

Epidemiological Bulletin

PAN AMERICAN HEALTH ORGANIZATION

ISSN 0256-1859

Printed on acid-free paper

Vol. 12, No. 4
December 1991

Epidemiological Stratification of Malaria in the Region of the Americas

Malaria in Latin America and the Caribbean in the 1980s presented a markedly increasing trend that has prevailed throughout the decade (Figure 1). During this period, malaria emerged again as a serious public health problem.

The continuing increase of malaria is of particular importance since it appears simultaneously with the socioeconomic deterioration occurring during the 1980s in the countries of the Region.

Beginning in 1987, more than a million new cases of malaria were reported annually. In 1990 the figure reached 1.04 million. These figures reflect the intensification of the malaria transmission process during this period.

This resurgence of malaria at a time of critical socioeconomic conditions has made it necessary to review and adjust the strategies used for malaria prevention and control. The purpose of this article is to present briefly some of the more salient components of epidemiological methodology that have been incorporated in the *strategy of epidemiological stratification of malaria*. In addition, the progress of the

stratification process in the Region is documented. The methodology for epidemiological stratification of malaria and other communicable diseases has been proposed and developed by Dr. Carlos Castillo-Salgado, Communicable Diseases Program, PAHO. This article is part of a more extensive paper by the same author, to be published in other epidemiology journals.

Basic Concepts of Epidemiological Stratification

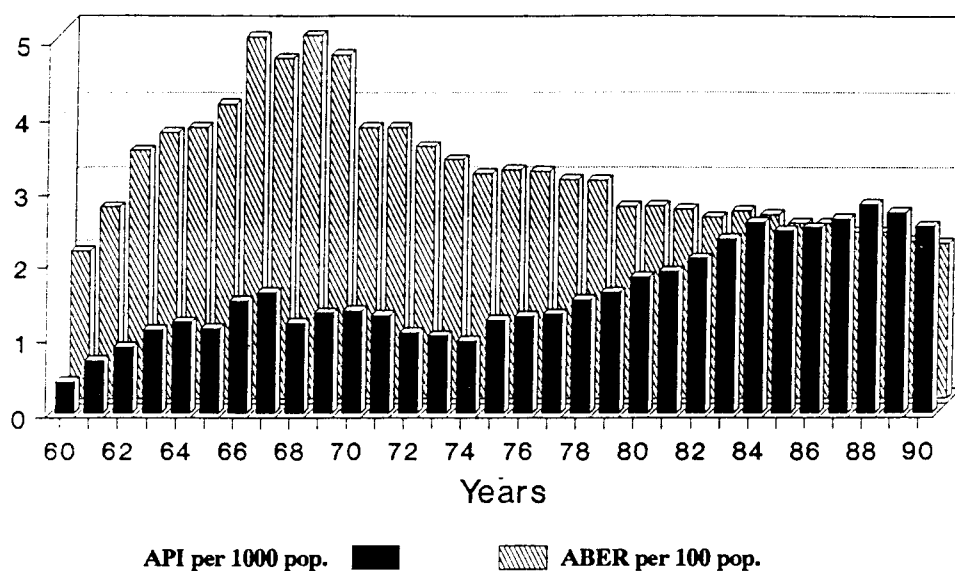
In Latin America the stratification of malaria emerged as a strategic approach in 1979 (1). In 1985 it was recognized as a helpful strategy for attaining an objective epidemiological diagnosis, to be used as the basis for planning malaria prevention and control activities. In general, the concept of *stratification* and its use for the study of the distribution of malaria has been applied according to different theoretical approaches (2,3).

The *epidemiological risk approach* was recently incorporated into the stratification guidelines; it supports both the situational analysis and decisions on

IN THIS ISSUE . . .

- Epidemiological Stratification of Malaria in the Region of the Americas
- Epidemiological Activities in the Countries
- Public Health Theory and Practice. A Proposal for its Development in the Countries of the Americas
- Cholera Situation in the Americas. An Update
- Meeting of the Advisory Committee on Health Research
- Diseases Subject to the International Health Regulations

Figure 1. Malariometric Indexes of 21 Countries, Region of the Americas, 1960 - 1990.



intervention strategies. Some of the most important concepts of this approach are described below.

