipment; 2) there was an inability to operate and maintain the full complement of technological equipment, because of the wide variety of makes and models and insufficient knowledge about how

such equipment works; 3) there were inadequately trained persons to ensure the adequate servicing of equipment and maintenance of facilities, which is particularly critical in small countries with equipment of medium and high technological complexity, and in countries without academic programs for training professionals and technicians; and 4) maintenance program budgets were insufficient for ensuring an adequate response and total coverage—on average, less than 1% of the health facilities' operating budget is earmarked for maintenance activities. Considering these problems, health authorities are giving greater priority to this area.

## HEALTH EQUIPMENT AND TECHNOLOGY

### Imaging and Radiotherapy

The United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) periodically reviews the global situation of radiology services worldwide. Its latest report, published in 2000 (13), includes qualitative and quantitative information on the frequencies and doses for diagnostic and therapeutic radiology equipment and procedures, assessments of global practices, and evaluations of temporal and regional trends from data collected in 1991–1996. Based on correlations found between the number of x-ray examinations and physicians, both calculated per unit of population, the report categorizes countries in four levels of health care, depending on whether there is at least 1 physician per 1,000 persons (level I), 1 per 1,000–3,000 (level II), 1 per 3,000–10,000 (level III), or 1 per more than 10,000 (level IV). This model provides a robust assessment of global practice in medical radiology and allows for an assessment of trends to be made. The report documents significant differences between countries and within regions in a country.

The vastly different demographic and socioeconomic circumstances to be found in the Americas result in a great variety in the number and quality of diagnostic and therapeutic radiology services in the Region. Diagnostic radiology and radiotherapy services continue to suffer not only from a lack of financial resources but also from an inefficient allocation of available resources. Many of the countries have inadequate and/or deteriorating physical resources (buildings and equipment), lack of adequate specifications for purchasing new equipment, insufficient salaries for the health service personnel, and a lack of working habit discipline. Obvious consequences include nonfunctioning equipment; minimally trained staff; ineffective diagnostic and/or therapeutic protocols; and unsafe radiation conditions for patients, staff, and the public.

Many of the Region's countries have worked on elaborating plans for the organization and development of radiology services; these plans give adequate attention to facility planning and renovation, equipment purchasing specifications, maintenance, continuing education, quality assurance, and radiation safety. A

growing number of countries are seeking to implement health technology assessment and management programs, diagnostic and therapeutic service standards, and radiation safety legislation and regulations is slowly increasing at the national government level.

#### *Status of Diagnostic Imaging Services*

Imaging services play an increasingly important role in the diagnosis and treatment of certain illnesses, especially cardiovascular diseases and cancer. Early detection is an important factor from the viewpoint of health promotion, as it translates into simpler treatment modalities with better survival outcomes and quality of life. The x-ray examinations that have increased in frequency, especially in health care level I countries, are most notably computed tomography (CT), angiography, and interventional procedures, while there has been a decrease in examinations of the gastrointestinal tract and chest photofluorography. In general, the number of medical x-ray units in level I countries has decreased, while the number of x-ray examinations per unit has increased. Advances in non-ionizing radiation imaging equipment, such as magnetic resonance scanners, ultrasound units, and endoscopy devices, may eventually reverse this trend. Significant differences in imaging studies have been reported within countries and within regions in a country. For example, in Canada variations in the frequency of medical x-ray examinations between the different provinces ranged from 708 per 1,000 population to 1,043 per 1,000, with the national mean value being 892 per 1,000 (13). Table 10 shows the status of diagnostic imaging equipment and services in the English-speaking and Dutch Caribbean countries in 2000, as well as whether facilities in these countries have quality assurance protocols and equipment, maintenance support services, and personnel radiation monitoring programs. On average, these countries have one unit per 10,000 to 20,000 population, which is acceptable for this area, except for Bahamas and Guyana, where the number is not sufficient. In Bermuda, which is classified as health care level I country (13), for example, the average is one unit per 600 inhabitants.

The annual average of medical x-ray examinations in these countries in 1991–1996 ranged between 100 and 300 exams per 1,000 population, which is about one-third of the figure in Canada (892). In Guyana and Jamaica the number of exams is lower still, 50 and 60 on the average, respectively. The Cayman Islands has the highest rate, with 572 x-ray exams per 1,000 population.

According to PAHO's guidelines on radiology services, available human resources are inadequate in most of these countries, especially in terms of radiologists (14). Guyana ranks lowest, with one radiologist and one radiographer covering more than 100,000 inhabitants. Equally insufficient are the country's quality assurance protocols, which are only partially performed. As can be seen in Table 10, equipment servicing in most of these countries is inadequate, whether done locally or from the United States of America. Radiation monitoring of personnel is lacking

in the British Virgin Islands, Dominica, the Netherlands Antilles, and Saint Lucia, which constitutes a violation of radiation safety standards endorsed by the XXIV Pan American Sanitary Conference (15).

Complete surveys of radiology services, evaluation of imaging and processing equipment performance, and personnel training, were conducted in Belize and in Trinidad and Tobago, and a survey was updated of Haiti's radiology services, which are equipped with World Health Imaging-Radiography Units. These assessments will provide the governments with a basis for establishing standards for radiology services. New imaging services have been installed in Saint Kitts and Nevis (radiography/fluoroscopy) and Dominica (computed tomography scanning), with emphasis being placed on quality assurance and ongoing maintenance support; one of the most serious problems in the Region.

No data such as is shown in Table 10 exist for Latin American countries, although much information has been compiled in Argentina, Bolivia, Colombia, Cuba and Mexico, through a multicenter research project conducted by national investigators and coordinated by PAHO. An evaluation, using internationally accepted technical criteria, was conducted of the technical performance of conventional radiographic/fluoroscopic equipment, mammography units, and CT scanners used in selected public and private facilities of medium complexity to diagnose tuberculosis, back pain, gastrointestinal ailments, and breast lumps. Patient workload, equipment specifications, staff training and experience, quality assurance and maintenance programs, and compliance with national radiation safety standards were documented, and equipment performance, patient dosages, and image quality were measured. In each country a panel of radiologists, recognized as experts by the national radiological societies, evaluated the clinical films and assessed the accuracy of the local radiological interpretation. Figure 3 shows the results of the mammography equipment evaluation (16). Compliance with established performance criteria was found to be better than 60%, except for the viewbox. Although the viewbox is one of the least expensive items, it significantly affects image visualization and, thus, diagnostic accuracy. The coincidence between the panel and the institution ranged between 15% and 100%, and was found to correlate only with radiologist experience. (17).

#### *Radiation Therapy Services*

The increase in life expectancy will bring with it a greater demand for cancer therapy services. It is estimated that radiation therapy, alone or in conjunction with surgery or chemotherapy, is required in more than half of cancer patients. An UNSCEAR publication in 2000 (13), reports that there are 5,500 radiation therapy centers worldwide, which perform 5.5 million radiotherapy treatments each year, using some 9,000 high-energy teletherapy machines, including linear accelerators and radionuclide (mostly Cobalt-60) units. The trend is for the latter to be replaced by the former, especially in health care level I countries. Other signifi-



cant trends involve the replacement of manual brachytherapy sources with surface, interstitial, and intracavitary applications by low dose-rate or high dose-rate remote afterloading brachytherapy devices. The number of units that perform stereotactic radiosurgery, whether radionuclide or linear accelerator-based, is also increasing.

Table 11 lists the distribution of radiotherapy equipment and brachytherapy sources in the Americas. In the United States and Canada there is one high-energy radiotherapy unit per 114,000 and 205,000 population, respectively (1991–1996). Other countries in the Region that approach these numbers are Argentina (260,000), Peru (206,000), and Uruguay (249,000). Brazil, Colombia, Cuba, Mexico, and Paraguay have far worse coverage, about one unit per 1,000,000 population. Many other countries, especially in the Caribbean (Antigua, Bahamas, Dominica, Grenada, Guyana, Saint Kitts, Saint Lucia, and Saint Vincent) offer no radiotherapy services. Human resources were not documented in this period. In the countries where the information is available, the situation has not changed significantly since the previous evaluation (14).

Because of the high costs involved, providing radiation therapy services remains a serious challenge in the Region. In terms of improving radiotherapy services, health authorities have debated whether to upgrade existing public installations, purchase services from private facilities, or establish some sort of partnership. If the services are offered through private facilities, the ministries of health face the problem of how to monitor the service's quality. Most health authorities do not have mandatory standards for quality assurance programs.

Haiti, Panama, and Trinidad and Tobago have plans to upgrade their radiotherapy services. In these projects, many questions have been raised and decisions revisited in terms of type and level of sophistication of the equipment to be obtained. To shed some light in the decision making process, complete evaluations of radiotherapy services were conducted in Colombia and in El Salvador. The project in Colombia had a dual purpose: to examine the situation with the aim of developing governmental standards for radiotherapy services and to develop an evaluation methodology that could be used in other countries.

### *Quality Assurance*

A quality assurance program is required in order to obtain the best quality of radiological images and guarantee the accuracy and precision of radiation therapy treatments. Governmental regulations and guidelines facilitate the implementation of these programs at the institutional level. The Region's countries have made great strides in establishing quality assurance in imaging services. Argentina, Belize, Brazil, Bolivia, Canada, Colombia, Costa Rica, Cuba, Mexico, Trinidad and Tobago, the United States, and Venezuela all have programs under way. In addition, many efforts are designed to evaluate the quality of mammography services in the Region.

In radiotherapy, the Region continues to participate in joint projects with the International Atomic Energy Agency (IAEA). Specifically, the IAEA/WHO Postal Dose Inter-comparison Program annually verifies the calibration of high-energy radiotherapy units (cobalt-60 and linear accelerators) used for cancer treatment. More than 100 units are evaluated yearly in Latin American and Caribbean public and private radiotherapy facilities. Figure 4 shows the results for 1990–1999 (18). The number of units checked has increased significantly, as has the accuracy of their calibration, which is one of the most important factors in radiation therapy; this should have significant benefits on patient survival.

### **Clinical and Public Health Laboratories**

The Region has about 30,000 laboratories, 97% of them are clinical diagnosis laboratories and 3%, public health laboratories. Most clinical laboratories are in the private sector, and public health laboratories come under the countries' ministries of health. In most countries, a national referral laboratory heads the network of public health laboratories, whether they belong or not to the hospital sector's surveillance system. In addition to surveillance functions, public health laboratories may conduct tests within the framework of health registration and drug control. Each country's referral laboratory has the authority to standardize, regulate, train, plan, supervise, evaluate, conduct research, and disseminate information.

In the last two decades, sectoral reform processes have led to structural, financial, and organizational changes to the health systems. Some of the key reform elements considered efforts to modernize public health laboratories by restructuring and deconcentrating them, redefining their activities and applying new technologies, and, as a central mission, focusing efforts on fields strictly related to public health practice.

The countries have acknowledged the need to set up warning and rapid response systems for communicable diseases that have a high epidemic likelihood. However, many political and financial factors made it impossible for the adopted initiatives to sustain an increased capability to detect, research, diagnose, and control those diseases. Moreover, the scant communication between laboratory services and epidemiology services has yielded information that is not always complete or timely, and has curtailed the technical design of interventions and the ability to take decisions.

Recent natural disasters in Central America and the Caribbean (hurricanes Mitch and George) make it obvious that public health laboratories, clinical laboratories, and blood banks need to be incorporated into the health sector's contingency plans, which demonstrates the importance of being able to obtain diagnostic confirmation of high impact communicable diseases, do basic tests to manage injured persons, and guarantee a timely supply of safe blood. Equal priority was given to the task of expediting information and communication mechanisms among various technical units or institutions involved in controlling epidemics

and among the different levels that provide health care services to individuals and populations.

In regard to clinical diagnosis laboratories, external performance evaluation mechanisms were developed as part of efforts to accredit private and public laboratories. To date, only Argentina, Brazil, and Mexico have accreditation systems. The Latin American Confederation of Clinical Biochemistry (COLABIO-CLI) is working to expand accreditation processes to the other countries in the next few years. The International External Quality Assessment Scheme (IEQUAS), a United Kingdom international program that provides external quality evaluations, is conducting quality evaluations on clinical chemistry, hematology, and parasitology in Argentina, Bahamas, Barbados, Belize, Brazil, Chile, Colombia, Costa Rica, Cuba, the Dominican Republic, Ecuador, El Salvador, Honduras, Jamaica, Mexico, Nicaragua, Paraguay, Suriname, Uruguay, and Venezuela. Training activities also were conducted in public health laboratories to introduce a quality assurance system that would include the normalization of procedures by standardizing methodologies, the introduction of external performance and quality control evaluations, biosafety, safe transport of samples and waste disposal, and maintenance programs.

Activities aimed at developing human resources focused on the diagnosis of priority emerging and re-emerging diseases that are under epidemiological surveillance or have been unleashed by disasters or emergency situations, such as water-borne and foodborne diseases, acute respiratory infections, bacterial meningitis, vector-borne diseases, zoonoses, vaccine preventable diseases, sexually transmitted infections, and blood-borne diseases. In a parallel effort and after training technical personnel to that end, the surveillance of bacterial resistance to antibiotics was strengthened; national and regional networks were created with the public health laboratories of Argentina, Barbados, Bolivia, Chile, Colombia, Costa Rica, Cuba, Brazil, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Peru, Paraguay, the Dominican Republic, Saint Lucia, Trinidad and Tobago, and Venezuela, as well as of the Caribbean Epidemiology Center (CAREC). Canada's Laboratory Center for Disease Control (LCDC) and Argentina's Carlos Malbrán National Institute for Infectious Diseases in Buenos Aires are the referral laboratories for enteropathogens and other microorganisms such as *Staphylococcus aureus*, a species of *Pseudomonas*, and the bacteria responsible for meningitis.

### Information Technology

As the patient management approach that held sway in the 1960s has given way to today's organizational restructuring paradigm, health information technology applications also have evolved. Applications have refocused to support clinical and administrative functions, including message exchange, resource administration, logistics of health care, management of patient in-

formation, epidemiological surveillance and health status monitoring, clinical decision assistance, knowledge management, image and signal analysis, modeling, remote consultation and intervention, and health education and promotion. Health information technology shares certain characteristics with other information- and knowledge-based industries, such as providing operational support to technical and knowledge management functions, operating in complex environments, requiring specialized human and organizational resources, using computer-based technologies and telecommunications, and relying on fast-changing innovation and markets (19–22).

There has been a flurry of health information technology projects in recent years. In large part, this surge of interest has been sparked by the need to control or reduce administrative costs; the desire to make eligibility, claims, and reimbursement processing more efficient and the procurement and management of supplies more efficient; the attempt to solve logistical problems of health care and the demand for customized patient services regarding choice, access, convenience, and dynamic service and resource scheduling; and by a desire to respond to demands for better care and to reduce medical errors by better communication of administrative and clinical data. Additional factors include the growing demand for information and documentation to support multidisciplinary practice; greater accountability and transparency of performance and measurement of outcomes; a growing desire for swift access to biomedical knowledge to support evidence-based practice; the expanding connectivity of professionals and the public to the Internet and to peer- and non peer-reviewed health information; and the emergence of electronic health records and databases, mobile technologies, portable data media, and Internet-mediated care delivery.

Worldwide, the major impediments to the deployment of information and communication technology have been economic, educational, and organizational. The "digital divide" between individuals, age groups, households, businesses, geographic areas, and countries at different economic and educational levels has been well documented in both the industrialized and the developing world (23, 24). Besides income and educational level, inequalities in information technology utilization result from a combination of factors that include insufficient telecommunications infrastructure, high telecommunications tariffs, inappropriate or weak policies, organizational inefficiency, language barriers, lack of locally created content, and uneven ability to derive economic and social benefits from information-intensive activities. Wealthier countries spend more per capita on information and communication technology than do poor countries, but some countries outpace others in the same income bracket by a wide margin, and some developing countries are spending more than others on new technologies.

Information technology development has been a constant issue in the agenda of many high-level Regional meetings, such as the 1998 Presidential Summit of the Americas, and in pro-

nouncements made at such international gatherings, such as the Florianópolis Declaration in 2000 issued by representatives of Latin American and Caribbean countries; the Brasília Communiqué of the Presidents of South America; the Rio de Janeiro Declaration of the Intergovernmental Meeting on Information and Communication Technologies for Development; the 2001 Declaration of the Rio Group; the Declaration of Santiago of the Rio Group; and the European Union Minister's Meeting. Key constraints to the development of health sector information and communication technology in the Region of the Americas involve issues such as policy matters and standardization issues related to data, organizational issues, financial issues, and technical issues.

The private health sector, insurance companies, group practices, and other stakeholders, because they rapidly understood the importance of information systems for organizational survival, for maintaining a competitive edge, and to be able to provide better service, have been at the forefront of developing information and communication technologies for health in the Region. The public health sector has lagged behind, despite the increasing diffusion of information and communication technologies in other subsectors of the public administration and social services. As a result, health has been conspicuously underrepresented in national efforts to develop information and communication technology policies and plans. A pervasive public sector information infrastructure (“infostructure”), the essential prerequisite for promoting health and providing continuous healthcare to the community, is still incipient in the health systems and, typically, generates only aggregated statistical data related to mortality, morbidity, and service utilization and coverage. Many countries continue to face such problems as a lack of coordination between private and public sector information and communication technology initiatives, an overlap of projects funded by different sources, and a lack of continuity of objectives and decisions regarding systems development and deployment.

Increasingly, consumers are relying on the Internet to get medical and wellness medical information, shop for health providers and services, assess risks, buy prescription and over-the-counter drugs and health products, and to communicate with special-interest groups. Because cyberspace's fast-changing, globally networked environment can easily disregard national and international borders and bypass and even challenge cultural mores, ethical standards, regulations, and laws, it raises many questions regarding the quality of health information publicly offered. The very qualities that make the Internet such a rich marketplace of ideas—its decentralized structure, global reach, leveling of access to publication tools, immediacy of response, and ability to facilitate free-ranging interchange—also make it an exceptional channel for potential misinformation, unethical use, hidden biases, covert self-dealing, fraudulent practices, and evasion of legitimate regulation (25, 26). Although the availability of locally relevant formal and informal information that ad-

resses indigenous cultural characteristics in national languages has been recognized as vital for success, it is sorely lacking.

A country's or community's readiness to adopt information and communication technology innovation and applications is complex and difficult to measure, because although a country may be ready to assimilate some technological components and applications, it may not be prepared to embrace all (27, 28). By assessing a community's relative progress in areas most critical for information and communication technology deployment can serve to assess the degree to which that community is prepared to take full advantage of information and communication technologies and, in turn, this information can be used to chart trends and make comparisons. Tables 12 to 15 summarize information-and-communication-technology readiness indicators for the Region related to infrastructure, extent of information and communication technology insertion in society, and information distribution resources.

### Regulation of Medical Equipment and Devices

Health sector reforms applied in nearly all the Region's countries have revealed the increasingly important role that health technology plays in the provision of health services and their potential benefit. The growing complexity and sophistication of medical equipment and devices, and the multiple options available that make it difficult to decide on what is the best quality and most cost-effective treatment, also deserve mention.

All the Region's countries, with the exception of the United States, are net importers of medical equipment and devices; even Canada, which also produces them. Several Latin American and Caribbean countries with emerging economies offer great potential for the medical equipment and devices market, which has grown at an annual rate of 10% over the last decade. The growing globalization and liberalization of markets open up many alternatives in the field of medical technology. This highlights the importance of the State's regulatory function, carried out through the ministries of health, for guaranteeing the efficacy, safety, and quality of the products used in the health services.

In the mid 1990s, PAHO, with support from its Collaborating Centers—Canada's Medical Devices Bureau, the United States Food and Drug Administration, and the Emergency Care and Research Institute—intensified its technical cooperation to help develop and boost the countries' regulatory capabilities. The development of regulatory systems varies from country to country, ranging from a total lack of legislation to advanced regulatory procedures.

The following points summarize the current status of regulatory programs and actions in 43 countries and territories of Latin America and the Caribbean:

- Even though the countries import more than 80% of their equipment and devices, 21 of the 43 countries and territo-

ries have no specific import legislation or regulations covering those imports.

- Only 7 of the 22 countries that have legislation to regulate equipment and devices enforce it effectively.
- Of the 43 countries and territories, 27 have no requirements for importing medical equipment and devices.
- Of the 43 countries and territories, 32 have no systems for registering imports.
- Only 9 out of the 43 countries and territories have participated in meetings of the Global Harmonization Task Force (GHTF) and consult its technical documents.

In the countries that have regulatory programs, the weakest areas are the inspection and even reporting components of surveillance systems, lack of enough trained staff, laboratory support, and allocation of operating budgets.

In addition to developing and strengthening their regulatory capability, the countries are working on harmonizing regulatory requirements. To that end, PAHO is encouraging and helping the countries to create links with GHTF and to access its documents. Moreover, with the collaboration of the United States Food and Drug Administration and Canada's Medical Devices Bureau, it has organized the Pan American Cooperation on Medical Equipment (PACME) to work with regulatory agencies and authorities and represent Latin American and Caribbean countries at GHTF meetings. An electronic chat group, MED-DEVICES, has been set up exclusively so that the countries' regulatory authorities can consult and exchange information on medical equipment and devices. With support from the Collaborating Centers, documents and instruments have been produced to support program organization.

In October 1999 the 1<sup>st</sup> Consultative Meeting on Medical Equipment and Devices was held in Washington, D.C., to analyze the current status of regulatory programs and to formulate a work plan to support and strengthen their development. A document and work plan were prepared on the basis of the conclusions and recommendations of this meeting and were presented at PAHO's 42nd Directing Council meeting. Through Resolution CD42.R10, Member States undertook to develop and strengthen programs to regulate medical equipment and devices and promote and support the participation of regulatory authorities in the meetings and study groups of the Global Harmonization Work Force.

### Health Technology Assessment

Health technology assessment has increasingly come to be viewed as a comprehensive way to analyze the short- and long-term technical, economic, and social consequences of health technology use on patients and populations, as well as their desired and undesired effects. Today it is recognized that the impact of health technology assessment in decision-making occurs in

the health systems' various levels: at the macro level, such as in planning and allocating resources by health care level; at the meso-level, such as in defining or reviewing the set of benefits guaranteed by the public sector or social security system; and at the micro level, such as in reorganizing the health care model directed to a specific population group or in organizing the work of a group of health professionals (29). It is not coincidental that this has occurred when most of the countries are implementing or have begun to implement strategies to reform their health systems and services as a way to attain higher levels of equity, equity, effectiveness and quality, efficiency, sustainability, and social participation.

The first contributions observed of health technology assessment dealt with efficiency, effectiveness, and quality. Two trends have become evident in the last few years: first, the group of people who need or want to be informed about health technology has increased and diversified to increasingly include legislators, government officials, health service managers, researchers, health care professionals, and, particularly, patients and their relatives and the public at large; second, in addition to up-to-date, clear, and reliable information on the safety and efficacy of technologies, information must be obtained on the effectiveness, quality of life associated with its application, cost of introducing it, and the ethical, cultural and social consequences from its dissemination and use.

In order to meet these challenges, since the mid 1980s, many of the developed countries of the Americas, Europe, and, more recently, Asia have set up committees, institutions, agencies, or specialized programs to assess health technologies, most of which were fully or partly State funded. In 1993, the International Network of Agencies for Health Technology Assessment (INAHTA) was created, and since then, its members have steadily increased.

In the Americas, Canada has had a federal coordinating institution since 1989, the Canadian Coordinating Office for Health Technology Assessment (CCOHTA), as well as several provincial organizations most of them publicly financed. The United States, the first country to have this sort of organization (the Office of Technology Assessment (OTA), which operated from 1972 to 1995) currently has more than 50 institutions that assess health technologies, most of them private nonprofit or for-profit entities. In 1997, the federal government, through the Agency for Research and Quality in Health Care, launched an ambitious program to support the centers that promote evidence-based clinical and managerial practice.

Historically, health technology in Latin America and the Caribbean has mainly involved costly, sophisticated equipment and devices, and its assessment has often been limited to the set of administrative procedures required for their registration and sale. Recently, however, a broader notion has gained acceptance, and health technology has come to include drugs, medical equipment and devices, preventive and clinical procedures, and ways to organize the provision of health care to patients.

In the middle of the 1990s, only a handful of public or private organizations assessed health technologies in Latin America and the Caribbean, with the notable exception of some public organizations charged with supervising conditions for introducing and circulating drugs and certain products in domestic markets. A worldwide survey conducted between 1994 and 1995 revealed that of the 103 organizations in the 24 countries that responded, only one was in Latin America and the Caribbean subregion (30). The situation has slowly improved since the health chapter of the Second Summit of the Americas, held in Santiago, Chile, in April 1998, was devoted to “health technologies linking the Americas.”

By the end of 2001, several of the Region’s countries had witnessed the launching of initiatives and the creation of groups, units, or organizations devoted to health technology assessment. In some countries (Argentina, Chile, Cuba, Trinidad and Tobago, and Uruguay), the units promote and coordinate the creation of articulated networks for assessing health technologies at the different levels of the public subsector, and they come under the ministries of health. Other countries have set up commissions or groups that operate close to decision-making levels (Mexico, Panama, Peru) or to social security regulatory institutions (Argentina). There are also countries, such as Brazil, that have set up autonomous public organizations specializing in the follow-up and assessment of health-related aspects, including the dissemination and use of health technologies. In still other countries (Colombia) universities tend to take on this responsibility, while in others (Bolivia, Costa Rica, Ecuador, Paraguay) initiatives are still incipient. In almost every case, attempts are made to bring together stable, multi-disciplinary teams that, although close enough to political decision-making spheres, can still issue independent opinions and also are highly qualified and well connected to the most advanced, international health technology assessment bodies, organizations, and networks. When this is achieved, benefits are clear, even in the short term.

Sometimes, functions dealing with the management of medical equipment and devices and with health technology assessment are developed in a coordinated manner within the group or unit itself, becoming part of strategies aimed at “developing health technology.” Efforts also are being to combine group efforts—particularly within the clinical field—in an attempt to promote professional practice models based on the best scientific evidence available.

Lastly, opportunities for subregional coordination have been created, such as the one developed since 1998 within MERCOSUR for medical care and the rational use of health technology.

Despite progress to date, however, major limiting factors remain. For example, political decision-making levels fail to understand the importance of assessing health technologies to strengthen the steering role of health authorities and help reach reform objectives; that many countries lack a critical mass of trained staff and that it is difficult to have continuity in existing teams also are obstacles.

The Pan American Health Organization, working alone or with WHO’s Collaborating Centers such as the University of Ottawa’s Department of Medicine and the Emergency Care Research Institute of (ECRI) in Pennsylvania (U.S.A.), the International Society of Technology Assessment in Health Care (ISTAHC), and the organizations grouped under the International Network of Agencies for Health Technology Assessment (INAHTA), has supported the countries’ efforts to set suitable policies and mechanisms to assess health technologies, prepare a critical mass of trained human resources, create and develop national groups and units, promote concrete assessments (31), and facilitate contact between specialized international groups and organizations.

The inclusion of health technology assessment as a component of essential public health functions that must be developed by the health authorities proved to be extremely beneficial. Both at the national and the regional level, the health technology assessment represents an important contribution to the strategies and programs on health care quality, as can be seen from the regional follow-up and assessment instrument in the essential public health functions implemented by PAHO in the Americas between 2001 and 2002.

## DRUGS, BLOOD, AND VACCINES

### Drugs

In the last 15 years, drugs have been affected by health sector reforms, which have altered the State’s role as a service provider. Drugs also have been affected by the globalization and free market processes promoted by the World Trade Organization (WTO), both of which have favored the development of free trade initiatives between countries.

### Drug Policies

Health sector reform processes have not covered drug policies, and only five Latin American countries (Brazil, Chile, Honduras, Nicaragua, and Panama) have policies specifically dealing with pharmaceuticals. But about 21 countries in the Region have basic drug lists and have incorporated the concept of essential drugs in them. In December 2000, the MERCOSUR ministers of health approved drug policies for their countries (32, 33).