In the Region of the Americas, *epidemiological stratification* of malaria in the control programs has been defined as a continuous dynamic process of research, diagnosis, analysis, and interpretation of information that serves as the basis for methodological, comprehensive categorization of geocological areas and population groups according to the *risk factors* for malaria (4).

The principal characteristic of this new strategy is the epidemiological study, in individuals and defined social groups, of the *risk factors* that are responsible for the incidence of malaria at the local level. Knowledge of the profile of these risk factors at the local level greatly assists in the selection of the interventions for malaria prevention and control.

The components of the combined process of analysis, intervention, and evaluation, that results in stratification and optimizes decision-making, can be summarized as follows:

- Study of the API (Annual Parasite Incidence) and its trends in recent years, to identify *priority areas*.
- Identification and measurement of *malaria risk factors* in the priority areas or localities, utilizing the methodology of epidemiological risk assessment.
- Construction of *epidemiological risk strata* according to the risk factor ranking.

- Selection of the *interventions* to reduce or eliminate the most important risk factors in each stratum.
- Adaptation of the *health services* for the implementation of the actions based on the epidemiological risk stratification.
- Identification of *indicators of structure, process, and impact* to evaluate the effect of each intervention.
- Execution of *specific interventions* to reduce or eliminate each risk factor.
- Evaluation and adjustment, including:
 - Measurement of *reduction of the risk* of disease or death from malaria, through specific incidence and mortality rates, as well as changes to the risk factors, measured through *relative risk and percentage of attributable population risk*.
 - *Evaluation* of each intervention through the indicators of structure, process, and impact.
 - *Monitoring and adjustment* of each phase of the process.

Based on the analysis of the API and its secular trend, priority areas are defined as those where the incidence has increased and/or is very high. In addition, observation of the API and its secular trend assists in

identifying areas where antimalarial interventions have not been successful.

Most countries of the Region with active transmission of malaria maintain a record of the API and have identified risk areas on the basis of this indicator.

In the epidemiological approach, a malaria *risk factor* is defined as any variable or set of variables directly related to malaria incidence. More broadly, it can be defined as any characteristic, attribute, condition, or circumstance that increases the probability of the appearance of malaria morbidity or mortality at a specific moment. The increased risk of becoming ill from malaria implies a higher probability of becoming ill through the presence of one or more risk factors.

Malaria risk factors can be classified in different ways. However, every classification should include the ecological, geographical, and entomological as well as the social, economic, and demographic factors, and those related to the health services' organization.

The Stratification Process in the Countries of the Region

Recent experience with the malaria stratification process in the countries of the Region of the Americas indicate that its development has been neither continuous nor homogeneous. The initial approaches used for stratification depended to a great extent on the diverse criteria used by the various countries and the kind of information available.

However, by the end of the 1980s most countries with active malaria transmission had completed initial stratification schemes based on the behavior and trends of the API. In those countries, this characterization of the epidemiology of malaria has permitted the subdivision of their malarious areas into *strata*, or *priority areas*, using as the basic criterion the observed malaria incidence or prevalence ratios. This aggregation of priority areas has represented a first level of analysis and synthesis of the malariometric information available.

The criteria used to stratify epidemiologically the local malaria situation should begin with the analysis and recognition of the risk factors that determine the frequency and distribution of the disease.

To further reduce the complexity of the malaria problem, stratification should incorporate the epidemiological analysis of local determinants and characteristics, that have been recognized as risk factors explaining the observed increase in malaria morbidity rates.

According to information available through 1990 the malaria stratification process has had the following characteristics in the Region:

- Malaria stratification allowed initiation of the study of the different risks of disease and death from malaria to which the population of the countries of

Latin America and the Caribbean are exposed due to specific attributes or characteristics of individuals and social groups, the environment, and the organization of the health services.