The concept of essential drugs dates back 25 years, but access to medicines continues to be limited; in Brazil, for example, only 31% of the population has access to drugs. In several of the Region’s countries, the use of quality generic drugs is being promoted as a strategy to improve availability of and access to drugs. Two-thirds of prescriptions issued in the United States are for generic drugs. Mexico and Brazil have introduced strategies to be able to interchange generics and guarantee the efficacy and quality of drugs, which is expected to encourage physicians to prescribe more generics and increase consumer confidence. With the introduction of a drug list and an emphasis on generic prescrip-

tion, the use of generics in Colombia has increased by 20% to 50%; in contrast, the brand-name products market did not grow at the expected rate. As a result of Colombia's issuance of its basic drug list, drugs included in it are obtained at low prices (32, 34). In Peru, the generics market represents about 20% in terms of volume and 6% in terms of value. At the end of the 1980s, the failure of price controls gave rise to a movement towards liberalization of prices, and today, market forces dictate prices in most of the countries. In some countries (Mexico, Peru, and Venezuela), however, the government exerts price controls, and in Brazil, the cost increases of some products is being investigated. Prices have gone up by around 5% per year (32, 34). Argentina in 2001 had to withdraw 140 drugs from its pharmacopoeia, because some of them had increased in price by as much as 308% (35).

In several of the Region's countries, traditional medicine is an ancestral practice, but despite the development of legal frameworks for herbal preparations, which vary from one country to another, in the main, traditional medicine has not been incorporated into official health services. Mexico has experimented with a scheme whereby allopathic doctors can prescribe traditional medicine; in Nicaragua, the modernization project supported by the World Bank has developed a pilot-stage alternative drug supply system; in Guatemala, medicinal plant treatments have been included under the first basic health care level for certain illnesses (32, 36). In 2002, nine traditional medicine treatments provided by accredited suppliers were included in Bolivia's basic health insurance scheme.

### *Globalization*

Globalization is well under way in the Region. By 2001, 140 World Trade Organization members had signed free trade agreements in which drugs were considered as an area to be homologized (37). Those newly joining WTO must sign 18 specific agreements, among which the Treaty on Trade Related Aspects of Intellectual Property Rights (TRIPS) is extremely important to the health sector. Patent protection laws have been enacted since 1994 and, despite the agreement's stipulation of a minimum of 20 years for patent protection, some countries lowered the limit to 15 years (Argentina, Chile and Mexico). The agreement on technical obstacles to trade and the General Agreement on Tariffs and Trade (GATT) are fostering harmonization processes, such as the Customs Union that is being developed in Central America (32). An Intercontinental Marketing Services (IMS) document states that Latin America is becoming an increasingly attractive market for multinationals, because most of the countries protect patents (38).

### **Harmonization**

Four fora are considering aspects of the harmonization of pharmaceutical regulations; these aspects have developed to varying degrees, depending on economic processes. The Andean Community of Nations is the oldest free trade agreement in the

Region. It began in 1969 with the Cartagena Agreement. The Andean Community's progress between 1998 and 2002 includes the establishment of requirements for registering drugs, approval of shortened requirements for registration of products manufactured in the Andean Area, and the scope of agreements on standards of good manufacturing practice, which observe WHO 1992 recommendations in this regard (39, 40). MERCOSUR approved inspection guidelines and the training program for inspectors among topics approved. Joint inspections on pharmaceutical laboratories also have been carried out (Argentina-Brazil and Argentina-Paraguay) (39, 40). Central America has no legally established mechanism to follow up drug harmonization agreements. Within the Central American Integration System (SICA), the Secretariat for Central American Social Integration (SISCA) deals with health issues. In 1999 it set up the Customs Union among El Salvador, Guatemala, Honduras, and Nicaragua, which has proposed that free trade in goods begin in January 2002. Drug regulatory authorities have set priorities for harmonization, including the establishment of requirements for the registration of drugs, good manufacturing practices, and the certification of quality control laboratories (39, 40). Within the North American Free Trade Agreement (NAFTA), which includes Canada, the United States and Mexico, work in this regard has been limited to the exchange of information on drugs between the regulatory authorities (39, 40).

In addition to the agreements discussed above, the Caribbean Community (CARICOM) which includes the English-speaking Caribbean countries and Belize, is working on a scheme for the joint purchase of drugs and the setting up of referral laboratories for quality control. Another group that will have an effect in the medium-term is the Free Trade Area of the Americas (FTAA), which was created after the 1994 Miami Summit of the Americas. PAHO sponsored the Pan American Conference for the Harmonization of Pharmaceutical Regulations, a forum where technical topics are examined within the harmonization process. The Second Conference (November 1999) acknowledged the progress made in the field of regulation, but stated that the harmonization process must be given more impetus and continuity within the framework of recognized standards, while considering and respecting the individual countries' health policies and legislation. At that meeting, the Pan American Network for the Harmonization of Pharmaceutical Regulations was set up to promote and sustain a constructive dialogue between regulatory entities, the pharmaceutical industry, and other sectors; to foster the convergence of pharmaceutical regulation systems; to adopt recommendations for these systems' implementation at the national and regional levels; and to foster cooperation among countries. A steering committee was appointed to follow up conference recommendations. Currently, topics under analysis include product bioequivalence, good clinical practices, good manufacturing practices, counterfeiting, and drug classification (40, 41).

### *Regulation and Registration*

Except in most of the English-speaking Caribbean countries, where they have been more evenly developed, national drug regulatory authorities in the Americas are at varying stages of development, and most come under ministries of health. Working with the support of official quality control laboratories, drug regulatory authorities make sure that the drugs consumed by the population are safe, effective, and of good quality. Preliminary results of a diagnostic study begun at the end of 2000 on the status of 21 official quality control laboratories showed that 100% of them had the necessary equipment and instruments to participate in the External Quality Control in Laboratories program; 100% of them also used quality manuals and standard operating procedures. Only four laboratories can guarantee their sustainability, 90% have buildings that do not meet functioning requirements to enable them to apply good laboratory practices, 75% lack suitable areas for microbiological control, and most have insufficient human resources. Argentina, Brazil, and Colombia have self-financing regulatory bodies, while in other countries, such as Costa Rica, a trust fund enables regulatory bodies to them to execute their own budget; the remaining regulatory authorities do not have sufficient financing to carry out surveillance and monitoring (32).

Between 1998 and 2000, most of the Region's countries updated their drug legislation. This process has not been devoid of pressure from economic groups, which has weakened regulatory action and, in some cases, shortened the time frame set for drug approval (32, 42). In countries that import most of their drugs, legislation includes authorization to market those imported drugs. Some countries participate in WHO's system for certifying the quality of pharmaceuticals destined for international trade, and they apply standards on good manufacturing practices for domestic drug production (32). Argentina, Brazil, Chile, Colombia, and Mexico have adopted WHO's 1992 recommendations for good manufacturing practices (32). Bioequivalence also was recently included in the countries' legislation. Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico, Paraguay, and Venezuela already have a legal framework in this regard. In most cases bioequivalence studies are conducted by the pharmaceutical industry; in others they are carried out by accredited laboratories or research centers (40, 43).

Legislation also covers drug clinical studies involving humans. Up to a few years ago, the clinical studies conducted in Latin America were phase IV studies (at the product's marketing stage) and promotional studies; phase II and III studies have increased in number in recent years. Currently, regulatory bodies are limited by the fact that they do not have enough trained human resources to evaluate protocols or inspect clinical trials (44). In addition to the United States and Canada, which have up-to-date legislation and systems in place for approving and supervising clinical trials, regulatory bodies in Argentina, Brazil, Mexico, and Venezuela have reached a higher degree of development, and

have legislation on good clinical practice, although few of them actually inspect and follow up the clinical trials (32). Drug advertising is a matter for concern, because, although by and large it is regulated, the media are subject to little control. Moreover, difficult access to independent sources of information, combined with the lack of regulation of the information available on the Internet, is liable to lead to the irrational use of drugs.

Counterfeit drugs are a problem that most of the Region's countries face to some degree or another. By and large, countries lack updated legislation to combat counterfeit drugs and apply the necessary sanctions, so this should be an issue dealt with within harmonization processes. The problem is worse in poor countries, where counterfeit drugs are sold very cheaply, enabling clandestine laboratories to make great profit from the high level of sales.

### *Drugs in the Health Services*

Health services in Latin American countries continue to face problems related to adequate supply, failure to program drug needs, and acquisition methods that affect the availability of drugs. The following are some aspects that influence the availability of drugs and access to them by the Region's population.

**Pharmaceutical market.** The United States has a leadership position in the Region's pharmaceutical market, with US\$ 93 billion, followed by Canada, with US\$ 4.5 billion. In 2000, the three Latin American countries with the highest sales were Argentina (US\$ 3.4 billion), Brazil (US\$ 5.1 billion) and Mexico (US\$ 4.1 billion). The pharmaceutical market is growing at an estimated annual average of 4%; public sector purchases represent only 12%, with the remainder being private sector acquisitions (34, 38).

In Latin America, the public and private pharmaceutical markets grew at different rates between 1995 and 2000. In selected countries (Argentina, Brazil, Mexico, Peru, Venezuela, and the Central American countries) the private sector market grew from US\$ 12.2 billion in 1995 to US\$ 15.4 billion in 2000, for a 26% increase; the public sector market grew from US\$ 3.7 billion in 1995 to US\$ 4.8 billion in 2000, for a 30% increase (34, 38, 45). In 1998, the market was dominated by original products, which highlights the fact that signing WTO agreements and the fulfillment of Treaty on Trade Related Aspects of Intellectual Property Rights (TRIPS) commitments are leading national companies to focus their strategies towards the development of those products and to enter into marketing agreements with multinational companies. For example, some laboratories in Argentina entered into a sales and marketing agreement for prescription drugs that began to be implemented in mid 1999, and Mexico's national laboratories are designing plans to increase their exports and forge alliances with other companies to guarantee their continued presence in the market (34).

In Latin American countries, the sale of over-the-counter drugs has increased; prescription drugs account for about 70% of

the total supply and over-the-counter drugs, 30%. Elsewhere in world, over-the-counter products have a relatively smaller share of the market (18% in the world market, 12% in the United States and Canada, and 19% in Europe). In Brazil, this market is rapidly expanding to cover 7% to 10% of the total market. A reason for this growth in the over-the-counter market is the lack of an effective regulatory framework and pressure from the pharmaceutical industry (34, 38).

**Financing.** Public and private sectors in developing countries spend about US\$ 44 billion, roughly US\$ 10 per capita, on pharmaceuticals. The economic impact of drugs is considerable, since drugs represent the second highest health expenditure item for the governments, after staff expenditures; in some Latin American countries, it takes up as much as 40% of the health budget. There are different types of financing methods in the Region. In Bolivia, for example, the Ministry of Public Health's basic health insurance scheme covers drug expenditures for 92 treatments for children under the 5 years old; pregnant women; and persons with communicable diseases, except AIDS. National health funds and private funds cover drug expenses for their insured (32).

According to a study on health insurance systems and access to drugs conducted by PAHO in 1998, the current system in the United States applies a series of measures to regulate drug supply and favors the use of generics. Per capita spending on drugs in the United States, however, is significantly higher than in other countries in the Region, such as in Costa Rica. This difference is partially explained by the fact that each country has a different insurance system. Colombia has included a list of drugs in its Compulsory Health Insurance Plan and large-scale purchases have been established through cooperatives and unions of health service providers, along with introducing the use of generic drugs. In Guatemala, the adoption of a centralized drug purchasing system has resulted in savings of up to 65% on Ministry of Health purchases and 24% on social security purchases. In Chile, the health system includes a provision for the use of generic drugs. In Mexico, social security covers medicines, and it is hoped that the comprehensive private insurance schemes will cover the drugs agreed on in the policy (46).

Financing for anti-retroviral drugs, because of their cost, is under discussion. In response to this problem, in 1999 PAHO set in motion the revolving fund for strategic public health supplies, which covers anti-retroviral, anti-tuberculosis, and anti-malaria drugs. A year later, Brazil, Guatemala, Haiti, Panama, and Paraguay had signed an agreement to join the fund; 3 have signed the agreement and 13 are currently at the discussion phase.

**Rational use of drugs.** A study conducted in six Latin American countries shows that two-thirds of the drugs acquired are self-prescribed. Research conducted in Colombia confirms this trend: only 28% of the pharmaceutical products purchased at pharmacies are prescribed by a doctor; 72% are chosen by

the user—which means that people are self-prescribing in about two-thirds of cases. All this leads to an irrational use of drugs. In Peru, self-medication accounts for 20% of the pharmaceutical market volume.

**Education and information.** Universities from more than 10 countries in the Region have played an active part in a well thought out pharmacotherapy training program designed to change the teaching/learning methodology of pharmacotherapy. This methodology, developed by the University of Groningen, in Holland, also is used by the Universidad de la Plata's Faculty of Pharmacology in Argentina. The pharmacy faculties at national Latin American universities continue to strengthen pharmaceutical care aspects in these professionals. The establishment of the Pharmaceutical Forum of the Americas during this period also deserves mention. PAHO and associations of pharmaceutical professionals from the Region participate in the forum, in order to launch pharmaceutical health care projects through the drug-marketing network.

### Blood Banks

The Region's blood bank services continue to be part of the Ministries of Health, even though they, in fact, may form part of the social security system, the Armed Forces, the private sector, or nongovernmental organizations such as the Red Cross. In most of the English-speaking Caribbean countries, which have few blood banks, policies for blood collection, processing, and transfusion are set by the public hospital to which a blood bank belongs. Latin American countries have tried to establish national blood programs with the support of national blood commissions. Responsibilities of the national blood programs include implementing policies and standards, developing budgets, training personnel, and assessing blood bank services.

Voluntary blood donation is still weak in the Region. Only Aruba, Bermuda, Canada, Cuba, Curaçao, Saint Lucia, and the United States report 100% voluntary blood donors. Bolivia, the Dominican Republic, Honduras, Panama, and Peru still pay blood donors as a matter of policy. By far most of the blood collected in the Region comes from replacement donors, which hospital-based blood banks require in order for a patient to be admitted to the hospital or given treatment there. Higher prevalence of markers for infectious agents is found among replacement donors, as compared with voluntary ones. More than 80,000 units of blood were discarded in the Region in 2000 because they contained at least one marker for infections transmitted through transfusion. Given the cost of collecting and processing blood, it is estimated that the financial burden of poor-quality donors exceeded US\$ 6 million that year (official information for 2000 provided to PAHO by the National Blood Programs).

The countries continue to strive to ensure universal screening for infectious markers. In Latin America, the consensus is to test



for human immunodeficiency virus (HIV), hepatitis B (HBV) and C (HCV), *Treponema pallidum*, and *Trypanosoma cruzi*. In the Caribbean, where Chagas' disease is not a public health problem, countries test for the first four markers, as well as for human T lymphotropic virus (HTLV). Tables 16 and 17 summarize the coverage of screening in Latin American and Caribbean countries, respectively. A steady improvement has been seen in Latin America since 1994, except in Bolivia. Data presented in this publication's 1998 edition, showed that only seven countries screened 100% of the blood for HIV, six for HBV, two for HCV, six for syphilis, and two for *T. cruzi*. The figures in Table 16 show that in 2000, 14 Latin American countries tested all blood units for HIV and 4 screened at least 97.5%; Bolivia tested less than 30% of the units. The situation is very similar for HBV and syphilis. In 2000, only 13 countries tested all units for HCV and only 6 did so for *T. cruzi*. Table 17 summarizes the data for the Caribbean countries for 1996 and 2000. HIV, HBV, and syphilis screening is universal. The situation is not as good regarding HCV and HTLV, with nine countries not testing for these agents. Dominica, Jamaica, Saint Lucia and Turks and Caicos Islands introduced HCV testing in the reporting period.

The Regional Program for External Evaluation of Performance of Serology has provided information that indicates that false positive and, more alarming, false negative results may be given by the participating blood banks. Furthermore, some countries cut costs by testing samples in pools of four or five, a fact that has been associated with lower sensitivity.

## Vaccines

### Production

In 1998–2001, Latin American and Caribbean countries increased their dependence on imported vaccines. As newer vaccines and vaccine formulations were introduced, the 12 countries with vaccine-production facilities did not produce competitive vaccine products. For example, the increased use of measles vaccine in the combined form with rubella vaccine or rubella and mumps vaccines lowered the demand for measles vaccines produced in Brazil and Mexico. Similarly, the availability of *Haemophilus influenzae* type b (Hib) vaccine and hepatitis B vaccine in combined formulations with DTP has made locally-produced DTP almost obsolete—Chile and Colombia, for example, have discontinued or drastically reduced DTP production.

The Region's vaccine self-sufficiency, which was established in the early 1990s, is beginning to erode, partly due to the increased use of new or combination vaccines in most countries' immunization programs. If vaccine production in the Americas is to remain competitive, national manufacturers must uphold vaccine quality standards and they must have the capability of incorporating new technologies to produce new vaccines. The acknowledgment by local vaccine manufacturers of the need to invest in upgrading

their facilities and equipment, and to put in place procedures to comply with good manufacturing practices and national/international requirements remains critical in this regard. Several countries have conducted technical and economic feasibility studies to identify institutional strengths and weaknesses, and needs for improvement. For example, Colombia's National Institute of Health (Instituto Nacional de Salud) undertook a feasibility study to establish priorities and alternatives for vaccine production. And in Chile, the production department and the national control department of the Public Health Institute (Instituto de Salud Pública) were evaluated in early 2001; national authorities are using the study's recommendations to reorganize the Institute. In a major breakthrough, Brazil's Biomanguinhos and Cuba's Center for Genetic Engineering and Biotechnology requested that their products—yellow fever vaccine and hepatitis B vaccine, respectively—be certified by WHO's assessment system; both products have been certified and now can be supplied to United Nations agencies.

Besides improving their facilities, to stay competitive local vaccine manufacturers must rapidly develop a research-and-development infrastructure to update their range of products. Some local producers have entered into joint ventures with major vaccine manufacturers to produce specific vaccines. For example, Biomanguinhos (Brazil) has entered into such a venture for the production of Hib vaccine; the Instituto Butantán (Brazil), for influenza vaccine; and the Instituto Finlay (Cuba), for meningococcal group B vaccine.

### Quality Control

Quality vaccines are at the heart of the successful and effectiveness of national immunization programs, because using low potency vaccines, or ones of unknown safety, may well jeopardize all other efforts and resources directed towards high vaccination coverage. As a result, high priority has been given to establishing and strengthening mechanisms that will allow countries to guarantee that quality vaccines will be used (47).

Efforts have concentrated on strengthening the Region's national regulatory authorities, as a way to ensure compliance with the following six regulatory functions of: licensing all vaccines used in the country; clinically evaluating vaccines and information regarding ongoing clinical trials in the country; releasing every vaccine lot to be used in the country; accessing a laboratory that can perform vaccine testing; inspecting manufacturers to evaluate compliance with Good Manufacturing Practices; and putting in place a post-marketing surveillance system. Compliance with all the functions is required mainly in those countries where local vaccine production is operational; for non-producing countries, licensing and lot release of vaccines, and post-marketing surveillance are the essential functions. Workshops on topics related to vaccine licensing, lot release, and Good Manufacturing Practices have been developed and carried out so as to provide the national regulatory authorities with the means to implement their regulatory activities (48).

Given the ongoing globalization trend and the establishment of subregional free trade agreements, the harmonization of regulatory activities has become a priority. The national regulatory authorities in countries that do not produce vaccines, particularly in Central America and in the Dominican Republic, have been working to harmonize vaccine licensing procedures. A document outlining harmonized procedures has been developed, and several countries already are using it. More recently, these procedures have been presented to countries in the Andean Region and are being evaluated for possible implementation.

Regarding testing for vaccine quality, national quality control laboratories in Argentina, Brazil, Chile, Colombia, Cuba, Ecuador, Mexico, and Venezuela have continued to progress toward achieving higher levels of proficiency and becoming qualified to perform specific vaccine tests for the regional laboratory network, work that is done in support of other national regulatory authorities and PAHO's Vaccine Revolving Fund. These countries have sought to standardize laboratory methodologies, production and distribution of reference reagents, training on the quality control testing of new vaccines, validation of alternative *in vitro* potency tests, and improvement in communication and exchange of information among participating laboratories. Mexico's National Public Health Laboratory (Laboratorio Nacional de Salud Pública) already has implemented recommendations issued by an evaluation team, and Chile and Venezuela have requested a similar evaluation.

Selected professionals of national regulatory authorities in the Region will be spending three to four months at PAHO's headquarters, learning and assisting in all areas related to regulatory activities and quality control of vaccines used in the Region's immunization programs. The program started in 1999, and professionals from Cuba, Argentina, Venezuela, Chile, and Brazil have participated so far.

In the near future, all of the Region's countries are expected to use vaccines of assured quality in their immunization programs, because they will be able to select vaccines that comply with quality standards.

## PROVISION OF HEALTH SERVICES

The provision of health services to individuals covers a wide range of activities in hospitals, outpatient clinics, and institutions within the community, which are complemented by collective actions, such as those designed to improve environmental conditions. This section highlights the care provided by health care centers, home and school care, and treatment with alternative and complementary medicine. Despite the fact that data is not routinely collected on these aspects, they are included because they play an important role in the actual health service coverage.

Given the diversity of health care services, proxy or tracer indicators are used in this section, such as hospital discharges, de-

liveries attended by trained staff, outpatient care, and vaccination coverage, taken by PAHO/WHO's basic indicators on the health situation in the Americas 2001 (49).

### Hospital and Outpatient Care Services

Although figures vary widely from country to country, Regionwide there were an average 75.4 hospital discharges per 1,000 population per year (Table 18). A comparison of countries with more than 500,000 inhabitants shows a range of 116.3 discharges per 1,000 population in the United States, to 32.1 per 1,000 in Bolivia, and 32.7 in Honduras (no information is available for Haiti). There is a positive and significant correlation between the level of economic development and the number of hospital discharges per 1,000 population per year. Figure 5 shows the variation in the number of annual hospital discharges per 1,000 population by per capita GDP, in US\$ adjusted for purchasing power parity (PPP) (50), for selected countries in Latin America and the Caribbean in 2000 or the last available year. There also are other factors related to the availability of resources and access that influence variations in annual discharges for similar socioeconomic levels: in countries with a per capita GDP below US\$ 3,000 (PPP), only Bolivia and Honduras recorded 32 annual discharges per 1,000 population, while Ecuador and Nicaragua recorded 51 and 57 annual discharges per 1,000 population, respectively (50).

In the most of the Region's countries, more than 95% of deliveries are attended by qualified personnel (Table 18) (49). There are countries with lower level of socioeconomic development and health infrastructure that have low delivery coverage, however: Bolivia, for example, only has 52.0%; Honduras, 53.8%; Peru, 54.8%; and Haiti, 59.8%.

Primary health care services offer a mix of preventive and basic curative activities. Tables 18 and 19 show vaccination coverage and the ratio of outpatient consultations per 1,000 population per year (data traditionally available that can be used as tracers for primary level services) (49). Outpatient consultations, at least those routinely recorded on a national scale, vary widely (Table 18), and range from 0.1 and 0.2 annual consultations per person (which probably indicates under-registration, since this is observed in countries with a high rate of vaccination coverage and economic development, such as the United States or Bermuda) to 10.4 in Brazil.

Vaccination coverage for infants under 1 year old in the Americas exceeds 90% : 92% with DPT3 vaccine (against diphtheria, whooping cough, and tetanus), 91% with OPV3 (against poliomyelitis), 97% with BCG (against tuberculosis), and 93% with measles vaccine (49). Table 18 shows a comparison of coverage in 1994, 1997, and 2000 with these four vaccines. A group of countries has almost universal coverage (over 95%); such is the case of Cuba, the non-Latin Caribbean countries, and Mexico. In most of the countries, coverage ranges between 85% and 95%.

At the opposite end of the scale, Haiti has a persistently low coverage rate, fluctuating between 30% and 60%.

In terms of trends, the Dominican Republic registered short-term variations—polio vaccine coverage dropped from 98% to 67% between 1994 and 2000, and BCG vaccine coverage increased from 60% to 90% over the same period. Coverage in Colombia has systematically dropped over that period: 91% to 74% for DPT3 coverage and 95% to 78% for polio vaccine coverage.

### Development of Emergency Medical Services

Emergency medical services are critical for dealing with urgent, life-threatening cases. In 2000, PAHO conducted a survey on the availability of emergency medical services in 12 countries (51). Survey results, coupled with the results of other studies conducted in Bolivia and Peru (52, 53), reveal the following:

- The 12 countries surveyed have some emergency hospital services; eight of them as pre-hospital care administered mainly by voluntary services such as the Red Cross or the Fire Brigade.
- In five countries emergency services are state funded or operate through a combination of donations, subscriptions, and collections or fees.
- In many Latin American and Caribbean cities, emergency medical services have not been systematically organized.
- There are differences in the operational models of hospital emergency services.
- The structural organization of hospital emergency services is plagued with problems.
- There are recurring problems in the management of processes in emergency services.
- The quality of emergency services is rarely monitored.
- There scant national policies for dealing with problems in services and medical emergencies.

### Home Care

Home care can provide an alternative for or complement institutional care. Cultural, physical, and socioeconomic differences make it impossible to promote a single approach to the delivery of home care services. In fact, it is important to identify a range of effective models rather than focus on a single service delivery model (54). Home care enables the patient to be cared for at home and ensures that cost-effective care appropriate for the patient's condition is provided. A comprehensive model for home care includes guidance for the transition between institutional care and home care; a framework that supports health care across a wide range of diseases and conditions, as well as across sites of care; and the development of standards for home care practice that steer the health care provider and the caregiver toward cost-efficient and cost-effective interventions (55).

In Canada, for example, a quick response team model is used to provide home care for patients with acute illness or injury. A home care aide stays round the clock for up to seven continuous days, aided by skilled care provided by nurses, physical therapists, and other specialists on an intermittent basis (56). In most countries that have established programs, however, home care is provided through intermittent services rather than round the clock care. These programs may be staffed exclusively by trained nurses, by teams of nurses and doctors, or by a mix of professional (nurses) and non-professional (home support workers or home care aides). Well established home care programs also usually have access to social workers, occupational therapists, and physiotherapists, who provide consultative assistance and/or direct care (54, 55).

Family caregivers are a critical part of the health care team, especially in delivering home care; they are an essential element of the patient's natural environment and directly contribute to their quality of life. Family members are estimated to provide as much as 75% to 80% of informal care to persons with long term health problems or disabilities (57). The care provided by families and friends includes personal care, meal preparation, and household support assistance with shopping and transportation; it complements the work of the formal (paid) health care workers. In addition, family members often assume health care tasks such as changing dressings or administering tube feedings, following instructions by health care providers. Home care programs can provide support for family caregivers that may include information, advice, training, service coordination, and respite care (54).

Formal caregivers vary. In some countries such as Canada and the United States, nurses predominate as the professional provider of home care services (54). But in countries where there is a relatively larger proportion of physicians, such as Uruguay, physicians are the predominant providers of home care. In countries with a primary health care focus or with large rural populations, community health workers often work as providers (55). All formal caregivers providing home care face such problems as working without immediate physical support from other health care workers and working in isolation. Although health care workers in some countries have been well trained to work in the home and in the community, in others orientation and training is needed. Some training requirements may be due to a strong reliance on or past experience with hospital level technology.

Educational programs vary widely in the preparation of formal caregivers for the provision of home care. In some areas where there is movement from a primary level of home care (preventive and health promotion services) to a higher technological care at the secondary and tertiary level, formal educational efforts need to be directed toward retooling health care workers to a home care focus (54, 55).