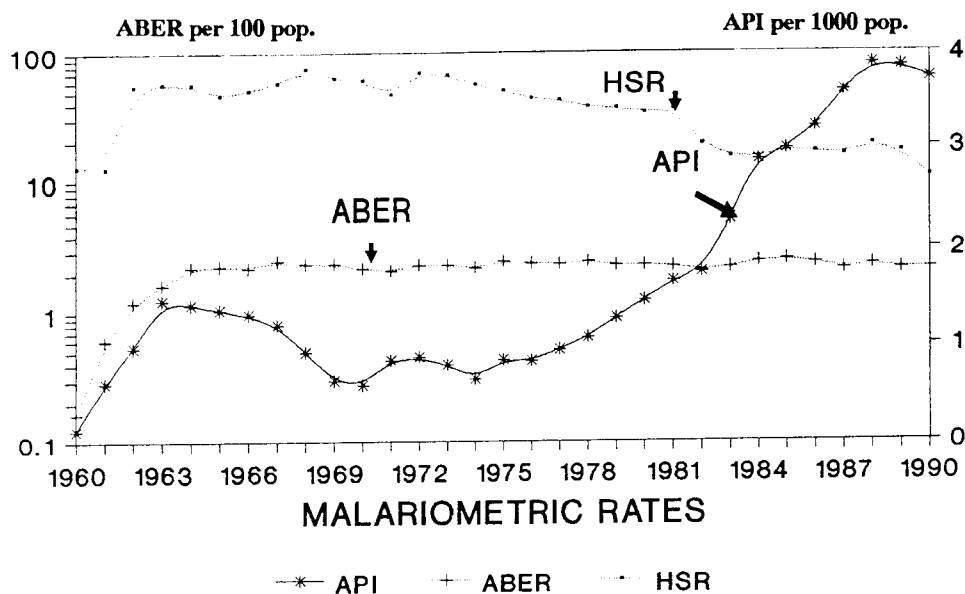
- The API trend in 21 countries of the Region shows an increase from 1.7 per 1,000 population in 1980 to 2.5 in 1990 (Figure 1). The API's average increase does not reflect the true intensification of transmission that has occurred in the countries' malarious areas. A more realistic picture of the malaria problem can be obtained when analyzing that indicator in the countries' interiors, with exclusion of areas and populations that have no transmission or disease risk. In 1990 the reported API in some high-risk areas in the various countries was *250 times* greater than the regional figure. Thus, for example, the API reached levels of up to 694 and 553 per 1,000 population in some municipalities in Brazil, and 659 and 415 per 1,000 in localities in French Guiana and Guyana, respectively.
- Malaria is a disease that manifests itself locally. As a result, it is of the essence that the study of its distribution and of the various mechanisms to be selected for its control include the local epidemiological profile of its determinants. General and global control strategies are not successful. Although in particular instances they may facilitate a temporary reduction in transmission, the continued existence of the active unaltered risk factors determines that local transmission may reappear, and that it may continue or increase rapidly.
- The epidemiological mapping of the high-risk areas of malaria transmission has helped the countries to recognize those priority population groups and geographical and ecological areas in which the epidemiological stratification of malaria makes it possible to identify the principal factors that determine malaria morbidity and mortality and whose removal should be the aim of the malaria prevention and control programs.

A brief summary of the current status of the stratification process and its relation to the malaria situation up to December 1990 is given below for some countries of the Region of the Americas. The description is not exhaustive and not all of the countries with malaria transmission are included. However, it exemplifies the role of epidemiological methodology in the stratification of malaria.

BRAZIL

The emerging process of epidemiological stratification of malaria in Brazil has made more visible

Figure 2. Malariometric Indexes, Brazil, 1960-1990.



the differences that exist in the distribution and frequency of malaria in this country. Moreover, it has made it possible to appreciate the importance to the control programs of the recognition of the specific risk factors that determine the intensity and severity of malaria in the different population groups and areas of the country.