Home care can be a viable alternative or a complement to existing services, and may assist in controlling health costs in many countries in the Region. The diversity of economic realities and

financial challenges in the countries' health systems makes dealing with the range of reimbursement alternatives a complex undertaking that requires specific analysis in every area in the Americas. Essentially, consideration of payment for home care services entails defining the organization and systematization of reimbursement where health insurance is involved. In many countries with established home care systems, there is a mix of publicly funded and privately paid for care. Alternatives such as payment based on professional visits, by episode, when a disease exacerbates, or by procedure are some alternatives that are under study. In addition, some countries are developing home care programs that are a direct extension of hospital programs (e.g. Chile) and that focus on specific diseases or conditions (55).

For countries without systematized home care programs, the development of home care can be relatively inexpensive to institute. Unlike hospitals and institutional care sites, home care has fewer building and equipment requirements. Most operational expenses are related to salaries and travel expenses; training of the formal health care workers can be expensive, depending on the frame of reference of the health system with regards to community-based care.

The cost-effectiveness and cost benefit of home care has been evaluated among varying populations with diverse care needs, which makes it impossible to assess its overall effectiveness. However, scientific evidence has shown that home care is effective for such patients as mothers and infants, low birthweight babies, women with high-risk pregnancies, technology dependent children, and patients who have undergone joint replacement surgery (58–60), although the evidence is not consistent. For other groups of patients, such as frail elders with high levels of functional dependency, home care may be more costly than nursing home care because of the high levels of needs of such patients. Among other elders with chronic illness, specifically heart failure, there is evidence that nurses with advanced preparation who provide home care can reduce rehospitalization and lead to better overall outcomes (61). Finally, there is insufficient scientific evidence to allow for the determination of cost effectiveness or cost benefit analysis for many groups of home care patients.

In Uruguay, a capitated health plan, conducted a study that showed that the cost of home care was one-third that of hospital care. The distribution of home care costs was: 48% drugs and supplies, 26% salaries, 18% other interventions (oxygen and blood transfusions), and 8% laboratory studies.

For countries that experience hospital overcrowding or long waits for hospital beds, home care can provide an alternative to costly hospital stays for some patients, such as those recovering from an acute illness or injury so they can continue rehabilitation under the guidance of a physiotherapist or a nurse specially trained in such care. Other good candidates for home care are patients who are experiencing an exacerbation of a chronic illness, such as heart failure; once the patient has been judged to be medically stable, he or she can be discharged with home care nursing

for follow up instruction to the patient and family on medication management and symptom recognition. These discharged patients free up hospital beds for patients suffering from more acute illnesses (54).

Finally, home care also plays a critical role in easing the family caregiver's burden and improving the quality of life for patients and their families. Although these benefits may be intangible and harder to measure, they are important indicators of any health service's success. Home care also helps to keep families together and represents a way to empower the family within the health care system (55).

In some countries, home care may not be a feasible option, either because resources (including human resources) are scarce or because there is a prevailing cultural belief system that judges hospital care to be better or more desirable than receiving care at home (55). The poor are particularly likely to believe the latter, since hospitalization for them represents shelter and meals. Home care also may be inappropriate where expensive equipment is required (e.g. with patients on ventilators who require the ventilator, ventilator tubing, suction catheters, and supplemental oxygen) as well as a great deal of electricity in the home.

Home care is one of many community-based modalities countries should consider as part of future health care sector reforms. Other community-based options include adult day care, group homes, infirmaries for poor elderly, and hospice services (either institutional or home-based). Home care may be conceived within a continuum of services, whereby individuals will move from level to level as their needs change. Community-based services also foster individuals' continued involvement with their families and communities. It is essential to integrate community-based services within the overall health care system, in order to avoid fragmentation of care or alienation of the patient from family and community (55).

### School Health Services

School health services are provided on school premises or in another community-level health service institution that is linked to the school. Early in the 20<sup>th</sup> century, school health services mainly focused on addressing contagious diseases. Most countries in the Region have school health clinics and dental clinics in their public schools; schools also are used for vaccination campaigns, school feeding programs, and universal height-and-weight screening (62). With primary-school enrollment reaching 94% in the Americas, schools are ideal settings for providing as many children as possible with basic health services (63).

There is no complete and relevant information about the status of school health services in the Region. Many countries have interesting approaches, and school health models usually reflect the organization of health care in each country. (62, 64–66). Usually these models also vary at the national, state, community, school district, and individual school levels, as they respond to

differing student needs and available resources (66). Most countries view schools as essential focal points for informing parents and children about immunization campaigns, providing immunizations, and searching for cases of vaccine preventable diseases. Most countries also provide basic physical exams, as well as visual and hearing screening. Screening usually has a good coverage, but referrals are difficult and follow-up, inconsistent.

School health services are critical for encouraging the incorporation of disabled children into regular schools. They also can help detect minor disabilities such as vision, hearing, speech, posture problems, and reduce major health problems (67).

According to PAHO's initial assessment of school health services in six of the region's countries, some of the major constraints in the implementation of school health services include: poor collaboration between health and education authorities, poor coordination between the school and the local health service network, not enough resources allocated to school health services, and inadequate personnel training (68).

### **Traditional, Alternative, and Complementary Treatments**

The demand for and use of alternative and complementary therapies is growing in many countries, although trends and reasons may differ from country to country (69, 70). In developed countries, this increase is mostly related to a search for new ways to get better health care, while in developing countries it mostly has to do with economic issues or because, as is the case with indigenous medicine, it may be the only available source of health care (70, 71).

In 1999, PAHO assessed the population's use of traditional, complementary, and alternative medicine in 15 countries (72). Results showed that 11 countries had standards, policies, and regulations for at least one of these disciplines; 8 countries had a national program based at the Ministry of Health; and 9 countries had an academic program in dealing with these treatments. The most common disciplines sought are herbal medicine, homeopathy, acupuncture, Ayurvedic medicine, and chiropractic.

According to World Health Organization estimates, approximately 60% of the rural population—indigenous and non-indigenous—rely on traditional medicine for basic health care in many developing countries. Limited access to Western medicine, as well as personal preferences, accounts for this figure (73). In Bolivia, for example, where slightly more than half the population is indigenous, between 43% and 48% of the total population uses Western medicine. There is strong preference for traditional medicine in the country, and recent estimations show that more than 70% of the population relies on traditional medicine at least some of the time (74).

Over time, various forms of traditional medicine have developed in the context of different cultures and in different geographic regions, without a parallel development of international

standards and effective methods for evaluating traditional medicine (75). And, despite traditional medicine's great potential contribution to the population's health care, there is insufficient information and lack of quantitative and qualitative research to provide evidence on its safety and efficacy. As a rule, the regulation and/or registration of herbal products and other traditional therapies is mostly lacking in the countries, and there also is a lack of coordination among institutions and sectors interested in traditional, complementary, and alternative medicine (75).

Other important factors restricting the widespread use of traditional medicine is the lack of respect for cultural diversity and the lack of knowledge of traditional and/or indigenous medicine and culture. The public has become increasingly concerned about the appropriation and improper use of cultural knowledge and intellectual property by traditional medicine sources, such as various health- and pharmaceutical-related groups. In addition, there have been growing calls to document and protect a country's or an area's biodiversity, and to cultivate endangered plant species known to have medicinal value to assure the sustainability of these resources (75).

The PAHO/WHO Working Group on Traditional, Complementary and Alternative Medicines and Therapies (75) emphasizes the need to respect the integrity of indigenous peoples' social, cultural, and spiritual values and practices. To this end, it encourages the full participation of indigenous peoples in national processes designed to overcome this population group's deficient coverage, lack of access, poor acceptance, and low health impact within health systems and services. Based on the challenges and issues identified by the PAHO/WHO Working Group, the use of herbal medicines, the integration of complementary and alternative medicines and therapies into national health systems, and the promotion of indigenous health systems have been established as priority areas of work. To further this effort, the Working Group will foster the exchange of general and evidence-based information on traditional, complementary, and alternative medicines and therapies (75).

### **SCIENTIFIC PRODUCTION IN THE FIELD OF HEALTH**

The fact that this topic is part of a chapter on health resources and technologies shows that scientific research production in Latin America and the Caribbean is considered to be critical for improving the health situation and health care. If scientific production is to effectively fulfill its social responsibility, its production process—the way scientific activities in the field of health are organized—must be consistent with that purpose. In other words, science's full potential for solving the leading main health problems is not always realized automatically, and one of the reasons for this is that health activities in a given society may not be properly organized or properly. Scientific activity is a set of

processes through which scientific knowledge is produced, disseminated, and used, as well as the conditions under which those processes occur. The organization of scientific activity is steered by scientific policy, which is the series of principles, guidelines, instruments, and mechanisms that pursue scientific progress in the medium- and long-term (76). This section describes the characteristics of scientific production in the field of health in Latin American and Caribbean countries, and attempts to understand the relationship between the problems and difficulties encountered and the way scientific activities are organized in the Region. Some trends and initiatives aimed at overcoming those difficulties also are indicated.

### Scientific Activity in Latin America and the Caribbean

The following presents some elements of the situation and trends of scientific activity in the Region, which influence the development of health research. In terms of financing, spending on scientific research and experimental development<sup>1</sup> in Latin America is relatively low (US\$ 9.7 billion in 1999, an average per capita expenditure of around US\$ 21, or 0.5% of GDP). About 70% of total spending is concentrated in Brazil (57%) and Argentina (13%), both with per capita expenditures of around US\$ 35. The United States spends a total of US\$ 247 billion, around US\$ 914 per person, which is 40 times the amount spent by Latin American and Caribbean countries. Canada spends 20 times more per person (US\$ 418) and Spain, 8 times more (US\$ 165). The fact that spending on research and development per person in Latin America increased by 41% between 1990 and 1999, and that total expenditures increased by 69% over the same period is a positive development. That growth is similar to the rate of growth seen in United States, Canada and Spain.

The State is the main source of funding for research and development activities. In 1999, it contributed an average of 56.6% of the Region's funds, while private companies contributed 32.6%. The situation in the United States is different, with private companies providing 68.5% of funding and the government, 27.5%. In Latin America and the Caribbean, however, the State is reducing its participation and companies tend to increase theirs. In 1990, the State contributed 66.5% of research and development resources, and companies, 22%. There are still no data available on the extent of these trends in the health sector, but there are indications that private funding by multinational pharmaceutical corporations for clinical drug trials by local researchers is increasing. Those trials are sparking ethical concerns, because they are carried out in vulnerable population groups in countries that do not have the capability to ensure compliance with ethical aspects. Expenses by executing sector re-

veal the importance of universities as the main source of research and development activities in Latin America; in 1999, universities were responsible for executing 42% of financing resources, versus 21% in Canada and 14.3% in the United States. On the other hand, companies in Latin America and the Caribbean execute 36% of expenditure, compared to 64.5% in Canada and 74.7% in the United States.

Latin America has 128,000 full-time researchers, whereas the United States, with around 60% of the Region's population, has eight times that amount (1,114,100). These researchers also are also heavily concentrated in certain countries, with almost two-thirds of Latin American researchers working in Brazil (50,000) and Argentina (28,500). The number of people with doctorates is proof of the Region's effort to train human resources for research. Between 1990 and 1998, the number of doctoral candidates graduating each year increased by 89% (96% in the medical sciences). As for postgraduates, the figure is 70% (23% more in the medical sciences) (77).

In Latin American countries, scientific production in terms of publications is about 3% of the world's production registered in the database of the Institute for Scientific Information (ISI) (23,931 articles out of a total of 945,768) (78). This proportion is relatively low, being almost identical to that in a country with a medium level of scientific development, such as Spain, and it is fairly concentrated, with just two countries, Brazil and Argentina, accounting for around 60% of the scientific papers published. In terms of productivity, in 1999 Latin American researchers published approximately 18 articles for every 100 researchers, which is less than half of the nearly 39 articles produced in Spain for every 100 researchers (76).

In general, indicators show how weak the Region is both in generating and mastering scientific and technological knowledge. However, the trend shows increases both for input indicators and for products, especially compared to the situation in the 1980s.

Research and development funding is increasing and its sources are diversifying. As important is the fact that funds are being spent differently—there is growing interest in applied research and experimental development, and there have been more technological development funds created to support companies in their technological innovation efforts. There also is growing concern over selectivity and quality, expressed in the strengthening of mechanisms for research project review, support for the consolidation of groups of excellence, and establishment of research careers that have rigorous performance evaluation criteria.

At the meeting of PAHO's Advisory Committee on Health Research (ACHR), held in July 1998, representatives of the science and technology councils of Brazil, Costa Rica, Mexico, and Venezuela presented their councils' main policy guidelines. These included the definition of research agendas based on social demands; the establishment of alliances with various actors, including the private sector, for financing and research; the creation

<sup>1</sup> According to OECD's Frascati's Manual, research and experimental development comprise "creative work systematically undertaken in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications."

of cooperation networks among researchers; the establishment of assessment systems for individual scientific production; the decentralization of science and technology activities; and the promotion of regional cooperation agreements.

Also noteworthy is the recent move to encourage hemispheric cooperation on science and technology through the creation of a series of mechanisms designed to strengthen international cooperation, such as the Common Market of Scientific and Technological Knowledge (MERCOCYT), the Programa Bolívar, the Specialized Meeting of Science and Technology (RECYT) of MERCOSUR and the Iberoamerican Network of Science and Technology Indicators (RICYT), created in 1995 by the Iberoamerican Scientific and Technological Program for Development (CYTED), which is the source of the data previously presented on the status of science and technology in the Region. As can be observed, the nineties, particularly the second half, brought major changes in the quantity and quality of the main inputs and products, as well as in the organization of scientific activity in the Region. The effect of these changes in the area of health is analyzed below.

### Latin American and Caribbean Scientific Production in Health

Health research in Latin America and the Caribbean has a longer history than other research fields. At the beginning of the last century, researchers such as Oswaldo Cruz, Carlos Chagas, and Carlos Finlay ushered a new science stage in the Region, and science ceased to depend solely on individual efforts and instead became a regular activity of groups attached to public institutions. Despite the shortage of resources and the absence of specific government policies to support scientific research on a large scale, these researchers and groups maintained close ties with world-class institutions with which they collaborated, and played a leading role in public health, establishing clear links between the so-called basic sciences, applied research to the study relevant diseases, and the development of strategies and programs to fight them.

As in other fields, beginning in the 1960s and 1970s, the State began to increase its involvement and commitment to the formulation and implementation of policies to support health research, thereby expanding and strengthening scientific infrastructure. However, these policies were unable to overcome the serious weaknesses in the Region's capability to conduct research, so as to keep abreast of the rapid progress in scientific and technological development and respond to complex health and health care issues.

Relatively few scientific papers on health are published in the Region, and those that are tend to be concentrated in a handful of countries. Latin America is the source of about 2% (6,758 articles out of a total of 421,833 in 1998) of the articles registered in the largest international database on scientific publications on

health, MEDLINE of the National Library of Medicine of the United States. This production is broken down as follows: Argentina (1,168), Brazil (2,882), and Mexico (1,271) are responsible for around 80% of the scientific articles on health published in Latin America and the Caribbean (77). The situation is similar in the English Caribbean, where Jamaica is responsible for 75% of this subregion's publications (79).

In addition to these limitations in terms of the amount and distribution of scientific production, there are also problems regarding the type and quality of the material produced. For example, despite significant health inequities in Latin America and the Caribbean and the need to study their determining factors, a review of the scientific papers written by the Region's authors on health issues and published in national and international journals, as well as in the so-called "gray literature," shows that they did not increase significantly in the last five years, as they did in the United States and Europe (80). As has been mentioned, the limitations of scientific production to respond to the Region's complex health problems and to contribute to health promotion and health care, is largely related to the way scientific activity is organized in the Region.

Worldwide, a new way of producing scientific knowledge is being consolidated, although there are pronounced differences among countries. Instead of having the problems in scientific disciplines be defined by researchers linked to relatively closed institutions and who are concerned almost exclusively about their peers' judgment of the scientific quality of their work as published in specialized journals, this new way of producing knowledge defines problems within the context of an interaction between producers and users of knowledge. Given their complexity, those issues tend to be dealt with through projects developed within collaborative networks of researchers from different institutions, working with a transdisciplinary approach. The quality of the results is evaluated by "peers" and "non-peers," not only in terms of scientific merit, but also in terms of their relevance to solving the issue at hand (81).

In Latin America and the Caribbean, this new way of producing knowledge is gaining ground, albeit incipiently, in some areas. Some fundamental aspects of how scientific activity in the field of health is organized in the Region are described below, taking as a conceptual reference this new way of producing knowledge, sometimes referred to as a method of producing socially distributed knowledge.

### Defining Priorities

Defining research priorities should not be the exclusive responsibility of experts; rather, it should be approached as an eminently social enterprise involving different actors with their own interests and perceptions, and expressed within a space that facilitates consensus building. The creation of these spaces is one of the State's most important functions in the field of scientific and

technological policies, so that these policies can be consolidated as public policies arising from public debate.

In fact, this democratic and participatory process for identifying problems also has a technical dimension, which in the case of health is determined both by characteristics of the health/disease/health care process in a given society and by factors within science itself. Although the development of science is strongly influenced by its social environment, scientific development has its own dynamic determined by the wealth of knowledge accumulated and the questions arising from it (76). In recent years, several initiatives by international committees and organizations have been disseminated in the Region to support the formulation of research agendas or to contribute towards the development of methodologies for defining priorities (82–84).

### **Institutional Development**

One of the fundamental elements of the organization of scientific activity is its institutional foundation, which includes both the institutions in charge of coordinating, financing, and drawing up scientific and technological policies, and those whose mission it is to produce and disseminate knowledge. The process for creating institutional structures dedicated to the organization of scientific activity has been a little late in reaching the health sector. In the 1980s, several countries, with support from PAHO, created health science and technology units within their ministries of health to undertake this task. However, most failed to accumulate sufficient technical, political, and financial wherewithal to be able to play a relevant role in coordinating health research policies. Currently, some countries such as Brazil, Argentina, and Chile are trying to create bodies to coordinate science and technology in the area of health that can play a more active role at the sectoral level. Brazil and Chile, for instance, have envisaged the creation of sectoral funds as a way to strengthen these bodies.

Universities execute 42% of the resources earmarked for science and technology in Latin America and are also responsible for 70% to 80% of scientific production. This significant accumulation of resources and experiences by the universities in the Region faces important challenges today, such as the need for universities to reorganize their structure and external relations to solve the complex problems in several disciplines. There is a tendency worldwide to face that challenge by creating networks of peri-university institutions, such as research institutes, consulting firms, and companies organized around the campus, that capable of forming reciprocal relationships according to specific interests and projects. In this way, the university ceases to be an institution with defined limits and becomes a nucleus within a set of peripheral relations. Working teams tend to organize themselves around specific issues, breaking down departmental or discipline borders. New information and communication technologies make such a working organization feasible, and ensure a smooth relationship between the nucleus and the periphery (81).

In regard to health science and technology, public organizations for science and technology in health have an excellent tradition in the Region. Many of them were created in the last century, such as the Oswaldo Cruz Foundation (FIOCRUZ) in Brazil, the Malbrán and Fatała Chabén Institutes in Argentina, and the National Health Institutes of Chile, Colombia, and Venezuela.

Within the framework of State reform processes, these organizations must adapt to a new situation in which their social legitimacy results from greater efficiency and competitiveness than other public and private organizations in their field. In order to face the challenge of reconverting their structures and processes and staying attuned to new world trends in scientific and technical development, these organizations must seek greater administrative flexibility and autonomy, especially in terms of human resources. They also must establish mechanisms and set criteria to assess the impact of their activities, and develop their technological management capacity, which includes the capability to negotiate technology transfer agreements and cooperation agreements. Similar projects are being developed by several organizations such as FIOCRUZ and the research institutes of the Health Secretariat in Argentina.

### **Dissemination and Utilization of Results**

One of the most serious problems in organizing scientific activity in Latin America and the Caribbean is the gap between the processes that produce knowledge and those that disseminate and use it. In the mid-1990s, the Latin American and Caribbean Center on Health Sciences Information (BIREME) and PAHO's Research Coordination evaluated 311 titles of Latin American newspapers. Forty-five were registered both in the LILACS (Latin American and Caribbean Health Sciences Literature) database and on MEDLINE (MDL group); another 266 (non-MDL group) were only registered in LILACS. Based on a series of variables, the newspapers were classified into very good, good, medium, and weak. In the MDL group, 46.7% were classified as very good, compared with only 3.8% of the non-MDL group. No title by the MDL was classified as weak, whereas 20.3% of the non-MDLs were put into that category (85).

With a view to expanding the dissemination of Latin American scientific production and helping to enhance the quality of the Region's periodical publications, BIREME has launched the SciELO (Scientific Electronic Library on Line) project, which involves publishing the main Latin American and Caribbean journals in electronic format, including indicators on their use and impact ([www.scielo.org](http://www.scielo.org)). Brazilian, Chilean, and Mexican journals already are available on SciELO, as are the main Spanish public health journals (86).

The fact that little use is made of research results, especially for defining health policies and programs, has much to do with the difficulty various social actors have in gaining access to these



results. Despite some progress, there is still unequal access to information and knowledge on health, which partially prevents some of society's groups from participating more actively in the formulation and application of public policies, including health and science and technology policies.

The new information and communication technologies offer great promise in reducing inequities in this regard. The great challenge is to include and master these technologies for that potential to be effectively realized, and to prevent inequities from widening. The so-called digital divide is already vast in the Americas Region, and it could widen existing inequities or create others. The number of Internet users in Latin American and Caribbean countries is growing by approximately 41% a year, but they are still only a small minority of the total population. There are around 17 million users, 57% of them in Brazil and 29% in five other countries (Mexico, Argentina, Chile, Colombia, and Peru). Despite it being the fastest-growing Region in terms of the number of computers connected to the Internet, in South and Central America there are only 2.53 computers per 100 population, compared with 39.5 in North America (87).

Capitalizing on the experience accumulated by BIREME and the Latin American Health Sciences Information System, PAHO is adding to the effort to democratize information and knowledge by creating the Virtual Health Library (VHL) ([www.bireme.br](http://www.bireme.br)), a virtual library that includes the most varied and relevant sources of conventional and unconventional scientific and technical information, in full text, along with numeric databases, directories, multimedia tools to support education and decision-making, news, and discussion lists. The virtual library facilitates the interaction among different categories of information and knowledge and among different actors, to give them direct access to information without the barriers of time or geography.

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TABLE 1. Human resources working in health, selected countries of the Americas, circa 2000.

Country	Total number of health workers	Percentage of EAP employed in health care	Female participation in human resources in health (%)
Argentina	440,100	3.0	56.0
Bolivia	43,920	1.4	60.7
Brazil	2,457,969	4.0	74.2
Costa Rica	32,082	1.6	53.9
Colombia	282,345	2.5	69.5
Cuba	359,653	5.5	72.4
Dominican Republic	59,194	2.3	...
Panama	30,834	2.7	61.9
Peru	165,103	1.4	61.6
Uruguay	71,496	5.0	54.0

Sources: ILO Statistics (<http://www.ilo.org/public/english/bureau/stat/>). Country reports, Human Resources Observatory 2000 ([http://observatorio\\_RH.TRIPOD.com/](http://observatorio_RH.TRIPOD.com/)).

TABLE 2. Ratio of doctors, nurses, and dentists per 10,000 population, by country, Region of the Americas, 1999.

Country	Doctors	Nurses	Dentists
Anguilla	17.5	36.3	1.3
Antigua and Barbuda	11.5	32.2	2.2
Argentina	26.8	5.2	...
Aruba	12.8	...	2.2
Bahamas	16.3	23.4	2.9
Barbados	13.7	51.2	1.9
Belize	7.4	13.2	1.1
Bermuda	17.7	89.6	4.2
Bolivia	3.2	1.6	0.4
Brazil	14.4	4.5	9.4
Canada	22.9	89.7	5.9
Cayman Islands	21.5	53.0	3.9
Chile	13.0	10.0	4.2
Colombia	9.3	4.3	5.7
Costa Rica	15.0	11.3	4.0
Cuba	58.2	17.4	8.9
Dominica	4.9	41.6	0.6
Dominican Republic	19.0	3.0	...
Ecuador	13.2	4.6	1.6
El Salvador	11.8	4.2	4.0
French Guiana	13.9	86.0	3.0
Grenada	8.1	19.5	1.1
Guadeloupe	13.8	29.9	3.1
Guatemala	9.0	3.5	1.6
Guyana	1.8	8.4	0.4
Haiti	2.5	1.1	0.1
Honduras	8.3	3.3	2.2
Jamaica	2.5	11.3	0.2
Martinique	19.7	56.8	3.1
Mexico	15.6	10.8	1.0
Montserrat	1.8	29.1	0.9
Netherlands Antilles	14.0	29.4	3.3
Nicaragua	6.2	3.3	0.6
Panama	12.1	10.8	2.6
Paraguay	4.9	1.2	0.7
Peru	10.3	6.7	1.1
Puerto Rico	17.5	42.5	2.5
Saint Kitts and Nevis	11.7	49.8	2.0
Saint Lucia	5.8	22.6	0.9
Saint Vincent and the Grenadines	8.8	23.9	0.5
Suriname	5.0	22.8	0.8
Trinidad and Tobago	7.5	28.7	1.1
Turks and Ciacos Islands	7.3	19.3	0.7
United States	27.9	97.2	6.0
Uruguay	37.0	7.0	12.6
Venezuela	19.7	7.9	5.3
Virgin Islands (UK)	11.5	33.0	2.0
Virgin Islands (US)	16.5	36.9	...

Source: Pan American Health Organization, Special Program for Health Analysis. *Health Situation in the Americas. Basic Indicators 2001*. Washington, DC: PAHO; 2001. (PAHO/SHA/00.01).

TABLE 3. Status of decentralization efforts in human resource management, by function, selected countries of the Americas, 2001.

Country	Can appoint staff	Can transfer staff	Can change staff function	Can set salaries/incentives	Can sanction	Can fire	Can contract with third parties
Argentina	By institution	✓	✓	✓	✓	✓	✓
Brazil	✓	✓	✓	✓	✓	✓	✓
Canada <sup>1</sup>	✓	✓	✓	✓	✓	✓	✓
Colombia	✓	✓	✓	✓ <sup>2</sup>	✓	✓	✓
Costa Rica	✓	✓	...	...	✓	✓	✓
Chile	✓	✓	✓	✓	✓	✓	✓
Dominican Republic	...	...	...	✓ <sup>6</sup>	✓ <sup>6</sup>	✓ <sup>6</sup>	...
Ecuador	✓	✓	...	...	✓	✓	✓
El Salvador	✓	✓	...	...	✓	✓	✓
Guatemala	P	...	✓	...	...	...	...
Honduras	✓ <sup>3</sup>	...	...	...	...	...	...
Jamaica	✓	✓	✓	✓	✓	✓	...
Mexico	✓	...	...	✓	...	✓	...
Nicaragua <sup>4</sup>	P	P	P	P	P	P	P
Panama	...	✓	...	...	...	...	P
Paraguay <sup>5</sup>	...	...	...	...	✓	...	...
Peru	✓	...	...	✓	...	...	...
United States	✓	✓	✓	✓	✓	✓	✓
Venezuela <sup>7</sup>	✓	✓	✓	✓	✓	✓	...

P: planned.

<sup>1</sup> More than 95% of health institutions are managed by nonprofit organizations through trust councils, charities, or municipalities, Autonomous management system.

<sup>2</sup> Deregulation of workers who are not career civil servants.

<sup>3</sup> In social service / continuous training / accreditation of training.

<sup>4</sup> The decentralization of policy has just been approved, but it is unknown how it operates.

<sup>5</sup> Handling of basic management functions, recording absences, vacations, and performance, were transferred.

<sup>6</sup> Recommendations from central level.

<sup>7</sup> Only 17 of the 24 states have been decentralized since 1995, or are in the process of being decentralized.

Source: Pan American Health Organization, Human Resource Development Program, 2002.

TABLE 4. Work flexibilization, selected countries of Latin America.