The trend of the malariometric indexes in Brazil from 1960 to 1990 is presented in Figure 2. It can be seen that beginning in 1975 there has been a continuing upward API trend. Starting in 1983 this upward trend becomes more pronounced although the Annual Blood Examination Ratio (ABER) remained the same. The House Spraying Ratio (HSR) showed a decline during the 1980s.

In 1990, Brazil, with 560,396 cases of malaria and 154 million total population reported an API of 3.7 per 1,000. This API value does not reflect the increase in the number of malaria cases in the areas of transmission. There are large variations among the regions and municipalities of the country. For example, for 1989, the Southeastern Region with 4,152 cases and an API of 0.21 contrasts with the Northern and Midwestern Regions, which reported 455,632 (API, 46.1) and 66,302 cases (API, 13.2), respectively.

If this indicator is disaggregated further, it can be seen that of the 27 states in the country, eight reported APIs higher than 7 per 1,000, as follows: Roraima, 146.5; Rondonia, 128.3; Amapá, 43.2; Acre, 38.5; Mato

Grosso, 28.8; Pará, 22.6; Amazonas, 16.9; and Maranhao, 7.2.

The highest rates of malaria transmission are found primarily in the states of the Amazon Region, where 97% of the cases of the country were reported in 1990. In that Region, three states were responsible for most of the cases: Rondonia with 45% of the total, Pará with 21%, and Mato Grosso with 11%.

On studying the intensity of the transmission at the local level, large differences can be found, as compared to the national or regional averages. For example, in 1990 the state of Amazonas had municipalities with APIs of 120; in Acre there were municipalities with APIs of 198.9; in Amapá, with 125; in Rondonia, with 550; in Pará, with 583.8; and in the state of Mato Grosso, there were municipalities with API of 3,924 per 1,000 population.

In the geographical areas where most of the cases of malaria are found, particularly in the Amazon Region, two major social processes are reported as determinants of the risk of contracting malaria. The first constitutes an intense and disorderly migratory flow toward mining areas that are difficult to access, where living and working conditions are very precarious, and where the levels of transmission are high. The second process, also of a social nature, corresponds to the intensification of population movements toward areas of subsistence farming with the ensuing establishment of settlements whose problems of inaccessibility, inadequate living conditions, and limited health protection have provided

the basic substratum for the continuance and increase in malaria in those areas.

Recognition of the forces and factors involved in transmission and of the actions that can affect them, and which would be the basis of the control programs, constitutes the next stage of this process of epidemiological stratification.

COLOMBIA

In recent years the basic malaria stratification effort in Colombia has consisted of the identification and grouping of critical malarious areas, with the basic selection criterion being the level of the API reached in those areas.

Consequently, the areas of malaria transmission in Colombia have been divided into three levels of risk, according to the API found.

The corresponding risk classification utilizes the *municipality* as the basic unit. Thus, the municipalities that present an API less than 0.5 are considered to be at *low risk*. Most of the municipalities in the consolidation phase are found at this level. The municipalities with an API between 0.5 and 10.0 are considered to be at *moderate risk*. Finally, those municipalities with an API of more than 10.0 are classified as *high-risk areas*.

The 100,286 malaria cases reported in Colombia in 1989 occurred in 2,103 of the 37,841 localities in malarious areas of the country. In addition, 72,650 cases, representing 72% of the total cases registered in 1989, were concentrated in six regions. These 72,650 cases were detected in 91 municipalities. Of these 91 municipalities, 32 accounted for 57,414 cases, representing 79% of the cases reported in these regions and 57.4% of the total cases in the country.

The most important universal risk factors reported by the Colombian authorities are included in Table 1.

Because of the complexity of the social risk factors involved in malaria transmission, control programs must give due consideration to the need to facilitate intersectoral actions with the economic and other social sectors, and will require significant adjustments in their control measures.