Country	Instruments	Contents	Implications
Argentina	Established Duration Program (CDD), 1995.	Trial periods, exoneration of social security contributions	Advantages for temporary employees. Incentives for dismissal at the end of the CDD.
Brazil	Differentiation of CDD and Non-established Duration Program (CDI), 1998.	Contracts up to two years; variation of the working day	Changes in individual working conditions.
Colombia	CDD with non minimum period. Regulations of Subcontracting Law 50 of 1990.	Extension of contracts for a limited time; legalization of outsourcing	Increase in precarious work. Increased outsourcing.
Costa Rica	Ministry of Labor Directives, 1998.	Dismissals due to forced reduction in services or lack of fund	Changes in staff endowment.
Ecuador	Revision of the Labor Code, 1991. Law of maquiladora labor contracts, 1992.	Creation of occasional contracts Flexibilization to meet market demands in the maquila factories	Change in deadlines for contract obligations. Subordination of labor rights to external conditions.
Panama	Law 44 of 1995.	Definite duration contracts. Simplification of severance payments. Functional mobilization	Compensation between the workers' interests and capital yield. Changes individual working conditions.
Peru	Employment Promotion Law, 1997.	Opens several options for contracts other than CDI. Outsourcing	Adaptation to generalized informal labor, moving to legalized precarious forms of employment. Generalized outsourcing

Sources: Adapted from Bronstein A: *Pasado y presente de la legislación laboral en América Latina*. San José, Costa Rica: International Labor Organization; 1998; Country reports and survey of PAHO's Human Resources Development Program.

TABLE 5. Regulation of professional training, selected countries in Latin America, 2001.

Country	Responsible for accreditation	Recertification process	Accreditation process
Argentina	Ministry of Health	Yes (physicians)	Yes (programs)
Brazil	University	...	...
Chile	University	No	Yes
Colombia	University	No	Yes (voluntary)
Costa Rica	CONARE (public)/ CONARE-CONESUP (private)	Yes (physicians/voluntary)	Yes (program/voluntary)
Dominican Republic	University/CONES	No	Yes (programs)
Ecuador	University/Professional Associations/ Ministry of Health and Education	No	Yes
El Salvador	University/Technical Schools	No	Yes
Guatemala	University	No	No
Honduras	University/Ministry of Health	Yes	Yes
Jamaica	University/Professional Councils	Yes	Yes
Mexico	University/Public Education Secretariat	Yes (associations of specialists)	Yes (federations)
Nicaragua	University	No	No
Panama	University	No	No
Paraguay	University/Ministry of Education	No	Yes
Peru	University	Yes (physicians and specialists)	Yes (Faculties of Medicine)
Uruguay	Ministry of Education and Health University	No	No
Venezuela	University	Yes (specialties)	Yes

CONARE: National Council of Rectors

CONESUP: National Council of Higher Education

CONES: National Council of Higher Education

Source: Survey of PAHO's Human Resources Program in the countries.

TABLE 6. Responsibility for human resources, by unit and area of responsibility, selected countries in Latin America, 2001.

Country	Office <sup>a</sup>	Policy	Management	Training	Regulation
Argentina	Training Office	✓	✓	✓	✓
Brazil	Ministry of Health's Policy Office; overall coordination of human resource policies	✓	✓	✓	...
Colombia	...	...	...	...	...
Costa Rica	...	...	...	...	...
Chile	Division	✓	✓	...	✓
Dominican Republic	General Office	✓	✓	✓	...
Ecuador	General Office	✓	✓	✓	(degrees and practice)
El Salvador	Management division	✓	✓	✓	✓
Guatemala	General Office	✓	✓	✓	✓
Honduras	Human Resource Unit	✓	...	✓	✓
Jamaica	Office	✓	✓	✓	✓
Mexico	General Office Quality	✓	...	✓	✓
Nicaragua	General Office	✓	✓	✓	...
Panama	Directorate	...	✓	...	...
Paraguay	National Human Resources System (SINARH); Office of the Ministry of Health, technical unit, social welfare	✓	✓	✓	✓
Uruguay	Quality Control Division de Calidad	...	...	...	Professional practice
Venezuela	Research and Education Office	✓	...	✓	✓

<sup>a</sup>Denomination of existing ministry of health units in charge of human resource activities.

Source: Prepared by PAHO's Human Resources Development Program.



TABLE 7. Regulatory framework for professional practice, selected countries of Latin America, 2001.

Country	Practice regulated by law	School or association faculty	Single national list	No. of official specialties
Argentina	✓	✓		50
Brazil	✓	✓	✓	66
Chile		✓		58
Costa Rica	✓	✓ <sup>a</sup>	✓	50
Colombia		✓ <sup>b</sup>		40
Ecuador	✓	✓		...
Mexico		✓ <sup>c</sup>		47
Panama	✓		✓	53
Peru	✓ (Supreme Decree)	...	✓	50
Dominican Republic	✓ (Law 6.097)	✓ (National Council of Medical Residencies)	✓	20 specialties/ 6 sub-specialties
Uruguay	✓		✓	44
Venezuela		✓		...

<sup>a</sup>For new specialties; currently, specialties are taught through an agreement between the Costa Rican Social Security Fund (CCSS), handled by the Center for Strategic Development and Health and Security Information (CENDEISS), and Universidad de Costa Rica.

<sup>b</sup>Delegated to the universities.

<sup>c</sup>National Academy of Medicine (voluntary).

Source: Pan American Health Organization, Human Resources Development Program survey.

TABLE 8. Availability of hospitals and hospital beds, by subregion, Region of the Americas, 2000 or most recent available year.

Subregion	Hospitals		Beds	
	Number	Ratio (per 100,000 population)	Number (in thousands)	Ratio (per 100,000 population)
Canada and the U.S.A.	6,711	1.2	1,336,000	3.5
Mexico	3,033	3.3	197,000	1.2
Central America	500	1.5	46,000	1.4
Latin Caribbean	649	2.1	86,000	2.8
Non-Latin Caribbean	231	3.0	27,000	3.6
Brazil	7,806	4.8	501,000	3.1
Andean Area	2,832	2.7	163,000	1.5
Southern Cone	3,512	6.1	216,000	3.5
Total	25,274	3.2	2,842,000	2.8

Sources: Based on data from the Pan American Health Organization, Directory of Hospitals in Latin America and the Caribbean [data base]; information provided to PAHO by the countries; American Hospital Association Statistics, Fast facts on US hospitals from Hospital Statistics [internet site], available at [www.aha.org](http://www.aha.org); and Statistics Canada, Canadian Statistics [internet site] at [www.stat-can.ca](http://www.stat-can.ca).

TABLE 9. Outpatient health care centers in the Americas Region, 2000.

Subregion	Outpatient centers	
	Number	Ratio per 10,000 population
Canada and the U.S.A.	...	...
Mexico	17,348	1.87
Central America	8,126	2.47
Latin Caribbean	16,923	5.44
Non-Latin Caribbean	1,238	1.61
Brazil	41,009	2.54
Andean Area	52,032	4.96
Southern Cone	19,875	3.64
Total	156,551	3.02

*Source:* Pan American Health Organization, Special Program for Health Analysis. Regional Core Health Data Initiative. Washington, DC: 2001. Available at: [www.paho.org](http://www.paho.org).

TABLE 10. Status of diagnostic imaging services in the English-speaking and Dutch Caribbean countries, 2000.

Country	Population (thousands)	No. x-ray			No. radiologists	No. radiographers	No. darkroom technicians	No. physicists	Equipment servicing	Quality assurance protocols	Quality assurance equipment	Personnel radiation monitoring
		units	examinations per year	No. examinations								
Antigua and Barbuda	67	6	23,700	3	4	3	—	—	...	Partial	no	yes, USA
Bahamas	293	9	46,200	3	15	2	—	—	...	Partial	no	yes, USA
Barbados	272	16	37,000	5	19	4	1	1	yes, local	Partial	yes	yes, Jamaica
Belize	246	22	28,812	—	9	3	—	—	yes, local	No	no	yes, USA
Bermuda	64	106	—	7	12	...	—	—	...	Yes	yes	Yes
British Virgin Islands	98	3	7,200	—	4	...	—	—	yes, USA	Partial	no	No
Cayman Islands	36	8	20,605	2	11	2	—	—	yes, contract	Partial	yes	Yes, USA
Dominica	71	4	19,440	1	4	...	—	—	...	Partial	no	no
Guyana	856	18	43,000	1	7	6	—	—	...	None	no	Yes
Jamaica	2,605	115	156,644	25	95	35	4	4	yes, local	Partial	yes	Yes, local
Monserrat	11	1	1,380	—	1	...	—	—	...	Partial	no	Yes, UK
Netherlands Antilles	198	13	67,069	...	30	...	...	...	...	Yes	yes	no
Saint Lucia	148	7	25,000	2	8	...	—	—	yes, USA	Partial	no	no
Saint Vincent and the Grenadines	115	6	13,840	1	13	1	—	—	yes, contract	Partial	yes	Yes, USA
Trinidad and Tobago	1,301	108	110,000	7	75	10	4	4	...	Partial	no	yes, local
Turks and Caicos	16	...	1,800	1	5	...	—	—	yes, contract	...	...	yes, Jamaica

Source: Pan American Health Organization, Essential Drugs and Technology Program. Training Course on Radiation Protection in Diagnostic Radiology, Final Report. Jamaica: PAHO; 2000.

TABLE 11. Distribution of radiotherapy equipment, selected countries of the Americas, 1991–1996.

Country	Population (thousands)	Teletherapy units					Brachytherapy sources	
		X-ray	Radionuclide	LINAC	Stereotactic radiosurgery	Manual	Remote LDR	Remote HDR
Antigua and Barbuda	67	—	—	—	—	—	—	—
Argentina	37,488	...	103	41	1	74	—	3
Bahamas	293	—	—	—	—	—	—	—
Barbados	272	—	1	—	—	2	1	—
Bolivia	7,957	—	5	1	...	...	...	...
Brazil	172,236	169	126	68	3	100	—	22
Canada	31,433	10	44	107	—	30	28	20
Chile	15,402	—	21	14	—	19	1	—
Colombia	43,074	—	28	11	—	15	7	—
Costa Rica	4,112	2	3	—	—	7	—	—
Cuba	11,239	30	9	1	—	8	4	—
Dominican Republic	8,232	—	8	1	—	3	1	—
Dominica	71	—	—	—	—	—	—	—
Ecuador	12,175	7	9	—	—	2	2	—
El Salvador	6,059	—	3	—	—	9	—	—
Grenada	93	—	—	—	—	—	—	—
Guatemala	11,562	—	6	—	—	8	1	—
Guyana	856	—	—	—	—	—	—	—
Haiti	7,534	—	2	—	—	—	—	—
Honduras	6,147	—	2	—	—	2	—	—
Jamaica	2,605	—	2	—	—	—	—	—
Mexico	95,831	7	92	24	—	65	7	—
Nicaragua	5,215	—	1	—	—	5	—	—
Panama	2,899	3	3	—	—	2	—	—
Paraguay	5,222	—	4	3	—	—	—	—
Peru	24,797	10	9	3	—	25	—	—
Puerto Rico	3,807	—	2	2	—	—	—	—
Saint Kitts and Nevis	41	—	—	—	—	—	—	—
Saint Lucia	148	—	—	—	—	—	—	—
Saint Vincent and the Grenadines	115	—	—	—	—	—	—	—
Suriname	442	—	—	—	—	—	—	—
Trinidad and Tobago	1,301	—	3	—	—	2	—	—
United States	273,754	—	504	1893	—	—	—	—
Uruguay	3,239	—	10	3	—	—	—	—
Venezuela	23,242	—	20	15	—	30	2	—

Source: United Nations Scientific Committee on the Effects of Atomic Radiation. Sources and Effects of Ionizing Radiation. Vienna: UNSCEAR; 2000.

TABLE 12. Selected information infrastructure indicators, selected countries of the Americas, 1995, 1998, 1999, and 2001.

Country	Radio receivers (per 1,000 inh.) <sup>a</sup>	No. TV receivers (thousands) <sup>b</sup>	TV receivers (per 100 inh.)	Households w/ TV receivers (%) <sup>b</sup>	No. Cable TV subscribers (thousands) <sup>b</sup>	Cable TV subscriptions (% of TV receivers)	No. home satellite antennas (thousands) <sup>b</sup>	Home satellite antennas (% of TV receivers)	Wired telephone lines (main/fixed) (thousands) <sup>c</sup>	Wired telephone lines (main/fixed) (per 100 inh.)	Households w/ telephones (%) <sup>b</sup>
Antigua and Barbuda	417	32	47.8	...	...	...	...	...	34	50.7	...
Argentina	681	10,600	28.6	90.8	5,890	55.6	500	0.5	7,357	19.9	...
Aruba	...	21	21.4	...	15	71.4	2.2	10.5	33	33.9	...
Bahamas	592	72	23.5	...	47	65.3	...	...	111	36.2	...
Barbados	876	77	28.5	...	...	...	...	...	113	41.9	80.0
Belize	...	42	17.4	95.3	...	...	...	...	32	13.1	48.0
Bermuda	...	70	109.4	...	10	14.3	3.0	4.3	54	83.9	...
Bolivia	676	930	11.2	47.1	41	4.4	...	...	472	5.7	...
Brazil	444	53,768	31.6	86.9	2,200	4.1	511.0	1.0	24,985	14.7	32.0
Canada	1,047	21,450	68.9	99.1	8,254	38.5	275.0	1.3	19,206	61.7	98.4
Chile	355	3,500	23.0	81.3	665	19.0	...	...	3,109	20.4	...
Colombia	560	8,000	18.9	96.5	613	7.7	...	...	6,665	15.7	30.0
Costa Rica	776	870	21.6	86.0	50	5.7	2.0	0.2	803	20.0	...
Cuba	355	2,660	23.7	...	...	...	0.6	...	434	3.9	7.4
Dominica	587	16	22.5	...	10	62.5	...	...	19	26.3	...
Dominican Republic	178	790	9.3	34.0	125	15.8	...	...	764	9.0	...
Ecuador	420	2,500	19.8	20.9	200	8.0	7.0	0.3	1,130	8.9	8.9
El Salvador	478	800	12.7	89.6	25	3.1	...	...	468	7.5	16.0
French Guyana	...	37	21.3	74.4	...	...	...	...	49	28.3	74.0
Grenada	...	34	36.6	...	...	...	...	...	28	29.6	...
Guadeloupe	...	120	26.3	49.4	...	...	...	...	201	44.1	88.0
Guatemala	80	660	5.8	50.0	299	45.3	2.0	0.3	605	5.3	...
Guyana	493	55	6.4	...	...	...	...	...	64	7.4	...
Haiti	55	40	0.5	...	...	...	...	...	60	0.7	...
Honduras	395	590	9.1	32.1	50	8.5	0.3	0.1	279	4.3	16.4
Jamaica	880	480	18.6	71.3	251	52.3	21.0	4.4	474	18.4	...
Marinique	...	60	15.2	48.5	...	...	...	...	172	43.5	93.0
Mexico	325	25,000	25.3	85.7	1,500	6.0	352.4	1.4	10,927	11.1	33.9
Netherlands Antilles	...	70	32.3	...	...	...	...	...	76	35.0	...
Nicaragua	277	330	6.5	29.1	190	57.6	3.0	0.9	140	2.8	...
Panama	300	530	18.6	88.9	30	5.7	...	...	463	16.2	...
Paraguay	182	530	9.6	68.3	81	15.3	...	...	297	5.4	...
Peru	273	3,600	14.0	66.5	350	9.7	2.0	0.1	1,689	6.6	48.0
Puerto Rico	742	1,250	32.3	63.0	278	22.2	...	...	1,262	32.6	76.4
Saint Kitts and Nevis	648	10	25.6	...	...	...	...	...	17	44.1	77.0
Saint Lucia	759	55	36.2	94.1	7	12.7	0.1	0.2	40	26.6	...
Saint Vincent and the Grenadines	26	23.0	...	3	11.5	0.3	1.2	21	18.6	...	...
Suriname	639	98	23.5	67.6	2	2.0	0.3	0.3	71	17.0	...
Trinidad and Tobago	535	430	33.2	...	...	...	...	...	264	20.4	...
United States of America	2,146	231,000	83.0	96.0	67,011	29.0	8,400.0	3.6	179,822	64.6	94.2
Uruguay	606	1,750	52.4	97.0	340	19.4	...	...	897	26.9	67.0
Venezuela	470	4,300	17.8	81.0	600	14.0	100.0	...	2,586	10.7	...
Virgin Islands (US)	...	70	74.5	85.7	27	38.6	...	...	65	69.0	...

Sources:

<sup>a</sup> United Nations, 1995 Statistical Yearbook, New York: UN; 1995 and World Bank, World Development Indicators 2001, Washington, DC: World Bank; 2001.<sup>b</sup> International Telecommunications Union, Americas Telecommunication Indicators, 2000, Geneva: ITU Geneva; 2000. (Data for 1998). Available at: www.itu.int<sup>c</sup> International Telecommunications Union (Data for 1999).

TABLE 13. Selected indicators of information infrastructure, selected countries of the Americas, 1998 and 1999.

Country	Digital wired access lines (%) <sup>a</sup>	No. wireless telephone subscribers (thousands) <sup>b</sup>	Wireless phone subscribers (per 100 inh.)	Number public pay phones (per 1,000 inh.)	Public pay phones (% of fixed lines) <sup>a</sup>	Waiting time for connection (years) <sup>a</sup>	Phone connection waiting list (thousands) <sup>a</sup>	No. line faults (per 100 lines/year) <sup>a</sup>	Residential connection fee (US\$) <sup>a</sup>	Residential monthly subscription fee (US\$) <sup>a</sup>
Antigua and Barbuda	100.0	2	2.2	0.3	5.1	1.0	...	59.0	69.00	11.10
Argentina	100.0	4,434	12.0	107.6	2.9	1.5	58.2	17.3	150.00	12.80
Aruba	...	5	5.5	0.8	7.8	2.3	1.5	...	70.00	10.10
Bahamas	100.0	16	5.2	1.4	4.6	1.3	...	...	...	...
Barbados	100.0	12	4.4	0.6	2.1	0.5	2.2	9.6	49.00	15.50
Belize	99.6	3	1.4	0.6	2.6	2.0	0.3	69.5	45.00	4.00
Bermuda	100.0	13	19.7	0.8	13.1	1.8	...	...	60.00	14.00
Bolivia	75.0	402	4.8	5.0	0.6	1.1	...	...	168.00	5.50
Brazil	73.2	15,033	8.8	484.1	2.8	2.8	2400.0	3.8	43.00	6.70
Canada	99.4	7,000	22.5	178.0	5.7	1.0	...	...	42.00	13.20
Chile	100.0	2,261	14.9	13.5	0.9	0.5	58.3	52.0	159.00	16.30
Colombia	98.8	3,134	7.4	50.5	1.2	0.8	1594.0	56.0	214.00	3.30
Costa Rica	67.0	143	3.6	7.9	2.0	1.2	40.8	42.1	64.00	4.30
Cuba	37.0	5	...	10.2	0.9	2.6	...	14.3	100.00	6.30
Dominica	100.0	1	1.0	0.3	4.4	1.7	...	12.0	20.00	2.70
Dominican Republic	59.0	256	3.0	4.9	0.6	0.6	...	...	98.00	6.60
Ecuador	86.8	383	3.0	3.9	0.3	0.4	...	82.0	294.00	3.70
El Salvador	95.7	383	6.1	5.2	0.8	1.6	...	36.7	331.00	6.80
French Guyana	100.0	18	10.3	0.4	2.2	0.8	1.0	...	43.00	7.10
Grenada	100.0	1	1.5	0.2	2.3	0.9	0.1	9.0	85.00	14.10
Guadeloupe	100.0	88	19.3	1.3	2.9	...	1.3	...	47.00	10.60
Guatemala	92.0	351	3.1	4.7	0.4	1.6	...	...	258.00	0.70
Guyana	100.0	2	0.2	0.4	0.5	0.7	...	...	1.00	0.20
Haiti	100.0	...	...	...	...	...	100.0	108.0	48.00	5.70
Honduras	92.5	79	1.2	2.6	0.4	1.0	689.0	36.0	...	...
Jamaica	100.0	79	3.1	2.1	0.8	0.6	183.1	...	16.00	2.70
Martinique	100.0	102	25.8	1.1	2.9	0.7	2.8	...	47.00	10.50
Mexico	97.7	7,622	7.7	314.8	3.2	3.2	137.3	4.6	107.00	14.00
Netherlands Antilles	68.0	16	7.4	...	...	...	...	...	...	...
Nicaragua	96.0	69	1.4	1.4	0.3	1.1	29.3	...	138.00	6.40
Panama	73.0	242	8.5	3.2	1.1	1.0	28.8	97.0	10.00	10.00
Paraguay	86.0	436	7.9	1.3	0.2	0.5	20.1	...	732.00	2.30
Peru	90.0	990	3.9	47.0	1.8	3.0	48.0	33.6	151.00	14.80
Puerto Rico	100.0	580	15.0	24.2	6.3	1.9	57.0	62.4	35.00	19.50
Saint Kitts and Nevis	100.0	...	1.0	...	...	...	...	...	27.00	3.00
Saint Lucia	100.0	2	1.3	0.4	2.8	1.3	...	...	46.00	9.00
St. Vincent and the Grenadines	100.0	1	0.7	0.2	1.5	0.6	0.6	...	37.00	6.30
Suriname	50.0	18	4.2	0.3	0.6	0.4	33.2	47.5	152.00	0.70
Trinidad and Tobago	100.0	26	2.0	2.1	1.6	0.8	7.4	75.0	11.00	4.60
United States of America	89.3	85,019	30.5	1745.1	6.3	1.0	...	13.4	44.00	19.90
Uruguay	100.0	316	9.5	9.1	2.7	1.1	...	95.3	214.00	8.70
Venezuela	66.1	3,400	14.1	75.1	3.1	2.8	392.0	3.5	99.00	8.20
Virgin Islands (US)	100.0	25	26.6	0.9	9.3	1.4	1.1	...	65.00	18.60

Sources:

<sup>a</sup> International Telecommunications Union. Americas Telecommunication Indicators, 2000. Geneva: ITU; 2000. (Data for 1998) www.itu.int

<sup>b</sup> International Telecommunications Union. (Data for 1999).

TABLE 14. Indicators of the scope of information and communication technology (ICT) in society, selected countries of the Americas, 1998 and 2001.

Country	Business connection fee (US\$) <sup>a</sup>	Business monthly subscription fee (US\$) <sup>a</sup>	Residential annual subscription (% per capita GDP)	Telecomm. investment (US\$ millions) <sup>a</sup>	Per capita investment in telecomm. (US\$)	Telecomm. Investment (% of revenue)	Total telecomm. staff in servs. (thousands) <sup>a</sup>	Main lines per telecomm. employee <sup>a</sup>	Information and telecomm. (ICT) expenditures (%GDP) <sup>b</sup>	Total telecomm. revenue (US\$ millions) <sup>a</sup>	Total telecomm. revenue per employee (US\$) <sup>a</sup>
Antigua and Barbuda	119.00	22.20	1.6	...	...	...	...	...	...	...	...
Argentina	150.00	36.40	1.9	1,456.7	39	22.0	21.2	347	3.41	6,611.3	311,854
Aruba	56.00	10.10	0.7	...	...	...	0.4	83	...	...	...
Bahamas	...	...	...	16.2	53	10.3	2.2	51	...	156.7	71,227
Barbados	49.00	42.40	2.0	25.0	93	14.2	1.0	113	...	176.0	176,000
Belize	45.00	10.00	1.8	12.0	50	30.0	0.4	79	...	40.0	100,000
Bermuda	60.00	20.00	0.6	25.0	391	30.7	0.5	107	...	81.5	163,000
Bolivia	179.00	9.90	6.8	308.0	37	86.4	4.4	107	...	356.6	81,045
Brazil	43.00	11.60	1.7	6,930.4	41	34.4	84.8	295	5.82	20,168.0	237,830
Canada	58.00	37.70	0.8	4,033.9	130	23.8	90.0	213	8.52	16,919.4	187,993
Chile	159.00	16.30	4.2	926.5	61	39.1	9.4	331	5.74	2,367.4	251,851
Colombia	305.00	5.00	1.4	1,125.5	27	30.1	35.4	188	8.85	3,735.6	105,525
Costa Rica	64.00	6.20	2.1	133.3	33	49.2	4.5	178	...	271.1	60,244
Cuba	100.00	9.30	5.7	74.4	7	14.2	16.5	26	...	524.6	31,794
Dominica	20.00	7.50	1.0	...	...	...	0.2	94	...	...	...
Dominican Republic	120.00	19.60	4.8	...	...	...	3.8	201	...	...	...
Ecuador	643.00	7.30	3.6	100.9	8	23.9	6.8	166	...	422.7	62,162
El Salvador	331.00	12.10	3.9	72.5	12	34.8	4.3	109	...	208.4	48,465
French Guyana	43.00	9.20	...	...	...	...	0.3	164	...	40.6	135,333
Grenada	85.00	40.70	4.9	...	...	...	0.3	92	...	...	...
Guadeloupe	...	...	...	21.1	46	16.4	0.8	251	...	128.8	161,000
Guatemala	258.00	2.10	0.6	...	...	...	2.9	209	...	251.6	86,759
Guyana	1.00	0.60	0.3	53.6	62	67.3	0.7	91	...	79.7	113,857
Haiti	48.00	11.50	18.5	4.1	0.5	4.7	2.8	21	...	86.6	30,929
Honduras	...	...	...	53.6	8	29.1	4.5	62	...	184.3	40,956
Jamaica	23.00	5.80	1.5	133.9	52	31.3	4.1	116	...	427.7	104,317
Martinique	47.00	12.40	...	25.0	63	21.1	0.8	215	...	118.6	148,250
Mexico	383.00	19.30	3.9	1,601.5	16	17.8	55.4	197	4.20	9,005.5	162,554
Netherlands Antilles	...	...	...	...	...	...	0.8	95	...	...	...
Nicaragua	138.00	6.40	16.8	40.7	8	56.8	2.8	50	...	71.6	25,571
Panama	20.00	20.00	4.0	43.7	15	17.6	3.9	119	...	248.6	63,744
Paraguay	732.00	4.20	2.0	71.2	13	31.5	6.1	49	...	225.7	37,000
Peru	151.00	16.20	7.3	738.9	29	51.1	6.5	260	...	1,445.8	222,431
Puerto Rico	120.00	28.90	3.1	354.7	92	29.1	7.9	160	...	1,217.3	154,089
Saint Kitts and Nevis	27.00	3.70	0.6	3.1	79	11.5	0.2	86	...	27.0	135,000
Saint Lucia	...	10.10	2.9	...	...	...	0.4	101	...	...	...
Saint Vincent and the Grenadines	37.00	14.80	3.0	...	...	...	0.2	105	...	23.1	115,500
Suriname	152.00	0.70	0.6	11.2	27	28.6	1.1	64	...	39.2	35,636
Trinidad and Tobago	22.00	27.80	1.2	34.4	27	16.2	2.8	94	...	212.6	75,929
United States of America	70.00	41.30	0.8	24,218.1	87	8.5	1,021.8	176	8.87	284,515.0	278,445
Uruguay	331.00	20.00	1.7	97.4	29	14.0	5.8	155	...	694.7	119,776
Venezuela	321.00	22.10	2.1	745.6	31	33.1	13.2	196	3.44	2,249.5	170,417
Virgin Islands (US)	105.00	49.90	...	11.3	120	16.9	0.4	162	...	66.8	167,000

Sources:

<sup>a</sup> International Telecommunications Union, Americas Telecommunication Indicators, 2000. Geneva: ITU; 2000. (Data for 1998) www.itu.int<sup>b</sup> World Bank. World Development Indicators 2001. Washington, DC: World Bank; 2001.

TABLE 15. Indicators of information distribution, selected countries of the Americas, 1997–2000.

Country	No. Internet hosts <sup>a</sup>	Internet hosts (per 1,000 pop.)	No. Internet service providers (ISPs) <sup>b</sup>	No. personal computers (thousands) <sup>b</sup>	No. personal computers (per 100 pop.)	No. Internet users (thousands) <sup>c</sup>	Population connected to the Internet (%)	No. hosps. w/computerized systems (all applications) <sup>d</sup>	Hosps. w/computerized systems (all applications) (%) <sup>d</sup>
Antigua and Barbuda	225	3.36	2			3	4.48		
Argentina	142,470	3.85	170	1,600	4.32	900	2.43	812	29.2
Aruba	353	3.60							
Bahamas	4	0.01		30	9.77	12	3.91	4	80.0
Barbados	68	0.25		20	7.41	5	1.85	1	12.5
Belize	276	1.15	1	30	12.45	12	4.98	1	10.0
Bermuda	2,825	44.14				25	39.06	1	50.0
Bolivia	948	0.11	9	60	0.72	35	0.42	58	15.0
Brazil	446,444	2.62	280	5,000	2.94	3,500	2.06	2313	37.7
Canada	1,669,664	53.61	800	10,000	32.11	11,000	35.32		
Chile	40,190	2.64	26	714	4.69	625	4.11	144	37.4
Colombia	40,565	0.96	15	1,024	2.42	600	1.42	417	39.6
Costa Rica	7,471	1.86	2	150	3.73	150	3.73	19	57.5
Cuba	169	0.02	3			25	0.22	37	15.2
Dominica	181	2.55		6	8.45	2	2.82		
Dominican Republic	6,754	0.80				25	0.29	30	14.0
Ecuador	1,922	0.15	9	225	1.78	20	0.16	59	19.7
El Salvador	975	0.16	7	100	1.59	40	0.64	23	29.8
French Guyana	125	0.72	4	20	11.49	2	1.15		
Grenada	3	0.03		10	10.75	2	2.15		
Guadeloupe	549	1.20		80	17.54	2	0.44	6	60.0
Guatemala	1,772	0.16	10	90	0.79	65	0.57	36	24.8
Guyana	16	0.02	5	20	2.32	3	0.35		
Haiti	1					2	0.02	3	2.9
Honduras	119	0.02	17	50	0.77	20	0.31	23	25.8
Jamaica	367	0.14	20	100	3.87	50	1.94		
Martinique	329	0.83	4	40	10.13	2	0.51	3	50.0
Mexico	404,873	4.09	148	4,500	4.55	2,500	2.53	693	13.3
Netherlands Antilles	97	0.45						6	54.5
Nicaragua	1,028	0.20	7	35	0.69	20	0.39	12	15.3
Panama	1,235	0.43	30	75	2.63	45	1.58	13	23.6
Paraguay	1,660	0.30	22	50	0.91	20	0.36	57	24.1
Peru	9,230	0.36	54	450	1.75	400	1.56	262	59.1
Puerto Rico	1,310	0.34				100	2.58	64	71.1
Saint Kitts and Nevis	8	0.21		5	12.82	2	5.13		
Saint Lucia	13	0.09	1	20	13.16	2	1.32	2	33.3
Saint Vincent and the Grenadines			1	10	8.85	2	1.77	4	30.7
Suriname			2	60	4.63	7	1.68	1	1.5
Trinidad and Tobago	4,852	3.75				20	1.54	1	100.0
Turks and Caicos Islands									
United States of America	52,207,402	187.56	4,300	124,000	44.55	110,000	39.52	66	59.4
Uruguay	25,385	7.61	12	300	8.99	300	8.99	54	15.5
Venezuela	14,281	0.59	32	1,000	4.14	400	1.65	5	21.7
Virgin Islands (US)	596	6.34	5	30	31.91	12	12.77		

Sources:

<sup>a</sup> International Telecommunications Union (data for January 2000).

<sup>b</sup> International Telecommunications Union, Americas Telecommunication Indicators, 2000, ITU Geneva; (data for 1998) www.itu.int

<sup>c</sup> International Telecommunications Union (data for 1999).

<sup>d</sup> Pan American Health Organization, Division of Health Systems and Services, Organization and Management of Health Systems and Services Program, Hospital Directory for Latin America and the Caribbean. Washington, DC:PAHO, 1997.



TABLE 16. Blood collection and screening for infectious markers, Latin American countries, 1999 and 2000.

Country	Year	No. blood banks	No. units collected	Coverage of screening (%)				
				HIV	HBsAg	HCV	Syphilis	Chagas
Argentina	1999	781	810,259	100	100	93	100	100
	2000	781	804,018	100	100	98	100	100
Bolivia	1999	60	20,628	29	29	10	10	23
Brazil	1999	3,264	1,663,857	100	100	100	100	100
	2000	2,161	1,827,937	100	100	100	100	100
Chile	1999	162	218,371	99	99	99	98	87
	2000	162	218,371	98	97	97	96	91
Colombia	1999	176	353,991	100	100	100	100	100
	2000	159	398,000	100	100	100	100	100
Costa Rica	1999	28	93,518	100	100	100	100	7
	2000	25	59,218	100	100	100	100	6
Cuba	1999	42	578,239	100	100	100	100	...
	2000	42	574,320	100	100	100	100	
Dominican Republic	1999	66	56,649	74	74	69	68	...
	2000	77	60,885	100	100	100	99	
Ecuador	1999	36	103,448	99	99	99	99	90
	2000	38	82,237	100	100	100	100	92
El Salvador	1999	31	67,224	100	100	100	100	100
	2000	59	76,096	100	100	100	100	100
Guatemala	1999	29	31,939	100	100	69	100	100
	2000	31 <sup>a</sup>	25,482	99	100	84	100	98
Honduras	1999	27	40,933	100	100	92	100	99
	2000	29	38,328	100	100	94	100	100
Mexico	1999	753	1,092,741	100	100	100	100	13
	2000	589	1,234,414	100	100	100	100	15
Nicaragua	1999	34	45,000	100	100	100	100	100
	2000	26	50,581	100	100	68	100	74
Panama	1999	34	43,921	100	100	99	100	17
	2000	25	44,496	100	100	100	100	29
Paraguay	1999	41	45,597	99	99	45	75	100
Peru	1999	143	311,550	100	100	100	100	100
	2000	144	332,800	100	100	100	100	100
Uruguay	1998	76	116,626	100	100	100	100	100
	2000	79	116,548	100	100	100	100	100
Venezuela	1999	263	302,100	100	100	100	100	100
	2000	262	323,860	100	100	100	100	100

<sup>a</sup>Information from public blood banks only.

Source: Information provided to PAHO by national blood programs

TABLE 17. Blood collection and screening for infectious markers, Caribbean countries, 1996 and 2000.

Country	No. blood banks	Year	No. units collected	Coverage of screening (%)				
				HIV	HBsAg	HCV	Syphilis	HTLV I/II
Anguilla	1	1996	165	100	100	—	100	—
		2000	26	100	100	—	100	—
Antigua	2	1996	755	100	100	—	100	—
		2000	1,050	100	100	—	100	—
Aruba	1	1996	3,325	100	100	100	100	100
		2000	2,902	100	100	100	100	100
Bahamas	3	1996	3,527	100	100	100	100	100
		1999 <sup>a</sup>	4,889	100	100	92	100	92
Barbados	1	1996	3,240	100	100	100	100	—
Belize	7	1996	2,770	100	100	100	100	—
		2000	2,935	100	100	100	100	—
Bermuda	1	1996	2,215	100	100	100	100	—
		2000	2,299	100	100	100	100	—
British Virgin Islands	1	1996	220	100	100	100	100	—
		2000	315	100	100	—	100	—
Cayman Islands	1	1996	449	100	100	100	100	100
		2000	...	...	...	...	...	...
Dominica	1	1996	705	100	100	—	100	—
		2000	885	100	100	100	100	100
Grenada	1	1996	816	...	...	...	...	...
		2000	742	100	100	—	100	100
Guyana	1	1996	2,801	100	100	—	100	100
Jamaica	9	1996	21,215	100	100	—	100	100
		2000	25,990	100	100	100	100	100
Montserrat	1	1996	38	100	100	—	100	—
Netherlands Antilles	1	1996	5,873	100	100	100	100	100
		2000	6,005	100	100	100	100	100
Saint Kitts	1	1996	140	100	100	—	100	—
		2000	242	100	100	—	100	—
Saint Lucia	2	1996	1,827	100	100	—	100	—
		2000	1,220	100	100	100	100	100
Saint Vincent	1	1996	1,062	100	100	—	100	100
Suriname	1	1996	2,188	100	100	100	100	100
		2000 <sup>b</sup>	5,246	100	100	100	100	100
Trinidad and Tobago	8	1996	14,882	100	100	100	100	100
		2000	...	...	...	...	...	...
Turks and Caicos Islands	2	1996	57	100	100	—	100	—
		2000	161	100	100	100	100	—

<sup>a</sup>For Bahamas, 1999 data were collected during an on-site assessment.

<sup>b</sup>For Suriname, 2000 data were obtained from a proposal sent to PAHO.

Source: Official information provided to PAHO by the National Blood Programs.

TABLE 18. Indicators of the provision of health care services, countries of the Americas, 2000 or most recent available year.

Country	Hospital discharges (per 1,000 population)	Outpatient visits (per person)	Prenatal coverage (%)	Delivery coverage (%)
Anguilla	129.6	...	100.0	100.0
Antigua and Barbuda	73.2	0.1	99.9	99.9
Argentina	59.4	2.2	83.9	99.0
Aruba	119.5	...	100.0	99.0
Bahamas	74.6	1.6	87.0	99.0
Barbados	80.7	1.6	98.0	98.0
Belize	70.9	0.8	95.9	96.9
Bermuda	118.6	0.2	100.0	100.0
Bolivia	32.1	1.0	60.0	52.0
Brazil	70.3	10.4	49.8	97.0
Canada	94.5	6.2	...	99.4
Cayman Islands	189.4	0.8	99.7	99.8
Chile	101.3	2.9	83.1	99.7
Colombia	...	...	91.0	87.0
Costa Rica	83.8	3.3	69.8	97.5
Cuba	119.0	9.6	93.9	100.0
Dominica	...	...	99.9	99.9
Dominican Republic	50.4	1.0	98.0	95.5
Ecuador	51.2	1.4	80.6	83.5
El Salvador	...	...	68.6	71.7
French Guiana	...	...	...	...
Grenada	...	...	98.0	99.0
Guadeloupe	...	...	...	...
Guatemala	22.0	0.9	55.0	84.0
Guyana	...	...	90.0	94.0
Haiti	...	...	78.8	59.8
Honduras	32.7	4.4	83.5	60.0
Jamaica	67.3	0.8	66.6	95.9
Martinique	...	...	98.0	100.0
Mexico	56.7	2.5	91.1	80.2
Montserrat	...	...	...	100.0
Netherlands Antilles	...	...	...	...
Nicaragua	57.4	2.0	81.5	81.5
Panama	81.8	1.4	80.4	89.3
Paraguay	23.5	0.5	67.9	85.6
Peru	45.2	2.3	71.0	54.8
Puerto Rico	38.0	8.1	98.7	99.9
Saint Kitts and Nevis	...	...	...	99.4
Saint Lucia	89.3	...	...	100.0
Saint Vincent and the Grenadines	78.3	0.8	99.0	100.0
Suriname	67.8	1.4	91.0	97.8
Trinidad and Tobago	110.9	0.8	93.0	99.0
Turks and Caicos	71.1	1.0	100.0	88.2
United States	116.3	0.3	96.6	99.4
Uruguay	...	5.2	91.6	99.6
Venezuela	...	0.2	25.5	95.3
Virgin Islands (UK)	...	...	...	100.0
Virgin Islands (US)	...	...	59.3	...

Source: Pan American Health Organization, Special Program for Health Analysis. Regional Core Health Data Initiative. Washington, DC: PAHO; 2001. Available in : [www.paho.org](http://www.paho.org).

VII. HEALTH RESOURCES AND TECHNOLOGY

TABLE 19. Percentage of vaccination coverage as an indicator of the provision of health care services in the countries of the Americas, 1994, 1997, and 2000.

Country	DPT3 <sup>a</sup>			OPV3 <sup>b</sup>			BCG <sup>c</sup>			Anti-measles		
	1994	1997	2000	1994	1997	2000	1994	1997	2000	1994	1997	2000
Anguilla	94	99	92	92	99	94	99	99	99	99	92	99
Antigua and Barbuda	99	99	95	99	99	96	...	...	...	91	93	90
Argentina	82	85	80	85	91	85	99	99	99	96	92	91
Aruba	...	...	...	...	...	...	...	...	...	...	...	...
Bahamas	88	87	99	88	86	91	...	...	...	92	94	93
Barbados	90	96	94	91	96	86	...	...	...	99	92	94
Belize	88	86	89	83	85	89	90	95	95	82	98	96
Bermuda	89	91	...	62	94	...	...	...	...	93	88	...
Bolivia	81	78	89	85	78	89	92	88	95	89	99	99
Brazil	69	79	98	89	89	99	87	99	99	72	99	99
Canada	89	97	...	93	86	...	...	...	...	...	96	...
Cayman Islands	95	95	93	96	96	92	97	86	90	91	93	89
Chile	92	91	97	92	91	89	91	98	99	93	92	97
Colombia	91	74	74	95	76	78	99	88	86	87	76	75
Costa Rica	87	91	88	88	93	79	94	92	92	89	99	84
Cuba	99	98	99	96	97	99	99	99	99	99	99	96
Dominica	92	99	99	92	99	99	92	99	99	92	99	99
Dominican Republic	83	83	78	98	81	67	60	88	90	87	80	88
Ecuador	80	76	89	78	77	83	99	94	99	99	74	89
El Salvador	89	97	99	89	96	98	82	93	99	80	97	97
Grenada	83	95	97	85	95	97	...	...	...	93	92	92
Guadeloupe	...	...	...	...	...	...	...	...	...	...	...	...
Guatemala	71	85	95	73	85	94	70	90	97	66	76	98
French Guiana	...	...	...	...	...	...	...	...	...	...	...	...
Guyana	90	88	88	90	88	78	94	94	93	83	82	86
Haiti	30	35	59	30	32	58	48	40	57	24	30	80
Honduras	95	93	96	95	95	87	99	99	99	93	89	99
Jamaica	93	90	86	94	90	86	99	97	94	77	88	88
Martinique	...	...	...	...	...	...	...	...	...	...	...	...
Mexico	91	95	89	92	95	89	98	99	99	90	91	96
Montserrat	99	99	85	99	99	85	99	99	99	99	99	99
Netherlands Antilles	...	...	...	...	...	...	...	...	...	...	...	...
Nicaragua	74	94	89	84	99	94	89	99	99	73	94	99
Panama	83	95	98	83	99	99	95	99	99	84	92	97
Paraguay	84	82	80	83	82	73	97	87	79	79	61	92
Peru	87	98	98	87	97	93	92	98	93	75	91	97
Puerto Rico	...	...	...	...	...	...	...	...	...	...	...	...
Saint Kitts and Nevis	99	99	99	99	99	99	...	99	99	99	97	99
Saint Lucia	97	98	70	97	98	70	95	99	91	94	95	89
Saint Vincent and the Grenadines	99	99	99	99	99	99	99	98	99	99	99	96
Suriname	74	85	...	71	81	...	..	..	..	67	78	0
Trinidad and Tobago	81	90	90	78	91	90	..	..	..	87	88	90
Turks and Caicos	99	99	99	99	99	99	97	99	99	93	99	99
United States	84	95 <sup>d</sup>	...	94	91 <sup>d</sup>	...	...	...	...	...	91	...
Uruguay	91	91	88	91	91	88	99	99	99	90	92	90
Venezuela	63	57	77	72	73	86	95	86	99	94	65	84
Virgin Islands (UK)	99	99	99	99	96	99	99	99	99	99	99	99
Virgin Islands (US)	...	...	...	...	...	...	...	...	...	...	...	...

<sup>a</sup>Diphtheria, pertussis, and tetanus vaccine.

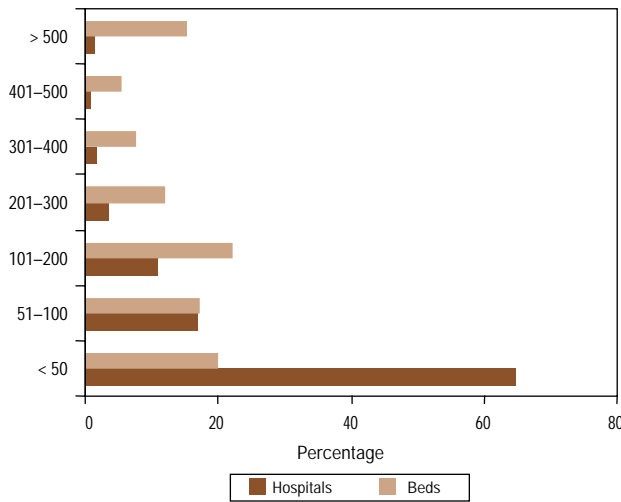
<sup>b</sup>Polio vaccine.

<sup>c</sup>Tuberculosis vaccine.

<sup>d</sup>Data for 1998.

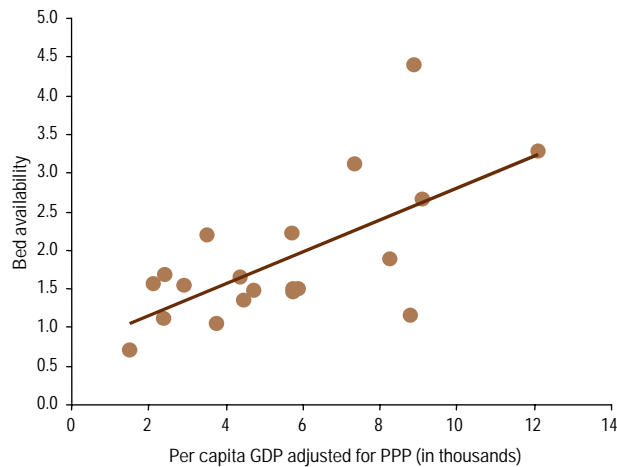
Source: Pan American Health Organization, Division of Vaccines and Immunizations. Washington DC, 2001.

FIGURE 1. Percentage of hospitals and hospital beds, by hospital size, Latin America and the Caribbean, 1997.



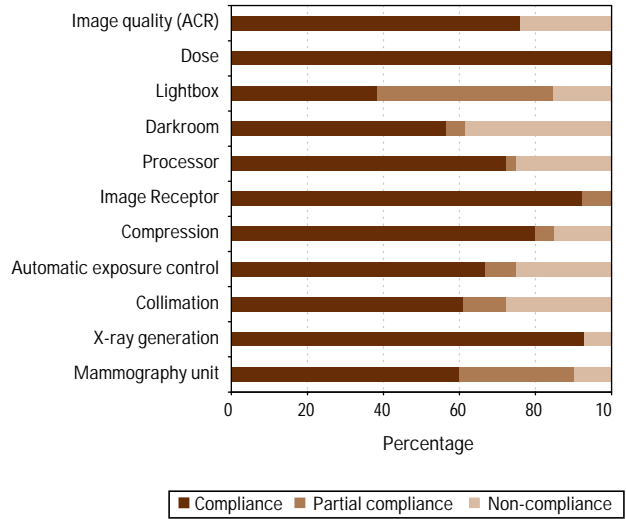
Note: The number of beds is unknown in 6.6% of hospitals.  
 Source: Based on Pan American Health Organization. Latin American and Caribbean Hospital Directory [data base]. Washington, DC: PAHO; 1997.

FIGURE 2. Availability of beds per 1,000 population, by per capita GDP adjusted for PPP, selected countries in Latin America and the Caribbean,<sup>a</sup> 2000 or most recent available year.



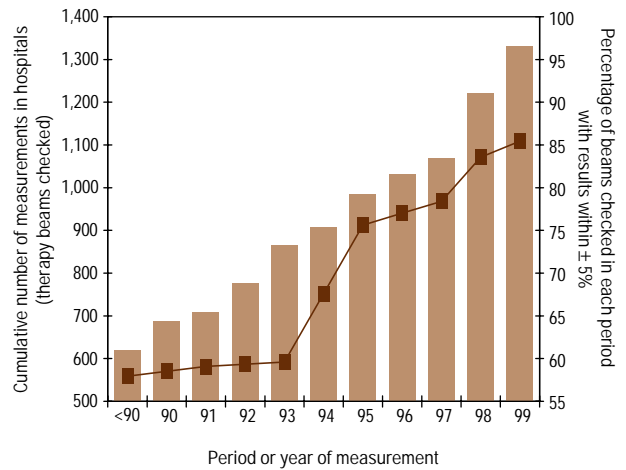
Source: Based on Pan American Health Organization data. Latin American and Caribbean Hospital Directory [data base]. Washington, DC: PAHO; 1997. World Bank, World Development Report, 2001, www.worldbank.org.

FIGURE 3. Percentage of mammography equipment in compliance, partial compliance, and non-compliance with performance criteria, five Latin American countries, 2001.



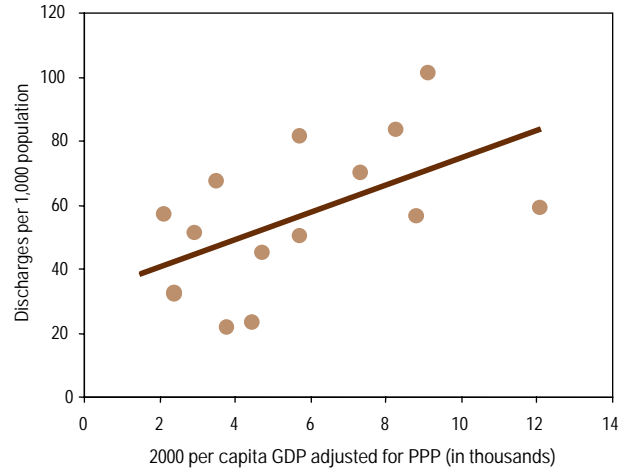
Source: Brandon ME, Ruiz-Trejo C, Caspani CEM et al. Evaluation of mammography equipment. Performance, dose and image quality in five Latin American countries. In Barrios FA, Brandon ME, Rodriguez AO, eds, V Mexican Symposium on Medical Physics. Juriquilla, Mexico: AIP Conference Series; 2001.

FIGURE 4. Results of IAEA/WHO thermoluminescent dosimetry postal dose quality results, Latin America and the Caribbean, 1990–1999.



Source: Izaeska J, Bera P, Andreo P, Meghziifene A. Thirty years of the IAEA/WHO TLD postal dose quality audits for radiotherapy. International Atomic Energy Agency: Vienna; 2001.

FIGURE 5. Annual hospital discharges per 1,000 population, by per capita GDP (PPP), selected Latin American and Caribbean countries, 2000 or most recent available year.



Source: Pan American Health Organization. Hospital Directory for Latin America and the Caribbean [data base]. Washington, DC: PAHO; 1997, information provided to PAHO. World Bank. World Development Report, 2001, available at [www.worldbank.org](http://www.worldbank.org).



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# VIII. CHARACTERISTICS AND TRENDS IN EXTERNAL COOPERATION

*If each and every one of us puts his shoulder to the wheel and we begin to work together at once, this can be done and will be done. There can be no nobler feat than true Pan American cooperation in health [whose objective is] the great work of saving human lives...*

J. H. White,

*Boletín de la Oficina Sanitaria Panamericana, 1922*

## HEALTH AND INTEGRATION EFFORTS IN THE AMERICAS

As is every country in the world, the Region's countries are experiencing globalization that has intensified with information, transportation, and communications innovations that have emerged at the end of the 20th century (1). Moreover, globalization has been strengthened by the Uruguay Round of the General Agreement on Tariffs and Trade (GATT).

Despite the fact that some countries have experienced economic stagnation, overall integration has progressed in the Americas (2). Integration is not new to Latin America and the Caribbean. Given their generally homogeneous history, language, and culture, this region's countries have historically worked toward integration. Economic and political roots also lie at the root of integration, as the countries hold on to their identity while they cope with global competition.

Subregional integration serves to transfer some national control to subregional and regional institutions, thereby increasing a country's bargaining power, as well as complementing efforts to integrate trade with those designed to integrate social, ideological, and cultural issues (3). The most indebted, less developed, countries with smaller economies can offset the negative effect of sectoral imbalances, by aligning themselves with kindred countries through a process that recognizes and responds to factors that determine their capability to compete (4).

Social aspects are accorded differing importance and treatment across the Region's integration processes: they arise from the interaction of specific political actors and civil society and, thus, are channeled through different institutions and are subject to different regulations. Social aspects also are influenced by pre-existing fora or sectoral agencies that deal with relevant issues, such as meetings of ministers of health. Regardless of how social aspects are specifically dealt with in each country, the following overall trends have been observed:

- Establishing the means to deal with social issues, particularly health issues, in the agenda of each of these integration efforts. As stated by the Latin American Integration Association (ALADI), sustainable integration is based on development that goes beyond the strictly commercial arena (5), and where the highest political echelons must consider social aspects, particularly those connected with health. The declarations of the Presidential Summits of the Americas in the 1990s endorsed these statements.
- Acknowledging the role of long-standing sectoral fora, particularly those dealing with health, as the forerunners to sustainable integration. Consequently, health sector fora are afforded the same consideration in integration processes as political or economic ones.
- Coordinating a set of priorities dealing with technical cooperation in health; these priorities should be collectively



agreed upon by health sector fora and presented to the international community for their support. Health sector fora within the subregional integration efforts have emerged as strong, new players in the Region's international technical cooperation, as will be seen in the following sections.

### Andean Area

The Hipólito Unanue Agreement for cooperation in health in the Andean Area (CONHU), a health agency established to help reach the integration objectives of the Cartagena Agreement, links all Andean Community member countries—Bolivia, Colombia, Ecuador, Peru, and Venezuela; Chile also belongs, even though it is not an Andean Community member. The Agreement coordinates cooperation activities and fosters the exchange of experiences among ministries of health of the signatory countries. The Hipólito Unanue Agreement's Executive Secretariat is headquartered in Lima, Peru, and its governing body is the Meeting of Health Ministers of the Andean Area. The strategic areas established in Hipólito Unanue's 1996–2000 plan of action were health sector reform, healthy borders, emergencies and disasters, and communication in the field of health.

In 1997, the Cartagena Agreement was institutionally and programmatically restructured, and as a result, the Andean Community's Integration System was created. The Heads of State of the Andean Community Member Countries acknowledged that Andean integration had been economic and social in nature since its inception. In August 1998, the Andean Council of Foreign Affairs Ministries approved the Hipólito Unanue Agreement's incorporation into the Andean Integration System as a way to make public health part of the integration process. In May 1999, the 21st Andean Presidential Council, held in Cartagena de Indias, resolved that health should be part of the Andean Community's social agenda, along with labor, education and culture, science and technology, and the environment.

Within that context, the Hipólito Unanue Agreement conducted specific activities to ensure that new information and communication technologies are used in the field of health, such as the establishment of an epidemiological surveillance network that operates through the Andean Health Intranet. In November 2000, during the 22nd Meeting of Health Ministers of the Andean Area (REMSAA), a new Executive Secretary was elected. In September 2001, a new agreement was signed between CONHU and PAHO, outlining a joint work plan in the following areas:

- developing means to exchange experiences in hospital management;
- strengthening epidemiological surveillance;
- promoting the information flow as a way to develop a unified health strategy in border areas and reach consensus on new provisions of the International Health Regulations;

- developing health-related telecommunications, or telemedicine; and
- establishing mutual cooperation means for disaster mitigation and humanitarian assistance.

### Southern Cone

The creation of MERCOSUR culminated with the 1994 signature of the Ouro Preto protocol. Health-related aspects were first discussed in Working Subgroup 3, which dealt with technical standards. The sectoral fora established or continued in the new organizational structure defined in 1995 include the Meeting of MERCOSUR Ministers of Health. With PAHO acting as secretariat, ministers of health have met since 1991 to define and provide follow up on the Southern Cone Health Initiative (INCO-SUR), but it was not until they met in 1996 that they decided to ask the Common Market Group to set up Working Subgroup 11, dealing specifically with health. This subgroup includes the Commission on Health Products, the Commission on Epidemiological Surveillance and Health Control in Ports, Airports and Borders, and the Commission for the Provision of Health Services.

In September 2001, the Common Market Group approved the negotiating guidelines for Working Subgroup 11 dealing with health, which defined the tasks for the subgroup's national coordinators, and established the following overall directive:

Harmonize Signatory Parties' legislation on health-related goods, services, raw materials, and products; epidemiological surveillance criteria; and health monitoring to promote and protect the populations' health and conditions and eliminate barriers to regional trade, thereby contributing to the integration process.

Since its inception, Working Subgroup 11 has requested PAHO's technical assistance. In 1999, the subgroup formally requested that the Director of PASB for cooperation on technical issues. PAHO has advised on such issues as drugs, national accounts, dengue, tobacco, International Health Regulation that Working Subgroup 11 has dealt with.

In addition to considering the deliberations of Working Subgroup 11, MERCOSUR minister meetings also discuss other health issues of interest to the Party States (Argentina, Brazil, Paraguay, and Uruguay) and the Associated States (Bolivia and Chile). At these meetings, progress in the elimination of *Triatoma infestans* and the interruption of transmission of Chagas' disease by blood transfusions—as set by the Southern Cone Intergovernmental Commission—are evaluated within the framework of the Southern Cone Health Initiative. The Southern Cone Intergovernmental Commission, whose Secretariat is under PAHO, has met for the last 10 years and has made significant international achievements.

### The Caribbean

The Caribbean Community (CARICOM) comprises the following Member Countries: Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, Montserrat, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, and Trinidad and Tobago. Haiti has met membership requirements and is in the process of becoming a full member. CARICOM has an intersectoral policy dealing with social development aspects; accordingly, its regional agenda is articulated as follows:

- linking public and private players for the development of their respective sectors;
- labor market reform;
- using a multisectoral approach in dealing with HIV/AIDS;
- elimination of poverty;
- dealing with challenges facing youth.

The Health Bureau, which operates within CARICOM headquarters, is mainly charged with policy formulation. Although the ministers of health in this subregion do not meet formally, they are part of CARICOM's Human and Social Development Council, which devotes itself to health, education, and sports sectors, among other issues. A Committee of CARICOM Health Ministers meets each year, and the meetings are facilitated by PAHO. Meetings are held the year before PAHO's Directing Council meeting. This Committee directs the Caribbean Cooperation in Health (CCH) initiative.

The Caribbean Cooperation in Health initiative is conducted with cooperation from subregional institutions that directly or indirectly are involved with the Initiative's priorities, including the Caribbean Epidemiological Center, the Caribbean Food and Nutrition Institute, the Caribbean Regional Drug Testing Laboratory, the Caribbean Environmental Health Institute, and the Caribbean Health Research Council. In 1996 the Initiative's progress was reviewed. As a way to strengthen it, the Initiative's priorities were defined as follows:

- environmental health, including vector control;
- strengthening of health systems;
- prevention and control of chronic, non-communicable diseases;
- mental health, including drug addiction and drug dependency;
- family health, including population health;
- communicable disease prevention and control, including HIV/AIDS;
- food and nutrition; and
- human resource development.

The Initiative's Secretariat, which encompasses CARICOM's Health Bureau and PAHO, directs administrative activities, and

PAHO's Caribbean Program Coordination (CPC), headquartered in Barbados, follows up on the Initiative's progress.

### Central America

In 1965, a decade prior to the establishment of the Organization of Central American States (ODECA), the health ministers in the subregion launched the Meeting of Health Ministers of Central America and Panama (REMCAP). Since then, this subregional health forum has operated uninterrupted, except for name changes and an increase in the number of participating countries and institutions. It is now called the Meeting of the Health Sector of Central America and the Dominican Republic (RESSCAD).

When the Central American Integration System (SICA) was created in 1992, technical secretariats were set up under SICA's General Secretariat. The Secretariat of Social Integration coordinates integration policies dealing with health, education, and labor.

RESSCAD is made up of ministers of health and executive directors of social security, water, and sanitation institutions. It includes the seven Central American countries—Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama—and since 2000, the Dominican Republic. The Committee of Central American Ministers of Health (COMISCA) operates as an agency of SICA and as a subregional body with a steering role on health policies. The Central American Council of Social Security Institutions (COCISS) also is part of the integration system. The water and sanitation subsector is incorporated into SICA through the Regional Coordinating Committee of Drinking Water and Sanitation Institutions of Central America, Panama, and the Dominican Republic (CAPRE). The role of this complex subregional health structure is to define the Central American Health Agenda, based on the following principles:

- Dealing with priority issues that can be dealt with at the subregional level and that have attainable and measurable outcomes; strengthening technical cooperation among countries; and reducing inequities.
- Establishing national follow-up mechanisms to monitor compliance with the agreements of Summit Meetings of Central American Presidents and of regional and subregional agreements.
- Adopting a consensus and a position for the health sector and for the Central American health block in order to gain access to Regional and worldwide agencies and fora.

Within this framework, the Central American Health Agenda approved at the 27th RESSCAD (Managua, August 2001) includes the following priorities:

- Health sector reforms;
- Immunization programs;

- Water, sanitation, and the environment;
- Reducing vulnerability to disasters;
- Emerging and re-emerging diseases;
- Food and nutritional safety;
- Violence as a public health problem; and
- acquired immunodeficiency syndrome (AIDS).

RESSCAD and COMISCA coordinate their work through their respective technical secretariats—the Pan American Health Organization and SICA's Secretariat of Social Integration—which consult each other. In the last two years, other subregional and Regional organizations have joined SICA, such as the Central American Bank for Economic Integration (BCIE), the Inter-American Development Bank (IDB), and various United Nations agencies and bilateral organizations, such as the Swedish International Development Agency (SIDA).

### Technical Cooperation among Countries

Technical cooperation among countries (TCC) is far from new to the Region. In fact, the creation of the Pan American Sanitary Bureau itself can be viewed as a manifestation of such cooperation. The Region's countries, relying on the aggregate capabilities of their health sector institutions and on other government sectors and agencies that deal with health, became major players in international technical cooperation in health in the 1990s. While economic globalization tends to blur the borders, technical cooperation among countries is turning out to be a foreign policy tool and a means of reaffirming the countries' national identities, regardless of their stage of development.

TCC in health has many modalities, and PAHO has provided support for many of them. PAHO's support is catalytic in nature and involves activities that are collateral to the projects. These activities include informing the parties involved of their respective capabilities and priorities, participation in monitoring and evaluation meetings, cooperation in formulating projects, and, in particular, financing the travel of experts. Within that framework, it is critical for countries to know the capabilities of their respective institutions and to express their political will to participate as cooperators, in other words, guiding the transfer of knowledge and technology.

Table 1 lists the TCC projects that PAHO supported in 1998–2001, grouped by category. Although categories are not mutually exclusive, they allow for an understanding of the main issues and approaches that countries use to respond to their technical cooperation priorities in health through the cooperation between countries. Categories cover geographic, political, and issue-based criteria. Geographical proximity and the social and economic integration processes have a determining influence on categories A and B. Projects that have more than one topic or more than one technical cooperation area are assigned to the cat-

egory that corresponds to the bulk of the project's technical cooperation. As used here, the concept of subregion considers how countries participate in subregional integration processes in the field of health. Belize, for example, participates in the integration processes of the English-speaking Caribbean and in Central America's; Chile participates in the Hipólito Unanue Agreement and also is an observer at MERCOSUR; and the Dominican Republic participates in Central America's integration activities in the field of health.

#### *Technical Cooperation Projects between Neighboring Countries that Include Activities in Border Areas (Category A)*

These projects deal with priorities in disease prevention and control and local health service systems development. These projects respond to bilateral commitments that are based on agreements signed by the participating countries. As a rule, ministries of foreign affairs and of other sectors including health participate in these efforts. In the last four years, nearly all the Region's countries that share borders have taken part, with PAHO support, in these sorts of projects. The tripartite border project among Argentina, Brazil, and Paraguay and the tripartite border project among Brazil, Colombia, and Peru are good examples. Both of these projects aim to strengthen health service networks and epidemiological surveillance in areas with heavy human traffic and intensive trade in goods and services. The border projects between Haiti and the Dominican Republic and between Belize and Guatemala are limited to joint activities to control certain communicable diseases, particularly canine rabies. This category does not cover projects between neighboring countries undertaken between institutions at the national or central level.

#### *Technical Cooperation Projects between Countries from the Same Subregion that Are Framed Within a Regional Integration Process (Category B)*

This category covers technical cooperation projects between neighboring countries and between countries/islands, other than those undertaken within their borders. The goals of these projects tend to respond to priorities set by health organizations within a given integration process. The project between Bahamas and Belize to prevent mother-to-child transmission of HIV/AIDS, and the project among Barbados, Suriname, and Trinidad and Tobago to strengthen the food safety monitoring system are examples of these projects. The project to interrupt transmission of Chagas' disease from mother to child and through blood transfusions that all the Southern Cone countries have undertaken also deserves mention.

#### *Technical Cooperation Projects between National Health Institutes or National Diagnostic and Referral Institutes (Category C)*

This category covers technical cooperation projects between national- and central-level institutions that are responsible for such areas as health information, epidemiological surveillance,

and laboratory diagnosis. Countries participate regardless of their geographical location; their participation is guided instead by formal conventions or informal agreements on reciprocal support between their respective centers of excellence. These projects aim to transfer diagnostic laboratory technology, develop research on biological products, and exchange information on progress of state-of-the-art technology for diagnosing emerging and re-emerging diseases. This category also includes projects aimed at strengthening the networks of institutions that deal with essential public health functions, such as networks for monitoring antimicrobial resistance and influenza. Argentina, Brazil, Canada, Colombia, Costa Rica, Cuba, Chile, Nicaragua, Mexico, Peru, and Venezuela often participate in these sorts of projects.

#### *Technical Cooperation Projects among Countries from Different Subregions (Category D)*

This category includes projects in which geopolitical variables are relatively less important. The main reasons for implementing these projects are to exchange experiences and transfer technologies between countries at different stages of development. Projects worthy of mention are one between Cuba and Ecuador to boost municipal level health development and another between Honduras and Puerto Rico to develop the national kidney health program.

### **Conclusions and Prospects**

Table 1 shows that between 1998 and 2001, nearly every country in the Region participated, with PAHO support, in at least one technical cooperation project on health. This marks a major change from the situation seen in the early 1990s, when TCC projects were less well known, and their application depended on the enthusiasm of a “key” country, such as Brazil and Cuba.

The tendency towards an increase in the number of TCC health projects, both those that PAHO’s support is a catalyst for and those directly undertaken by the countries themselves, would seem to justify a new effort by the health sector to coordinate activities with national TCC agencies in the foreign ministries or planning ministries. Moreover, the scope of the health sector’s efforts justifies monitoring them to document their effects and quantify their costs.

## **TRENDS IN INTERNATIONAL COOPERATION IN HEALTH**

### **A Higher Profile for Health in the International Agenda**

Health issues have taken center stage in the development agenda in the last few years. This rise in importance has been partly due to the worsening AIDS situation in Africa, but it also has been fueled by the increasingly widespread recognition that “health is a

priority goal in its own right, as well as a central input into economic development and poverty reduction” (6). The United Nations and WHO have successfully brought health issues to the attention of political leaders and international groups such as the G8, the G77, and the European Union. This greater visibility has led to the establishment of special funds and initiatives designed to address the world’s health problems.

For example, the United Nations Program on HIV/AIDS (UNAIDS) was created in 1996, followed by the Vaccine Fund (GAVI) in 1999, and the Global Fund to Fight AIDS, Tuberculosis, and Malaria (GFATM) in 2001. By providing funds to procure vaccines, enhancing access to vaccinations, strengthening infrastructure, and expanding vaccine research and development, the Vaccine Fund has helped countries make great and sustainable strides towards saving millions of children’s lives. The Global Fund to Fight AIDS, Tuberculosis, and Malaria will mobilize unprecedented resources to combat these diseases. By mid-2001, nearly US\$ 2 billion already had been committed to the Fund, and it had attracted much media attention at the G8 leaders meeting in Genoa, Italy, in June 2001, where the plans for this Fund were endorsed.

That same month, the UN General Assembly held a Special Session on AIDS, at which many world leaders gathered to address the AIDS pandemic.

### **Health in the Hemisphere’s Development Agenda**

Interest in health also ranked high in the political and development agendas of international gatherings in the Western Hemisphere, such as the Summit of the Americas, the Ibero-American Summits, and the Conference of First Ladies.

#### *Summits of the Americas*

Health issues have been at the heart of discussions in the three summits of the Americas, starting with the first time the heads of state and government of 34 of the Region’s countries came together at such a meeting in Miami in 1994. Mandates issued by summit leaders clearly have moved the health agenda forward, facilitated the work among countries, shaped the activities of institutions such as PAHO, and increased the collaboration of inter-American and international organizations.

Initiative 17—“Equitable Access to Basic Health Services”—of the Plan of Action issued at the 1994 Miami Summit of the Americas, calls on the Region’s governments to endorse a package of basic health services that cover child, maternal, and reproductive health interventions, including prenatal, delivery, and postnatal care, family planning information and services, and HIV/AIDS prevention, as well as immunizations and programs combating the other major causes of infant mortality. Health issues also were addressed in Initiative 18, “Strengthening the Role of Women in Society,” and Initiative 23, “Partnership for Pollution Prevention.” These Summit initiatives, in turn, sparked others: for

example, PAHO launched “Healthy Children: Goal 2002,” which aims at preventing 100,000 deaths in children under 5 years old in the Americas by 2002, using the Integrated Management of Childhood Illness (IMCI) strategy.

Political leaders gathered at the 1998 Santiago Summit of the Americas pledged to further equity by bringing health to the most vulnerable groups, emphasizing the development and implementation of effective, low-cost health technologies. In response, PAHO launched its initiative, “Health Technologies Linking the Americas,” which promoted access to quality drugs and vaccines, better information and surveillance systems, more access to better quality water, an improved sanitation infrastructure, and greater use of technology assessment.

The Declaration issued at the 2001 Summit of the Americas (Quebec City, Canada) placed the goal of a Free Trade Agreement for the Americas squarely within the context of a broader commitment to prosperity, reduction of inequality and poverty, and a balanced development. The Summit’s Plan of Action made health an integral part of dealing with equity and poverty and devoted a chapter to health; it also stressed the importance of pursuing equity-oriented health sector reforms, combating communicable and noncommunicable diseases, and enhancing the Region’s connectivity through information and communications technologies. HIV/AIDS figured prominently in the statements and discussions among the leaders, as well as in Plan of Action specifics. The Plan also referred to mental health, the virtual health library, and the prevention of tobacco-related diseases. The need for strong partnerships with NGOs also was highlighted at the 2001 Summit—Canada made their inclusion a major policy issue and the Summit formally called for involving civil society more closely in the implementation of hemispheric initiatives. The Director of PASB addressed the political leaders gathered at the meeting and participated in discussions, as did other heads of organizations with full participation in the meeting. Implementation of Summit mandates has had a significant effect on efforts to mobilize resources. For example, as a follow-up to the 2001 Summit, Canada has pledged CAN\$ 20 million to combat diseases in the Americas.

### *Ibero-American Summits*

Ibero-American heads of state and government have been coming together at these summits to address specific issues such as the trade and integration components of the development process, education as an essential aspect of economic and social development, governance for an efficient and participatory democracy, the ethical values of democracy, and the challenges of globalization and regional integration. The 1999 Summit addressed Ibero-America’s place in the international financial situation within a global economy (Havana, Cuba) and the 2001 Summit (Panama City, Panama) focused on childhood and adolescence.

Prior to a summit, meetings dealing with a given sector are held, and based on meeting discussions, that sector’s ministers

issue recommendations to be considered by heads of state and government at the summit. For both the 1999 and 2001 summits, preparatory meetings included health-sector discussions that recommended debate topics to be taken up by summit participants. Some of these recommendations included health as an integral ingredient of social and economic progress; the health of children, adolescents, women of childbearing age, and indigenous peoples; communicable diseases, especially HIV/AIDS prevention and control, the eradication of measles by 2000, and better coverage of diseases preventable by immunization; the aging of the population; the elimination of unhealthy lifestyles; accidents and violence; and Ibero-American cooperation in health.

The ministers of health also addressed the importance of strengthening scientific and technological development to support health service delivery and organization. To this end, they recommended that an Ibero-American Network of Virtual Libraries be established to facilitate access to health science information. PAHO and the Government of Spain, through the Instituto de Salud Carlos III, are working to bring this to fruition.

### *Conference of First Ladies*

The idea of a conference of first ladies originated in 1980, when Central American wives of heads of state and government came together to try and solve the subregion’s social problems. The first actual conference of first ladies took place in Venezuela in 1991, and thereafter there has been one every year (in Colombia in 1992, Costa Rica in 1993, Saint Lucia in 1994, Paraguay in 1995, Bolivia in 1996, Panama in 1997, Chile in 1998, and Canada in 1999). In 1994, Canada and the United States participated for the first time, during a special session timed to coincide with the first Summit of the Americas. In 1999, Canada expanded the participants of the conference to include technical advisors, nongovernmental organizations, international cooperation agencies, and government officials.

Because these conferences have always underscored the importance of women’s role in promoting the well-being of the most vulnerable groups in the Americas, education and, particularly, health have always been at the forefront of their agendas. First ladies have taken steps that resulted in their countries’ progress on issues such as maternal and child mortality, violence against women, eradication of measles by the year 2000, health education, and the reduction of childhood illnesses. Adolescence was the theme at the tenth conference, which after being postponed for one year was held in Ecuador in October 2001.

These conferences give the first ladies a unique forum to exchange information, ideas, and experiences, and to pool their efforts in advancing solutions to pressing social challenges in the hemisphere. They are committed to using their influence to mobilize domestic and international attention and resources to address these challenges. The exchange of ideas and initiatives in health and in other areas has been particularly fruitful, because

they have translated into shared actions on behalf of young children and women in the Americas.

### *Shared Agenda for Health in the Americas*

In June 2000, PAHO, the World Bank, and the Inter-American Development Bank signed “A Shared Agenda for Health in the Americas,” which aims to enhance the health conditions of the peoples of the Hemisphere by adding joint and coordinated efforts to each of these institutions’ individual agendas (7). An inter-agency coordination group was appointed to oversee the agenda’s implementation, and working groups were established for inter-agency collaboration in the following leadership areas: health accounts, pharmaceuticals, disease surveillance, and environmental health. Several positive outcomes already have been seen in these leadership areas after the first year of operations, and it is important to note that no additional bureaucracy has been created, nor have additional resources been allocated.

Regarding health accounts, much progress has been made towards establishing national health accounts in each Latin American and Caribbean country within three years. As part of this effort, comparative studies, regional conferences, creation and maintenance of databases, and dissemination of information have been planned. A Web site has been set up as a central clearinghouse on health accounts, through which methodologies, data, and research can be shared, and users can communicate with national health accounts experts throughout the world.

Work in the pharmaceutical area has led to improved communication, knowledge sharing, coordination, and technical cooperation. The three institutions have been working with the pharmaceutical industry to address ethics and its relationship to improving access to health care and medicines. Activities also were undertaken to move towards a pharmaceutical clearinghouse.

In regard to surveillance programs, shared expertise has served to strengthen surveillance programs for communicable diseases in Latin America and the Caribbean. In addition, a “Toolkit for Disease Surveillance” has been developed, which presents best practices for national epidemiological surveillance and response.

The environmental area has been divided into three sub-areas—water and sanitation, air, and solid waste.

Overall, the shared agenda initiative has been well received in the international and hemispheric community, including at the Implementation Review Group of the Summit of the Americas. International partners are particularly interested in how this initiative will work at the country level, where they see an important role for IDB, PAHO, and the World Bank working together to support the development of the health sector in each country. United Nations sister agencies also have expressed interest in joining the agenda. During its second year, the agenda’s coordination group expects to consolidate the work of the four working groups, as well as to foster the expansion of this regional cooperation to the country level. Requests by any of the participating institutions to create new working groups are being evaluated, and criteria are

being developed to define when to create new ones or terminate old ones. Following the 2001 United Nations General Assembly’s Special Session on AIDS, an inter-agency subgroup on HIV-AIDS was created as part of the Shared Agenda’s disease surveillance working group.

### *Civil Society*

According to the *Yearbook of International Organizations* (8), there were more than 26,000 international organizations in 2000/2001, dramatically higher than the 6,000 in 1990. In the United States alone, the Internal Revenue Service reported 773,934 national non-profit organizations registered in 1999, including 77,287 private foundations (compared with 38,807 foundations reported in this publication’s 1998 edition). This growth of NGOs clearly shows how much “civil society” has grown.<sup>1</sup>

NGOs have traditionally played an important role in development cooperation activities, often reflecting the solidarity between NGOs in donor countries and their counterparts in the developing world. NGO grants to developing countries increased by one-third between 1997 and 2000, rising from about US\$ 5 billion to nearly US\$ 7 billion<sup>2</sup> (9, Table 1). The role of NGOs is particularly strong in the health field: according to the Foundation Center, giving for international health and population programs by United States foundations grew by almost 50%, rising from US\$ 158 million in 1998 to US\$ 240 million in 1999. In the 1990s, an estimated 25% of the European Commission’s (EC) NGO cofinancing budget line was devoted to health-related activities. In terms of project implementation, the role of NGOs is significant, with approximately 20% of all the EC’s health-related commitments during the 1990s being channeled through projects and programs with NGOs (10). Most notably, international and national NGOs frequently work among the poorer populations.

In 1997–2000, large, philanthropic, private foundations established by such businessmen as Bill Gates, Ted Turner, and George Soros emerged to do their part. These foundations often offer a broad, long-term vision that governments and NGOs seldom can provide. In 2001, Bill Gates and his wife Melinda donated an additional US\$ 2 billion in Microsoft stock to their private foundation, raising its endowment to US\$ 23.5 billion. The previous year, their foundation gave nearly US\$ 1 billion in grants, and its endowment is now worth almost twice that of any other private foundation in the United States. Ted Turner pledged US\$ 1 billion over ten years to the United Nations system, much of it going to global health programs channeled through the UN Foundation. In 1999, the Lilly Endowment increased its total grants to US\$ 558 million, the Ford Foundation to US\$ 514 million, and the David and Lucile Packard Foundation to US\$ 391 million. In 2001, United Nations Secretary General Kofi Annan called on

<sup>1</sup>According to the Organization of American States, civil society encompasses “any national or international institution, organization, or entity made up of natural or juridical persons of a non-governmental nature.”

<sup>2</sup>These grants are net of the subsidies received from the official sector.

these major donors to join the UN in a global battle against AIDS and other major diseases.

## RESOURCES FOR INTERNATIONAL AND BILATERAL TECHNICAL COOPERATION

In 1996, the Organization for Economic Cooperation and Development (OECD) set international development goals designed to halve extreme poverty in the world by 2015 (11); these goals were reaffirmed and expanded upon by world leaders when they gathered at the United Nations Millennium Summit in September 2000. Three of the goals are specific to health—reduce child mortality rates by two-thirds; reduce maternal mortality ratios by three-quarters; and halt and begin to reverse the spread of HIV/AIDS, malaria, and other diseases; the others are closely related to health (12).

Millennium development goals focused the attention of the international community on aid funding, with one goal calling for “raising the official development assistance” in order to achieve the other goals. Official development assistance (ODA),<sup>3</sup> which has represented between 15% and 25% of all net financial resources to developing countries in the last few years, complements other sources such as export credits and private investments, loans, and grants. These funds represent a critical source of aid for the poorest countries (9, Table 1), and they also are an important resource for developing countries in the low and lower-middle income categories.

This section discusses the volume, trends, and main characteristics of ODA resources between 1996 and 2000, a period during which bilateral and multilateral donors were called upon to increase their future official development assistance. The section also addresses the contribution of the civil society to development cooperation, and briefly reviews recent international efforts to mobilize the resources needed to meet the millennium goals. OECD’s Development Assistance Committee (DAC), whose members work to increase the resources for developing countries and improve these resource’s effectiveness, periodically reports on the amounts and nature of ODA contributions. Its data and analysis are the primary source for this section (9, 11, 13–17).

### Level and Geographic Distribution of Official Development Assistance

Net ODA disbursements from countries that are members of OECD’s Development Assistance Committee totaled US\$ 55.6 bil-

lion in 1996, compared to US\$ 53.7 billion in 2000, which represents a 3.4% decrease over the period.<sup>4</sup> In constant dollars, however, there was an overall 9.5% increase between 1996 and 2000, as shown in Figure 1 (9, Table 8). Annual variations reflect special situations such as an important ODA drop in 1997 due to budgetary constraints in some donor countries, and marked increases in 1998/1999 that reflected Japan’s higher contributions to offset the Asian financial crisis and humanitarian assistance from several donors for Central America, Kosovo, and East Timor. By 2000, 14 of the 22 DAC donor countries had increased their official aid (in constant dollars) over the previous year, sometimes outpacing their rate of economic growth. The United Kingdom, Belgium, Sweden, Greece, and Luxembourg led the way, increasing their official aid by more than 20% (9, Table 6a).

As expected, almost three-fourths of all ODA disbursements in 2000 came from the wealthiest countries (the G-7 group), with Japan and the United States ranking first and second, respectively, in absolute terms (Figure 2). When the donor’s economy is taken into account, however, Denmark, the Kingdom of the Netherlands, Norway, and Sweden, in descending order, led the level of committed funds in that same year (Figure 3). The aforementioned countries have consistently reached the United Nations ODA target of 0.7% of GNP since it was adopted in the 1970s; in 1996–2000, these countries actually surpassed this level, with Denmark reaching 1.06%. In contrast, the percentage of GNI for the G-7 countries was only 0.19% in 2000, with the United States posting the lowest aid performance among donor countries (0.1%) (9, Table 6).

Africa and Asia have been the largest beneficiaries of ODA, each receiving about one-third of all net receipts in 2000. Latin American and Caribbean countries received about US\$ 5 billion of ODA, almost 10% of the total (9, Table 25). Figure 4 shows that, while Africa and Asia received the largest proportion of ODA, funds for both areas declined throughout the 1990s, with Africa reversing this trend in 2000. The funds received by Latin American and Caribbean countries, on the other hand, increased during the first part of the 1990s, remaining basically stable since 1997 (14).

The United States, Japan, Germany, the United Kingdom, and Spain provided the largest absolute amounts of net ODA disbursements to Latin America and the Caribbean (17). As seen in Figure 5, however, Spain, Luxembourg, Canada, the United States, and Sweden, in descending order, were the main contribu-

<sup>3</sup>ODA includes non-repayable grants and subsidized loans to countries and territories included in Part I of OECD’s list of aid recipients (i.e. developing countries, except the most advanced). It must be provided by the official sector of a donor country primarily for promoting the economic development and welfare of the recipient country. If a loan, it should have a grant element of at least 25%. In addition to financial flows, ODA also includes technical cooperation resources (13, p. 278).

<sup>4</sup>These ODA figures reflect disbursements from DAC-member countries to developing countries and to multilateral organizations. Alternatively, these figures would be US\$ 49.5 and US\$ 55.8 billion in 2000 and 1996, respectively, if measured as ODA receipts—i.e., resources received by developing countries either directly from the bilateral donor or from the multilateral sources. (The figures in the 1998 edition of *Health in the Americas* reflect the ODA receipts concept.) The difference between the disbursement and the receipts approach results from the time lag incurred by multilateral institutions between receiving the disbursements from donor sources and providing them to the developing countries (13, p. 93).

utors on a percentage basis (9, Tables 4 and 28). These countries provided 15% or more of ODA for health in the region, with Spain contributing almost 40% of the total. Within Latin America and the Caribbean, Central America and Mexico received the largest share (36%) in 2000, although the level did not reach that seen in 1999, when Guatemala, Honduras, and Nicaragua received considerable special assistance after Hurricane Mitch. The Andean subregion received the second largest share, with about one-third of the total (primarily destined for Bolivia and Peru), followed by the Caribbean countries (primarily Haiti and the Dominican Republic), and the Southern Cone subregion (see Figure 6) (9, Table 25).

### Official Development Assistance for Health

Aid to the health sector from bilateral donors and major multilateral institutions, including aid for reproductive health,<sup>5</sup> averaged US\$ 3.4 billion per year in 1999–2000, compared to US\$ 3.3 billion in 1996–1998 (16; 13, p. 143). If estimates include funds for water supply and sanitation, basic education, and social services that affect health, as well as funds to NGOs, many of which provide health-related services, the overall annual amount is probably closer to between US\$ 5 and US\$ 6 billion (13, p. 151). The increased amounts of aid to the health sector in 1996–2000 are part of a long-term upward trend that began in the 1970s and held through the 1990s, despite decreases in ODA in the early 1990s (see Figure 7).

As Figure 8 shows, support for health varies considerably from donor to donor. The United States was the largest bilateral donor to the health sector during the 1990s, both in absolute and relative terms. In 1996–1998, the United States' contribution reached an average of US\$ 733 million per year, representing 17% of the country's aid to all sectors (and 22% of the aid to health by DAC countries). While Japan was the second largest bilateral contributor in absolute terms (US\$ 242 million), this contribution represented only 2% of its total aid. Spain posted a remarkable effort at 17%, sustaining it through most of the decade. In addition, Belgium, the United Kingdom, and Denmark devoted 10% to 11% of their total ODA to health, well above the DAC country average of 6%. The International Development Association (IDA) arm of the World Bank Group was the largest contributor to health among multilateral organizations (US\$ 893 million), allocating 14% of its aid to this sector. Most notably, IDA accounted for approximately 27% of the contributions to health of all donors (13, p. 143).

<sup>5</sup>Unless otherwise specified, development assistance to the health sector reflects commitments to both health and population (reproductive health). The health area is subdivided into basic health—which includes basic health care, basic health infrastructure, and infectious disease control programs—and general health—which covers health policy and administration management, medical services/training/research. Population programs include population policy/administration management, reproductive health care, family planning, and STI control including HIV/AIDS programs (13, p. 140–141).

Latin American and Caribbean countries received commitments for health of about US\$ 378 million per year, on average, during 1998–2000, accounting for approximately 10% of all the contributions to this sector (16–17). As shown in Figure 9, the top five donors to Latin America and the Caribbean were the United States, the Inter-American Development Bank's Special Fund, Japan, Spain, and the United Kingdom, which together provided three-fourths of the total ODA destined to health in the Americas in this period (17).

Bolivia, Nicaragua, Peru, and Honduras each received 10% or more of this aid, and together took up 56% of the total for the region (Figure 10). The significance of the ODA support for health also was particularly important for Suriname, Saint Kitts and Nevis, and Antigua and Barbuda, all of which allocated 20% or more of ODA they received to their health sectors in 1998–2000 (Figure 11). This ranking changes considerably when commitments to water supply and sanitation are factored in. As shown in Figure 12, several countries in the region designated 15% or more of their ODA to these sectors, with Mexico devoting more than half (16, 17).

Figure 13 illustrates which specific areas were targeted for ODA support within the health sector—Latin America and the Caribbean allocated the largest proportion toward health policy and administration management programs (35% of the total), followed by basic health care programs and family planning programs, and did so in a greater proportion than other aid recipients. Conversely, the region devoted a smaller proportion of aid for health to infectious disease control activities and STI/HIV/AIDS programs than did all other aid recipients (17).

### Role of Major International Financial Institutions in Health

#### *The World Bank Group*

The World Bank Group has become a major player in and contributor to the health sector, both through global efforts and at the country level. Its support focuses mainly on health, nutrition, and population issues, and seeks to improve the health, nutrition, and population outcomes of the poor; enhance the performance of health care systems, particularly through health reform projects; and secure sustainable care financing for health care systems. The Bank also provides loans for water and sanitation projects (18).

Between 1997 and 2001, the World Bank approved US\$ 6.6 billion in loan projects dealing with health, nutrition, and population. Funds approved peaked in 1998, but declined in 1999 and 2000, reflecting specific circumstances in some subregions and the Bank's efforts to ensure that aid was effectively utilized. Funds increased again in 2001, with newly approved loans totaling US\$ 1.3 billion. Loans for health, nutrition, and population projects represented between 4% to 6.5% of total World Bank lending over this period (18). The importance of this source of funds is signif-



icant. For instance, OECD data indicate that, in 1996–1998, the Bank's International Development Association was the single largest source of ODA funding for health-related activities in developing countries, accounting for 27% of the aid to health provided by all donors (13, p. 143).

World Bank-approved loans for health, nutrition, and population for Latin America and the Caribbean totaled US\$ 1.6 billion between 1997 and 2000, and represented about 30% of the Bank's lending for such projects, the highest among the regions. In addition, the Bank approved US\$ 673 million in loans for water and sanitation projects over the 1997–2000 period, representing about 20% of all the loans for this sector. After declining for two years, lending for health, nutrition, and population projects increased sharply in 2001, reaching US\$ 500 million, most of it destined for Mexico, which (along with Brazil and Argentina) is one of the top four borrowers of World Bank funds destined to health, nutrition, and population projects (18). These 2001 funds also included US\$ 155 million destined to fight HIV/AIDS in the Caribbean.<sup>6</sup>

Loans destined to health, nutrition, and population projects in Latin America and the Caribbean were mainly provided through the International Bank for Reconstruction and Development (IBRD), the World Bank Group's lending arm. In recent years, loans covered a wide range of subjects, such as health sector reform, health financing, maternal health and child health, health insurance, basic health care, rural health, health and nutrition, and HIV/AIDS and STI control.

The World Bank also had a hand in the creation of UNAIDS, and committed US\$ 1.7 billion to combating the spread of HIV/AIDS worldwide, pledging that no country with an effective HIV/AIDS fighting strategy in place will go without funding. The Bank also helped launch the "Global Alliance for Vaccines and Immunization (GAVI)," and participates in the "Roll Back Malaria" and the "Stop TB" campaigns. In 1997–1999, the Bank committed approximately US\$ 500 million per year to these disease-specific programs (18).

#### *Inter-American Development Bank (IDB)*

IDB is the main multilateral lending source for Latin America and the Caribbean, with high priority given to the social sector, including health (19, 20). Overall, the social sector accounted for 41.8% of the volume of loans approved by IDB during the 1994–2000 period. IDB's Fund for Special Operations, which provides concessional loans to less developed countries, accounted for 13% of total ODA commitments to health in Latin America and the Caribbean in 1999–2000 (17).

The number of IDB's health-related loans has increased, reaching 5% of the total number of projects in 1999, compared to 1.3% in 1998. Loan amounts increased to US\$ 475 million in 1999, compared to US\$ 129 million in 1998 (19). The types of

projects funded by these loans also changed, moving from a focus on infrastructure and management of health services in the 1980s to a focus on health service organization and financing in the 1990s. In 2000, IDB's portfolio had 24 projects in the health sector under implementation, totaling US\$ 1.6 billion, although this figure probably represents an understatement, because it omits small grants and other health-related activities, such as water and sanitation, drug rehabilitation, or nutrition. The areas covered or under consideration include health sector reform projects in several countries of the region (Argentina, Bahamas, Belize, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Nicaragua, and Uruguay), maternal and child health, epidemiology, support to the restructuring of the social security system, and human resources development (21).

IDB also continued to support the Consultative Group Meetings in Central America and elsewhere in the Region. More recently, the Bank has begun to coordinate the Puebla-Panama Plan launched by the Presidents of Mexico and of Central America in June 2001. Human development aspects, including health, are a central component of this Plan.

#### *European Union*

The European Union's development cooperation aims to reduce poverty through humanitarian, development, and research activities; health is clearly identified as a priority for support. The European Union's cooperation is implemented by its executive body—the European Commission (EC)—and mainly funded from the EC's own resources and from the European Development Fund (EDF). EC resources assist developing countries throughout the world, and also provide sectoral grants, some of which are destined to health and humanitarian assistance. EDF funds, which are provided by Member States, are only available to African, Caribbean, and Pacific countries that are signatories of the Cotonou Agreement and other previous conventions (22).

EC cooperation provided US\$ 4.9 billion in net ODA disbursements in 2000 (including US\$ 1.6 billion of EDF funding), compared to US\$ 5.8 billion in 1997. This represents a 15% decline, which mostly reflects the fact that the nature of EDF and some other budget funds is tied to project cycles. The 2000 flows represent slightly more than 9% of official development assistance from all DAC donors (and 19% of the combined ODA of the 15 EU member states). In 2000, contributions to Latin America accounted for 5% of the European Community ODA budget, and focused primarily on human development, including health, which is the stated aim of the EC development cooperation in this region. EDF payments to the Caribbean (EUR 103 million in 2000) represented 4% of EDF funds (22).

Support for health, AIDS, and population programs increased substantially in the last few years, averaging about EUR 670 million per year between 1997 and 1999, compared to an average of approximately EUR 400 million annually between 1994 and

<sup>6</sup>Personal communication provided to the Pan American Health Organization by the World Bank.

1996.<sup>7</sup> Priorities in these areas included health systems development, especially health sector reform, including improving the capacity for procurement, distribution, and management of pharmaceuticals; population issues such as sexual and reproductive health and rights and safe motherhood; sexually transmitted diseases, particularly HIV/AIDS; and global action against HIV/AIDS, malaria, and tuberculosis. The last item represents a renewed focus on communicable diseases adopted in the year 2000 (10, p. 4).

Health, AIDS, and population activities also include a strong humanitarian aid component, which is administered by the European Union's humanitarian office, ECHO. Humanitarian aid activities accounted for 17% of all health, AIDS, and population activities during the 1990s, totaling EUR 492 million in 2000 (about 33% of the European Community's own resources). Nongovernmental organizations play an increasingly important role in the EC's development cooperation effort, in that they executed about 20% of EC aid during the 1990s (10, p. 8–10). In funding terms, co-financing with NGOs represented 7% of overall health, AIDS, and population funding commitments during the 1990s and was particularly strong in Latin America (at 27%) (10, p. 29–30).

Commitments to health, AIDS, and population activities in Latin America almost doubled, increasing from about EUR 50 million in 1997 to slightly over EUR 90 million in 1999, and accounting for an average of 10% of all health, AIDS, and population commitments between those years. Support went mainly to health reform projects in Bolivia, El Salvador, Guatemala, Peru, and Venezuela (5, p. 29–30), and funding also was provided to rehabilitate the health systems in the countries affected by Hurricane Mitch. Latin America also received an important amount of HIV/AIDS special and regular funds; support to the Caribbean went primarily to the Dominican Republic for an integrated health program and HIV/AIDS activities and to Haiti for health systems rehabilitation. Regional initiatives were planned for the year 2000 in the areas of epidemiological surveillance and strengthening of laboratory facilities (10, p. 20–22).

### A New Momentum

Despite the hopeful signs reported in the preceding paragraphs, there is a growing consensus that without vigorous growth in ODA levels, millennium development goals cannot be fully supported. In fact, preliminary World Bank and United Nations estimates suggest ODA funds must double from the current level of US\$ 53.7 billion to more than US\$ 100 billion a year.<sup>8</sup> For the health sector, the

<sup>7</sup>These figures probably underestimate the true amount as they exclude small grants and other activities that are health-related such as water and sanitation, drug rehabilitation, or nutrition.

<sup>8</sup>The World Bank estimates US\$ 40 to US\$ 60 billion per year and recommends that the upper level be used. The Zedillo report of the United Nations estimates the figure at about US\$ 50 billion (23).

first detailed cost estimates of the resources needed to meet health-related goals came from the Commission on Macroeconomics and Health sponsored by the World Health Organization. In its report on "Macroeconomics and Health: Investing in Health for Economic Development," the Commission urges developing countries to devote an average of an additional 1% of their GNP to health by 2007 (and 2% by 2015). It also asks the international donor community to increase ODA for health from current total levels of about US\$ 6 billion per year to US\$ 27 billion per year by 2007 (to US\$ 38 billion in 2015) (6, p. 18).

While proposed increases seem large relative to current donor assistance in health, the Commission points out that this would only represent about 0.1% of donors' GNP, while yielding considerable health and economic benefits. As pointed out by Dr. Gro Harlem Brundtland, WHO's Director-General, "eight million lives saved and US\$ 360 billion generated within 15 years is an estimate; but it is an estimate of such power that it cannot be ignored" (24).

The Monterrey Consensus arrived at the UN Conference on Financing for Development in March 2002 formally recognized the link between financing of development and attaining the internationally agreed development goals, suggesting that the case for increased aid is being heard. The first major signs of this new momentum were the commitments announced by the European Union and the United States. The former promised to increase ODA by EU Member States from the current level of 0.33% of their GDP to an average of 0.39% by 2006, and renewed its commitment to reach the 0.7% United Nations goal. The United States promised an additional US\$ 5 billion over the next three budget years, increasing its ODA/GDP ratio from 0.11% in 2001 to 0.16%. In particular, the United States expects that this increase would translate into a 54% increase for HIV/AIDS programs and an overall increase of 29% in the country's aid for Latin America and the Caribbean. The Monterrey Conference asked that these commitments and those from other developed and developing countries be regularly monitored through a collaborative effort involving the United Nations, international financial institutions, and other partners.

### EXTERNAL COOPERATION IN THE MANAGEMENT OF DISASTERS

Between 1997 and 2000, one of PAHO's most important external cooperation achievements was the Organization's support so that ministries of health in various countries could create or consolidate disaster programs. The appointment of one or more professionals to handle disaster emergencies—even in territories with populations under 200,000, such as the British Virgin Islands—has resulted in continuity in disaster preparedness in the Region, despite a high staff turnover rate.

Those countries that have more stable and more professionally staffed disaster programs, as well as better intra- and interinsti-

tutional leadership, have been the ones that have responded best in the event of disaster—for example, Honduras’ response phase after Hurricane Mitch (1998) and Belize’s after Hurricane Keith (2000). Disaster units’ technical knowledge also has reduced the vulnerability of hospitals in the event of an earthquake or other natural disaster in Chile, Colombia, Costa Rica, and Peru.

Those charged with coping with disasters must have the necessary capability and leadership to persuade political and technical-administrative bodies that the population’s health will benefit from reduced vulnerability. The biggest challenge arises because disaster prevention only reaps results in the long term, and those responsible for policy-making tend to have other priorities that are more attractive on the surface because they produce immediate, albeit limited, results.

The situation in 1997–2000 mirrored the Region’s experience over the last 25 years. Given that, the most effective form of external cooperation likely will continue to target the strengthening of disaster units within ministries of health and small coordinating units, as well as promoting disaster mitigation activities in all institutions involved in individual and public health.

### **New Players in External Cooperation**

In 1997, meteorologists predicted the onset of the El Niño phenomenon. To prevent the flooding caused by El Niño in 1992–1993, governments looked to medium- and long-term financing and planning institutions to fund projects designed to prevent structural damage. International lending institutions such as the World Bank, the Central American Bank for Economic Integration (BCIE), and the Inter-American Development Bank (IDB) added direct participation during a disaster’s response phase to their cooperation agendas.

The financial sector made two significant contributions to the health sector: it authorized virtually instant loans to facilitate national response and conducted rapid economic assessments, such as those carried out by the Economic Commission for Latin America and the Caribbean (ECLAC). Loans are only beneficial when they go hand in hand with business approach: in other words, when capital is invested in an enterprise that generates enough resources to pay off the loan and make the enterprise self-sustaining. Clearly, funds obtained through loans have allowed governments to solve their most pressing health care problems, restoring the population’s access to health and drinking water services; they also have helped to mitigate the direct effect of disasters, but they have yet to provide countries with a safer health structure.

Recent evaluations of the economic consequences of disasters have made it possible to measure a disaster’s direct impact, such as calculating the cost of rebuilding a destroyed hospital. Those evaluations have not shown the overall impact on health, such as assessing the cost to the productive sector of being without a hospital for the three years it takes to rebuild it.

The Armed Forces also play an important role in disaster management, both nationally and internationally. Mexico’s Armed Forces cooperated intensively after Hurricane Mitch and the earthquake in El Salvador. The United States Army, through its Southern Command, allocated significant resources to improve Latin American and Caribbean countries’ response to disasters: activities included setting up supply storehouses in the Caribbean and participating in simulation exercises of “Fuerzas Aliadas Humanitarias” (allied humanitarian forces) in Guatemala in 1998 and in the Dominican Republic in 2000; more than 500 persons participated. Although these massive contributions from abroad have benefited the countries, they also have led to coordination problems at the national level, because they selectively and disproportionately reinforce the role of local Armed Forces and debilitate the civil structure built up over the years by national democratic governments.

Pan American cooperation also significantly increased, increasing the number of arriving health brigades. For example, dozens of health professionals remained in Guatemala for more than a year to help areas affected by Hurricane Mitch.

### **Risks of External Cooperation**

At the Meeting on International Aid for Health Relief, held in Costa Rica in March 1986, the international community, the governments, and United Nations agencies explicitly acknowledged the need to channel external aid to ensure that it does not hamper national relief operations. Despite this caveat, emergency medical equipment and medicines nearing their expiration date continue to be sent. Those problems will persist until both recipient and donor countries cease to base their decisions on institutional priorities and begin to do so in terms of local needs.

It is noteworthy that some projects that are exorbitantly expensive to implement are conceived in isolation and do not consider the issue of vulnerability to disasters. Moreover, several countries that received external cooperation requiring that foreign experts be consulted, rejected design changes in construction works, such as those of hospitals, for administrative or other reasons; although those projects may be extremely beneficial, they also increase patient vulnerability, and some countries have had to apply for new loans only a few years later to rebuild or refurbish installations after being hit by another hurricane or suffering some other natural disaster.

### **Training and Education**

Universities and other national institutions offer many excellent courses focusing on training in dealing with disasters. The management of health during disasters has been included at undergraduate and postgraduate levels in faculties of medicine, engineering, and architecture in various universities, and the Universidad de San Marcos in Peru and Pontificia Universidad

Católica in Ecuador have introduced a three-year master's program on emergencies and disasters. Specific postgraduate modules in master's of public health programs also have been introduced in Cuba and Jamaica. Most of these courses, as well as commissions such as the Central American Commission on University Education on Disasters, were the result of local, national, or Regional efforts supported by external cooperation.

Several courses that began before 1997 have been improved and expanded. Two examples of ongoing cooperation in the Region are the support provided by the Office of U.S. Foreign Disaster Assistance (OFDA/USAID) to train instructors on several aspects of disasters and the SOS courses of the International Committee of the Red Cross (ICRC) for training in managing health in disasters. Although there have been some courses taught outside the Region, their reach has been limited due to their high cost, language limitations, and the need for visas.

In the aftermath of major disasters during 1997–2000, the countries realized that the technical knowledge acquired in previous years was insufficient to translate into actions. They concluded that professionals working in the disaster field needed to have more appropriate knowledge to be able to better influence programs, ministries, and institutions. To that end, PAHO developed "Lideres," an international course for managers on health, disasters, and development. The course has multisectoral participation and mainly targets the Spanish-speaking countries of the Americas; it gives preferential admission to applicants who are in management positions in the area of risk management.

The increased reliance on geographic information systems (GIS) holds much promise, because these systems graphically show potential risks and available resources for responding to a disaster. Only specific projects are currently using GIS, because the systems require a great deal of effort to prepare databases and because of a lack of standardized criteria that would allow various institutions to share data.

### Disasters and the New Information Technology

Financial aid from various external agencies, such as the United States National Aeronautic and Space Administration (NASA) and the Council of Europe, allowed the national health bureaus involved in disasters in several of the Region's countries to quickly incorporate Internet use in their emergency management and risk reduction programs. As the digital divide gradually narrowed in the Americas, information technology was increasingly used in the management of disasters.

In 1997, when the International Conference on Health Crisis and the Internet was held in Bogotá, fewer than 25% of participants had Internet access. By the year 2000, however, nearly every disaster program within the Region's ministries of health was connected to the Internet and used e-mail. Today, these disaster programs constantly use communication systems, which allows them to overcome the Region's geographical barriers and fosters

more efficient sharing of practices and knowledge. Hurricane Mitch (1998) marked a decisive moment in the use of electronic communications during and in the aftermath of a disaster, with the first-time, wide use of the Internet. The Internet also played a critical role by rapidly disseminating information in the disaster's aftermath and in using listservs to inform donors of health sector needs: response was generous and immediate. Managers of Central American disaster programs shared experiences in group discussions and published aid offers, epidemiological reports, and public health guides. Today, several ministries of health have their own web pages that provide direct access to disaster information.

Access to information also is important in normal situations, when countries are working to reduce their vulnerability to disasters. The advent of electronic publishing means and the availability of full-text books on the Internet facilitate more effective interactions and better information sharing. PAHO has supported several web page efforts: the Humanitarian Supply Management System (SUMA) and the Regional Center for Information on Disasters (CRID) offer interactive access to courses, information searches, and computer program updates; other sites are dedicated to specific subjects, such as the displaced population in Colombia or the reduction of vulnerability in the Central American countries affected by Hurricane Mitch.

CRID, which is located in Costa Rica, continued to disseminate technical information to improve risk management. In 1997, the Center broadened its institutional coverage, and since then has been sponsored by six international organizations,<sup>9</sup> as well as by the Government of Costa Rica. CRID is increasingly using new technologies, as a way to increase its impact. Its web page ([www.crid.or.cr](http://www.crid.or.cr)), with hundreds of full-text documents and more than 13,000 bibliographical references in its on-line database, is already one of the most important sources of information on disasters in Latin America and the Caribbean. At the same time, the Center continues to provide many of its traditional services, ensuring coverage in areas where telecommunications are weak. The Center also continues to promote and support the creation of other disaster information centers in the Region and to strengthen a regional information system in Latin America and the Caribbean.

As a result of external cooperation and an ongoing search for partners, at the end of 1999 CRID launched a special project in Central America, with technical and financial support from the United States National Library of Medicine, designed to substantially improve access to information sources and resources about disasters and health in countries worst hit by disasters, especially El Salvador, Honduras, and Nicaragua. The project will improve

<sup>9</sup>Pan American Health Organization, Inter-agency Team for the United Nations International Strategy for Disaster Reduction (ISDR), Costa Rican National Risk Prevention and Emergency Management Commission, International Federation of National Red Cross and Red Crescent Societies (IFRCRC), Coordination Center for the Prevention of Natural Disasters in Central America (CEPRENAC), and the Regional Office for Emergencies of Doctors without Borders/Médecins sans Frontières (MSF).

national and university libraries specializing in health in the following: technological resources and Internet connection, technical training of human resources, and creation of special disaster and health information services. Through this, many of CRID's documents will be converted into electronic format and published on the Internet; they will be accessible free of charge to any interested user.

Another obvious result of the increased use of information technologies is the production of electronic publications, both on the Internet and on compact disc; many institutions already publish complete documents in those media. Since 1997, all PAHO publications on disasters are available on its web page, and in 1998 PAHO/WHO's Health Library for Disasters was made available both on the Internet and on compact disc ([www.helid.desastres.net](http://www.helid.desastres.net)), which collects the most important technical publications on the subject. The second edition of this collection includes PAHO's and WHO's most important publications on emergencies, as well as those of UNICEF, the United States High Commission for Refugees (UNHCR), the International Committee of the Red Cross (ICRC), among others. This valuable technical resource has a worldwide reach, exponentially increasing the dissemination and potential use of its material.

Despite some persisting difficulties at the ministries of health, hospitals, and other health sector institutions, considerable progress has been made in improving access to information technology and connection speed. There is general consensus among disaster program managers in Latin America and the Caribbean on the Internet's role in preparing and disseminating information on disasters in the Region.

### Humanitarian Supply Management System

The Humanitarian Supply Management System (SUMA) developed by the countries with PAHO support, is a standardized regional tool for handling vast quantities of supplies from the moment aid is offered by donors until supplies reach the disaster area, are stored, and finally distributed.

During the Region's most recent disasters, SUMA has proven its usefulness as a tool for fostering transparency and fiscal responsibility in handling supplies, and for expediting coordination between the government and civil society. SUMA has strengthened coordination among community groups, non-governmental organizations, and government institutions, and it clearly showed its benefit in improving coordination and good governance during the 2001 earthquakes in El Salvador.

SUMA also has had a hand in building capabilities in the countries by providing training in the use of its electronic program and teaching a course on the comprehensive management of emergency supplies; the latter was part of the curriculum in several universities. With 2,500 trained volunteers in the Region, the countries now have enough local resources for setting up and

running SUMA during disasters and in normal times. Regional multidisciplinary and inter-institutional teams have been set up to facilitate the program's rapid installation and to provide technical support when it is used during a disaster. This is what happened after hurricanes Mitch and Georges in 1998, during which 30 regional volunteers were mobilized; after the eruptions of the Tungurahua and Pichincha volcanoes in Ecuador in 1999 and 2000, respectively, during which national volunteers from the municipalities, civil defense, firefighters, and the Red Cross were mobilized, as were volunteers from Bolivia, Colombia, Costa Rica, and Venezuela; and after the floods in Venezuela or the earthquake in Bolivia in 1999.

Emergency supply management has found its place on the national agendas of nearly all the Region's countries. Some countries have begun to institutionalize SUMA, as is the case in Honduras, the Dominican Republic, and Panama. Accordingly, in the year 2000, the ministries of foreign affairs and the national organizations that handle disasters in the Central American and Caribbean countries formalized their commitment to use SUMA and included its methodology in disaster coordination manuals and in general guidelines at embassies.

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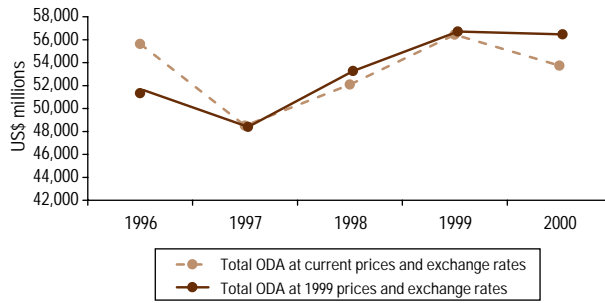
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TABLE 1. Technical cooperation projects backed by PAHO in the countries, 1998–2001.

Country	No. of projects approved	Categories			
		A	B	C	D
Antigua and Barbuda	2		2		
Argentina	7	4		3	
Bahamas	8		6		2
Barbados (TCC) <sup>a</sup>	12		11		1
Belize	7	2	4		1
Bolivia	8	2	3		3
Brazil	15	6	2	5	2
Canada	9		1	1	7
Chile	4		1	1	2
Colombia	8	5	1	2	
Costa Rica	6	2	2	1	1
Cuba	16	1	1	4	10
Dominican Republic	6	5	1		
Dominica	4		3		1
Ecuador	11	6	1	1	3
El Salvador	8	3	3		2
Grenada	5		4		1
Guatemala	5	1	3	1	
Guyana	5	1	4		
Haiti	3	2			1
Honduras	7	3	1	1	2
Jamaica	6		3		3
Mexico	4		2	1	1
Netherlands Antilles	1		1		
Nicaragua	9	1	2	2	4
Panama	6	1	2		3
Paraguay	7	5	2		
Peru	10	6		3	1
Puerto Rico	1				1
Saint Kitts and Nevis	1		1		
Saint Vincent and the Grenadines	2		2		
Saint Lucia	3		2		1
Suriname	6		5	1	
Trinidad and Tobago	7		7		
Turks and Caicos	1		1		
United States	1				1
Uruguay	2	1			1
Venezuela	9	2	2	3	2

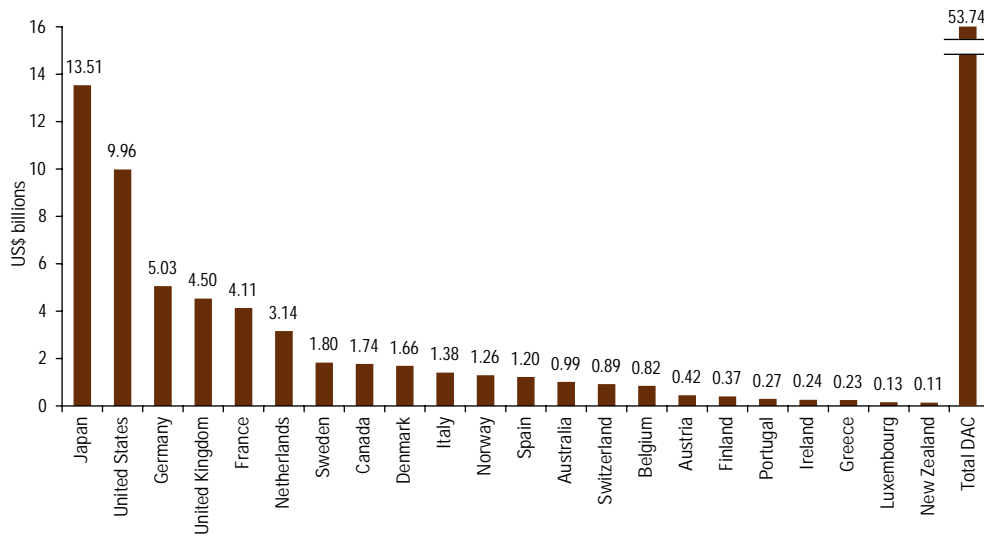
<sup>a</sup>Caribbean Program Coordination.

FIGURE 1. Net official development assistance (ODA), 1996–2000 (net disbursements).



Source: Data from 9, Table 8.

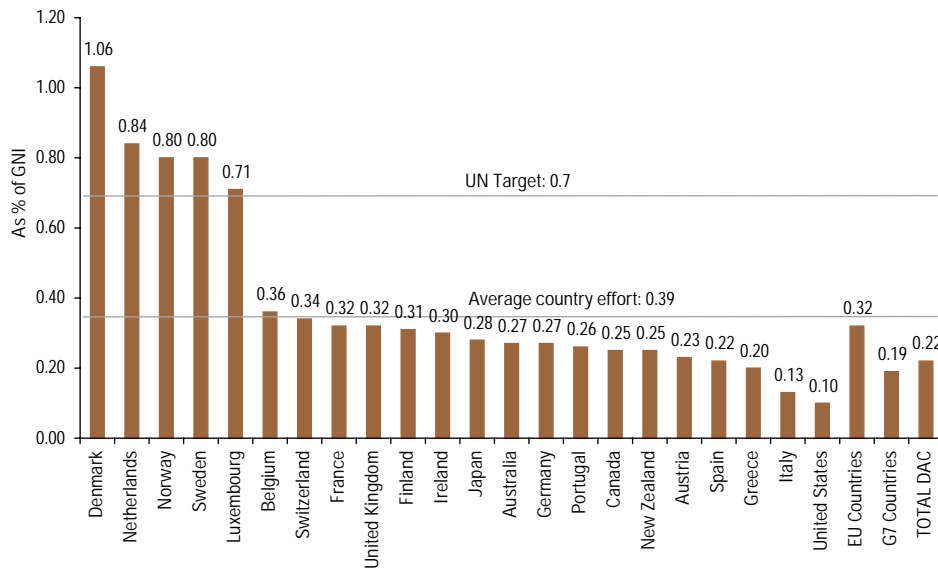
FIGURE 2. Net official development assistance in 2000, by Development Assistance Committee Member Country (net disbursements).



Source: Data from 9, Table 6a.

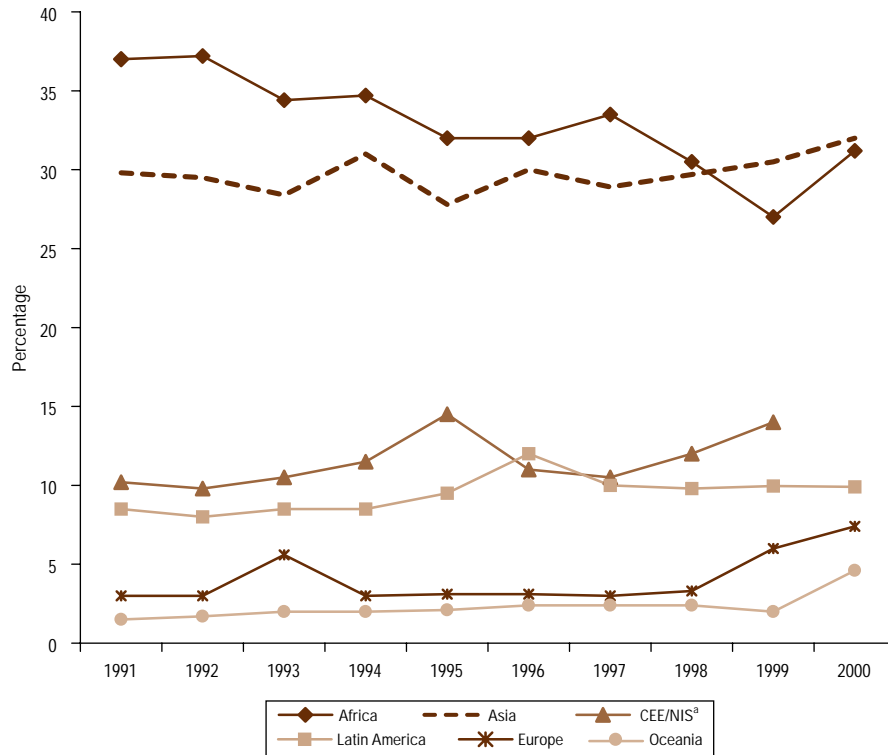


FIGURE 3. Net ODA as a percentage of gross national income, 2000.



Note: Gross National Income (GNI) broadens the coverage by the GNP; therefore, ODA/GNI ratios are generally lower than traditional ODA/GNP ratios (13, p. 281).  
 Source: Data from 9, Table 6a.

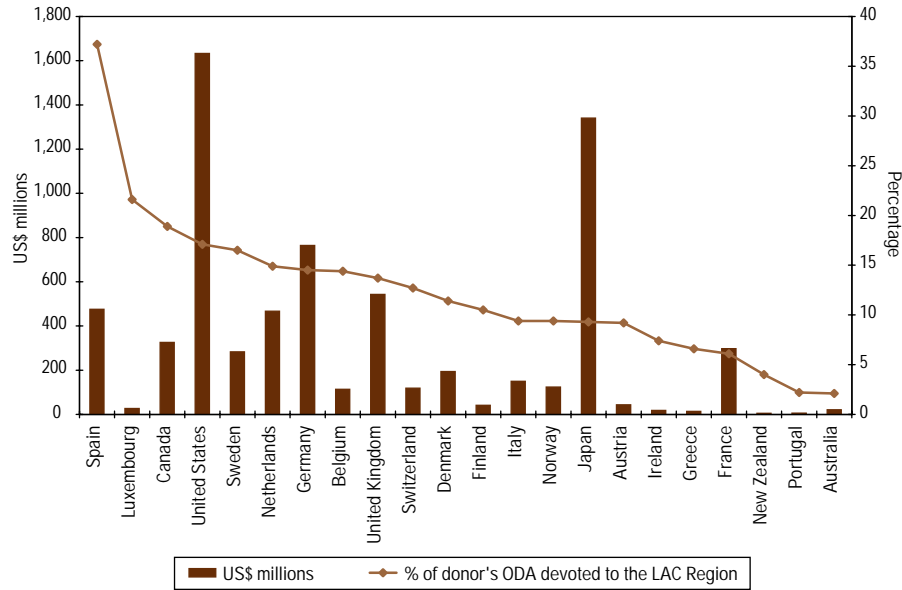
FIGURE 4. Aid by region in percentage of total net aid, 1991–2000.



Source: Reproduced from 14; figures for 2000 are based on 16.

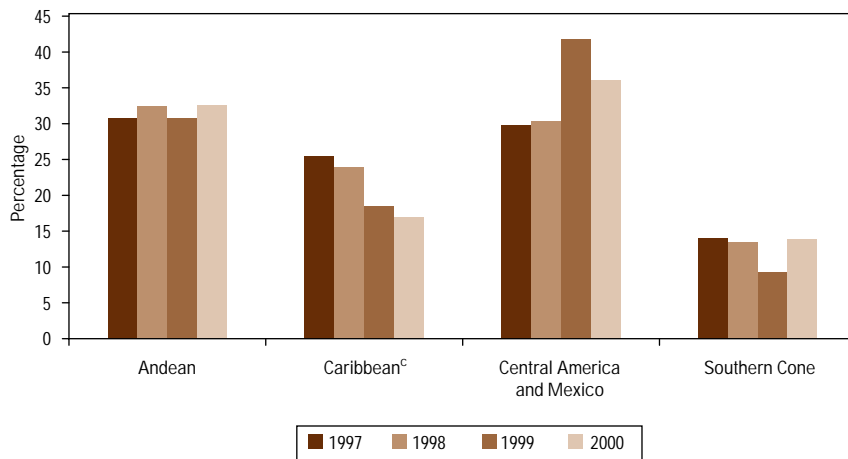
<sup>a</sup>CEE: Central and Eastern European countries; NIS: new independent states from the former Soviet Union.

FIGURE 5. Absolute and percentage distribution of official development assistance (ODA) to Latin America and the Caribbean, by donor, 1999–2000 average, net disbursements.



Source: Data from 9, Tables 4 and 28.

FIGURE 6. Percentage distribution of total net official development assistance (ODA) receipts<sup>a</sup> to Latin America and the Caribbean, by subregion,<sup>b</sup> 1997–2000.



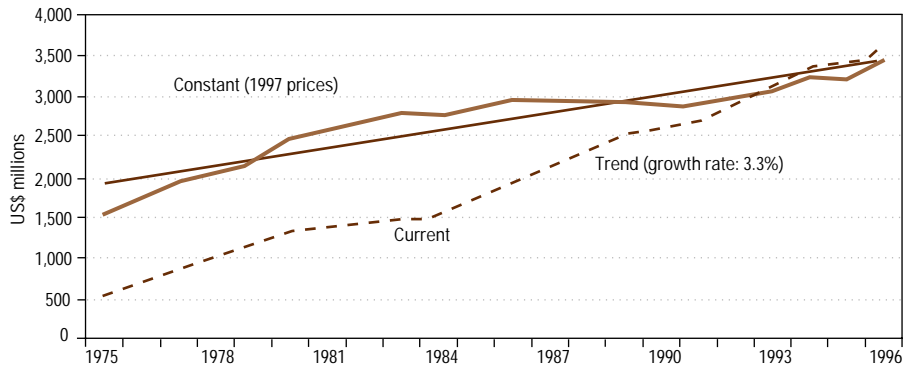
<sup>a</sup>ODA receipts are total net ODA flows from DAC countries, multilateral agencies, and Arab countries.

<sup>b</sup>Excludes unallocated amounts.

<sup>c</sup>Including Guyana and Suriname.

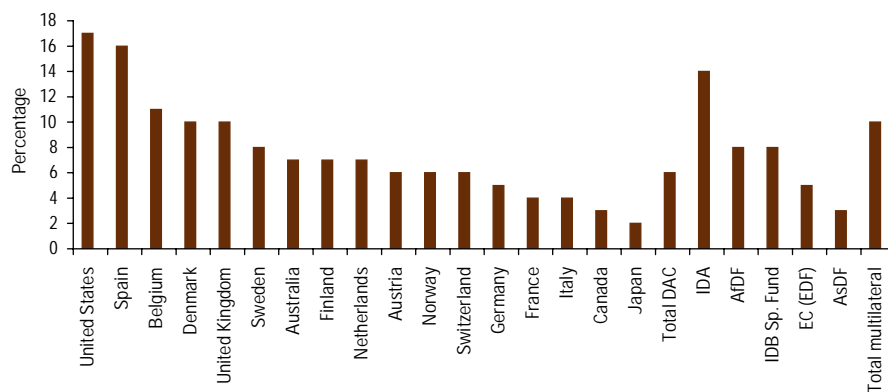
Source: Data from 9, Table 25.

FIGURE 7. Aid to health, 1975–1996: five year moving average.<sup>a</sup>



<sup>a</sup>Refers to bilateral and multilateral ODA commitments to health (excluding the UN and European Commission budgets). Averages even out the "lumpiness" of commitments and thereby allow better identification of the underlying trends. Source: Reproduced from 13, page 142.

FIGURE 8. Aid to health as a percentage of the donor's total aid, 1996–1998.<sup>a,b,c</sup>

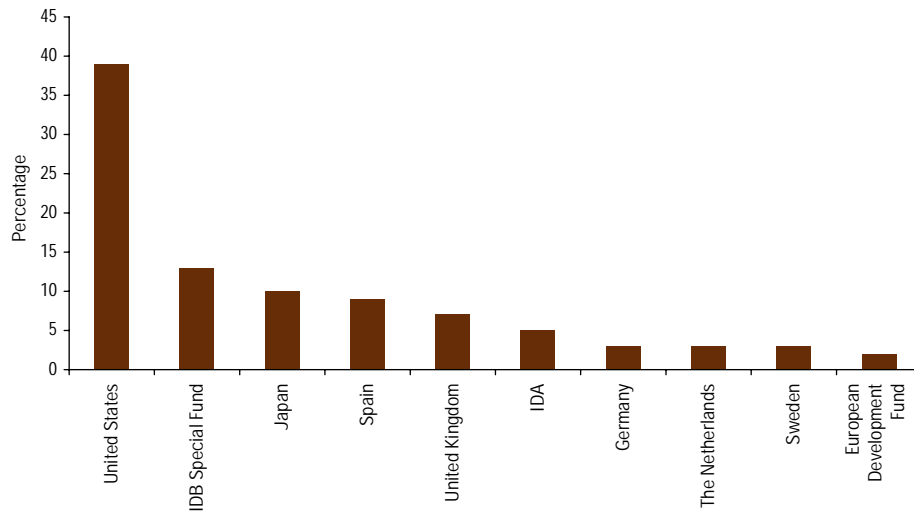


<sup>a</sup>Ireland and Luxembourg do not report this type of data. According to DAC statistics, 14% of Ireland's total bilateral ODA was devoted to health in 1996–1998. The corresponding figure for Luxembourg was 23%.

<sup>b</sup>Data for France, Germany, Japan, and Portugal partially excluded their technical cooperation activities and therefore underestimate their aid to health in value terms. However, this has very little effect on the share calculations. Aid to health in 1996–1998, including technical cooperation, represented 4% of France's and Germany's total bilateral aid, 3% for Japan and 6% for Portugal.

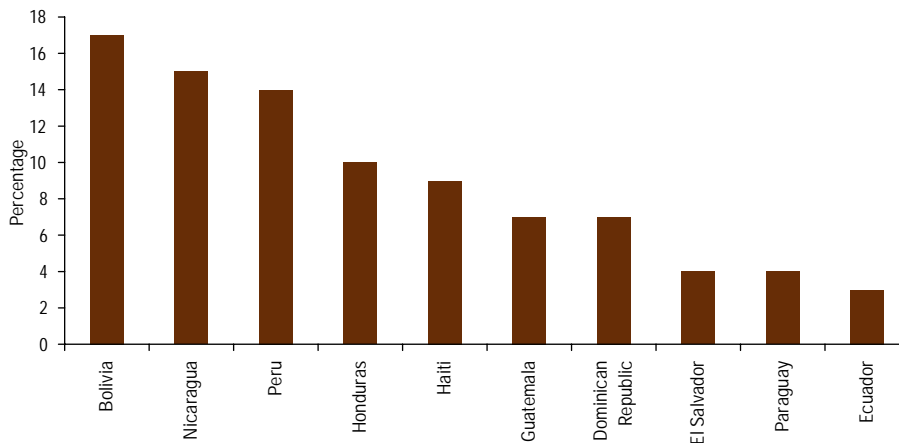
<sup>c</sup>Data for the United States cover the USAID program only and slightly overestimate the share of aid to health in its total. Source: Data from 13, Table V-2, p. 143.

FIGURE 9. Top ten donors of aid to health in Latin America and the Caribbean, 1998–2000, commitments.



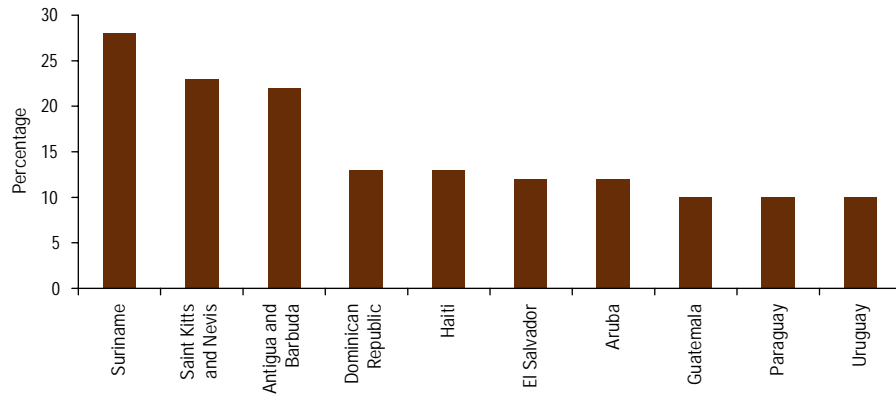
Source: Data from 17; amounts were totaled (and complemented with data from 16) to yield figure.

FIGURE 10. Top ten recipients of official development assistance (ODA) for health in Latin America and the Caribbean, 1998–2000, annual average, commitments.



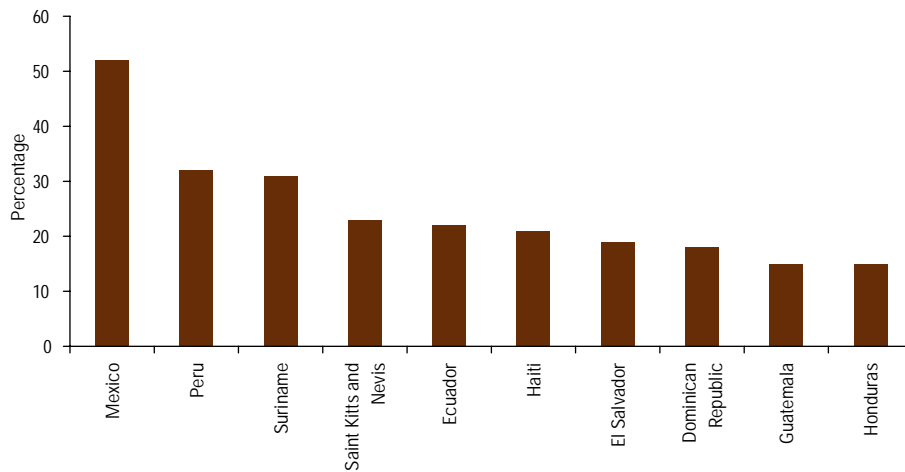
Source: Computations based on data from 17.

FIGURE 11. Countries with the highest share of official development assistance (ODA) in health in 1998–2000, commitments.



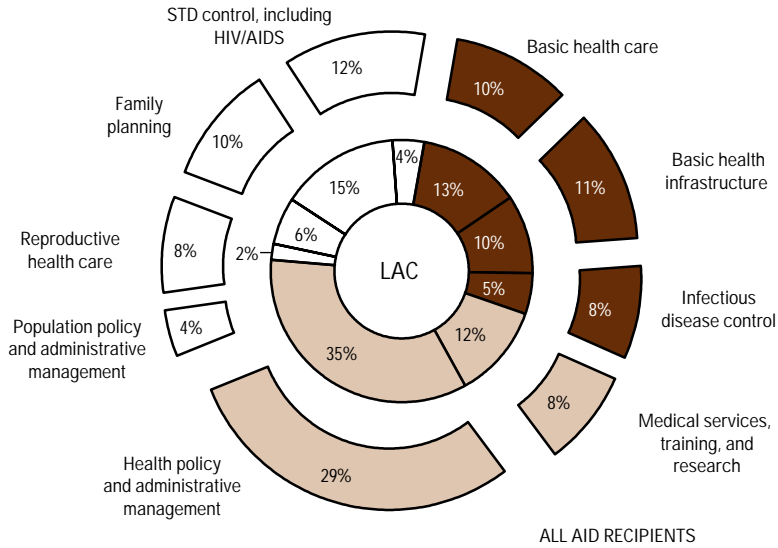
Source: Data from 12, 17.

FIGURE 12. Countries with highest proportion of official development assistance (ODA) designated for health and water supply and sanitation, 1998–2000 average, commitments.



Source: Based on data from 16.

FIGURE 13. Breakdown of aid to health by subsector (commitments), Latin America and the Caribbean and all aid recipients, 1998–2000.



	LAC	All aid recipients
<b>BASIC HEALTH:</b>	28%	29%
– Basic health care		
– Basic health infrastructure		
– Infectious disease control		
<b>GENERAL HEALTH:</b>	47%	35%
– Medical services, training and research		
– Health policy and administrative management		
<b>POPULATION:</b>	27%	34%
– Population policy and administrative management		
– Reproductive health care		
– Family planning		
– STD control, including HIV/AIDS		

Source: Based on data from 17. Country figures were totaled to yield regional amounts.



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# ACRONYMS USED IN THIS PUBLICATION

AFP	Acute flaccid paralysis	CRS	Congenital rubella syndrome
ADC	Andean Development Corporation	CSIH	Canadian Society for International Health
AECI	Spanish Agency for International Co-operation	CT	Computed tomography
AIDIS	Inter-American Association of Sanitary Engineering	CVD	Cardiovascular diseases
AIDS	Acquired immunodeficiency syndrome	CWWA	Caribbean Water and Wastewater Association
ALAESP	Latin American and Caribbean Association of Public Health Education	DALY	Disability-adjusted life year
ALOS	Average length of stay	DANIDA	Danish International Development Agency
AMPES	American Region Planning, Programming, Monitoring, and Evaluation System (PAHO)	DFID	Department for International Development (UK)
API	Annual parasite index	DMFT	Decayed, missing, filled teeth
ARI	Acute respiratory infections	DOTS	Directly observed treatment, short course
BCG	Bacille Calmette-Guérin vaccine	DPT	Diphtheria, pertussis, tetanus vaccine
BIREME	Latin American and Caribbean Center on Health Sciences Information (PAHO)	DT	Pediatric diphtheria and tetanus toxoid vaccine
BMI	Body mass index	EAP	Economically active population
CAREC	Caribbean Epidemiology Center (PAHO)	ECDS	Eastern Caribbean Drug Service
CARICOM	Caribbean Community	ECLAC	Economic Commission for Latin America and the Caribbean
CARMEN	Strategies to reduce multifactor non-communicable diseases	ECRI	Emergency Care Research Institute
CAT	Computerized axial tomography	EDV	European Development Fund
CEHI	Caribbean Environmental Health Institute	ELISA	Enzyme-linked immunosorbent assay
CELADE	Latin American and Caribbean Demographic Center (ECLAC)	EPA	Environmental Protection Agency (USA)
CEPIS	Pan American Center for Sanitary Engineering and Environmental Sciences (PAHO)	EPI	Expanded Program on Immunization
CDB	Caribbean Development Bank	FAO	Food and Agriculture Organization of the United Nations
CDC	Centers for Disease Control and Prevention (USA)	FDA	Food and Drug Administration (USA)
CFNI	Caribbean Food and Nutrition Institute (PAHO)	GDP	Gross domestic product
CHRC	Caribbean Health Research Council	GEF	Global Environment Facility
CIDA	Canadian International Development Agency	GNP	Gross national product
CIN	Cervical intraepithelial neoplasia	GTZ	German Technical Cooperation Agency
CIOMS	Council for International Organizations of Medical Sciences	Ha	Hectares
CIS/CA	Carcinoma in situ/Carcinoma	HACCP	Hazard analysis critical control point
COSALFA	South American Commission for the Control of Foot-and-Mouth Disease	Hb	Hemoglobin
CPC	Caribbean Program Coordination (PAHO)	HBV	Hepatitis B virus
		HBsAg	Hepatitis B surface antigen
		HCV	Hepatitis C virus
		HDI	Human development index (UNDP)
		Hib	<i>Haemophilus influenzae</i> type b vaccine
		HIPC	Heavily Indebted Poor Countries Initiative (IMF/World Bank)
		HIV	Human immunodeficiency virus



HMO	Health maintenance organization	QAP	Quality Assurance Project
HTLV	Human T-cell lymphotropic virus	RELAB	Latin American Biology Network
IAEA	International Atomic Energy Agency	REPAMAR	Pan American Environmental Waste Management Network
IBRD	International Bank for Reconstruction and Development (World Bank)	REPIDISCA	Pan American Network of Information and Documentation in Sanitary Engineering and Environmental Sciences
IBWC	International Boundary and Water Commission	RESSCA	Meeting of the Health Sector of Central America
ICD-9	International Classification of Diseases, Ninth Revision	RESSCAD	Meeting of the Health Sector of Central America and the Dominican Republic
ICD-10	International Classification of Diseases, Tenth Revision	RILAA	Inter-American Network of Food Analysis Laboratories
IDB	Inter-American Development Bank	SciELO	Scientific Electronic Library Online
IICA	Inter-American Institute for Cooperation on Agriculture	SD	standard deviation
ILO	International Labor Organization	SICA	Central American Integration System
IMCI	Integrated Management of Childhood Illnesses	SIDA	Swedish International Development Cooperation Agency
IMF	International Monetary Fund	SIDS	Sudden infant death syndrome
INCAP	Institute of Nutrition of Central America and Panama (PAHO)	SIREVA	Regional System of Vaccines (PAHO)
INPPAZ	Pan American Institute for Food Protection and Zoonoses (PAHO)	SME	Small and medium enterprises
ISCA	Central American Health Initiative	SPR	Slide positive rate
IUD	Intrauterine device	STD	Sexually transmitted diseases
JICA	Japan International Cooperation Agency	STI	Sexually transmitted infections
LAMM	Latin American and Caribbean Initiative for Maternal Mortality Reduction	SUMA	Humanitarian Supply Management System (PAHO)
LILACS	Latin American and Caribbean Center on Health Sciences (PAHO)	TCC	Technical cooperation among countries
MASICA	Environment and Health in the Central American Isthmus Program (PAHO)	Td	Adult diphtheria and tetanus toxoid vaccine
MedCarib	Caribbean Health Sciences Literature	TRUST	Toluidine red unheated serum test
MERCOSUR	Southern Common Market	TSP	Total suspended particles
MMR	Measles, mumps, rubella vaccine	TT	Tetanus toxoid vaccine
MRI	Magnetic resonance imaging	UNAIDS	Joint United Nations Program on HIV/AIDS
NAFTA	North American Free Trade Agreement	UNDP	United Nations Development Programme
NGO	Nongovernmental organization	UNDCP	United Nations Drug Control Programme
NORAD	Norwegian Agency for Development Cooperation	UNEP	United Nations Environment Programme
OAS	Organization of American States	UNESCO	United Nations Educational, Scientific, and Cultural Organization
OECD	Organization for Economic Cooperation and Development	UNFPA	United Nations Fund for Population Activities
OECS	Organization of Eastern Caribbean States	UNHCR	United Nations High Commissioner for Refugees
OPV	Oral polio vaccine	UNICEF	United Nations Children's Fund
PAHEF	Pan American Health and Education Foundation	UNISDR	United Nations International Strategy for Disaster Reduction
PAHO	Pan American Health Organization	USAID	United States Agency for International Development
PALTEX	PAHO Expanded Textbook and Instructional Materials Program	USDA	United States Department of Agriculture
PANAFTOSA	Pan American Foot-and-Mouth Disease Center (PAHO)	UWI	University of West Indies
PASB	Pan American Sanitary Bureau	VDRL	Venereal Disease Research Laboratories
PCB	Polychlorinated biphenyl	WFP	World Food Program
PLAGSALUD	Occupational and Environmental Aspects of Exposure to Pesticides in the Central American Isthmus	WHO	World Health Organization
PPO	Preferred provider organization	WTO	World Trade Organization
		YLE	Years of life expectancy
		YLEG	Years of life expectancy gained
		YLEL	Years of life expectancy lost
		YPLL	Years of potential life lost