VENEZUELA

In Venezuela in 1989 there were 43,369 reported malaria cases. The API of the country was 2.2 per 1,000 population, very similar to the API of 2.4 for 1988. Venezuela has an epidemiological risk map showing three geographical areas with high levels of malaria transmission.

These areas correspond to the Southern Region, represented basically by the state of Bolívar; the Western Region, which includes the states of Zulia, Táchira, Apure, and the Federal Territory of Amazonas; and the Eastern Region that surrounds the state of Sucre.

Analyzing the malariometric indicators according to the epidemiological malaria stratification approach, it can be seen that the distribution of malaria morbidity is concentrated in the state of Bolívar, where 61% of total malaria in the country is reported.

As in the rest of the countries of the Region of the Americas, malaria in Venezuela has a marked variation among localities.

HAITI

Epidemiological information on malaria in Haiti has been limited in recent years. By 1989, 23,231 malaria cases had been registered, all of them by *Plasmodium falciparum*.

Of the four health regions into which the country is divided, the Transverse Sanitary Region was responsible for 10,139 cases representing 44% of the

Table 1. Global risk factors determining the persistence of malaria transmission, by area. Colombia, 1989.

Area	Malaria cases	Risk factors
Uraba Lower Cauca	18,072	Factors associated with social conflicts. Lack of resources.
Amazonia	17,903	Factors associated with social conflicts. Lack of resources.
Pacific Coast	16,074	Technical problems. Lack of resources.
Sarare	4,608	Low spraying coverage. Problems in vector behavior.
Middle Magdalena	2,821	Low spraying coverage. Disturbances of public order.
Catatumbo	694	Social problems. Precarious housing. Settlement areas. Low spraying coverage. Problems in vector behavior.

cases registered in 1989. In the Western Region 6,458 cases were registered, while in the Northern Region there were 3,737 cases and in the Southern Region, 2,897. These figures do not reflect the true morbidity due to malaria, since epidemiological information sources on malaria cases are very limited.

In 1980 a first stage malaria stratification design was implemented to identify the most important malaria risk areas in the country. As in other countries, the basic criterion for the selection of those areas was the behavior of the API.

The areas considered to be at high risk were those localities with API of 10 and more per 1,000 population. Areas with moderate risk were those whose API were between 5 and 9 per 1,000. Low-risk areas were those with API of 0.1 to 4 per 1,000. Localities whose API were outside these three intervals were considered to be negative with respect to malaria.

According to this characterization, 66% of the 24,470 localities, representing 39.5% of the country's total population, were declared negative with respect to malaria.

In 3,401 localities API higher than 10 were found, with 21.6% of the total population; they constituted the areas at greatest risk of malaria in the country. At moderate risk were 6.3% of the localities (1,535) with 10.7% of the population, while 13.7% of the localities (3,345) with 28.2% of the population were considered to be at low risk for malaria.

Among the most important risk factors in the dynamics of malaria transmission were the constant internal migrations and the socioeconomic deterioration affecting the population.

With respect to factors related to the organization of the health services, it should be noted that control measures began to be cut in 1968. As of March 1988, at the time of a major financial crisis, the government closed the National System for Eradication of Malaria, discharging all field workers and administrative personnel. Financial difficulties and political instability have impeded a systematic implementation of control measures.

BOLIVIA

In Bolivia in 1989 there were 25,367 malaria cases with a national API of 3.6 per 1,000 population, but in malarious areas the API was found to be 9.9 per 1,000 population.

On studying this malariometric indicator by department, it can be seen that in the department of Tarija the API was as high as 21. In Pando the API was 19.8; in Chuquisaca it was 11.8; and in Beni, 10.5 per 1,000 population.

Among the risk factors to explain the mechanisms of malaria transmission are migration of workers toward mining and rice-producing areas, where great mobility

and precarious living conditions of the population make them subject to high risks of contracting malaria. In addition, there is mention of parasite drug-resistance in the malarious areas of the departments of Beni and Pando. Low health services coverage and operational problems in the control programs are additional important factors in the transmission of malaria in the country.

ECUADOR

In 1989, there were 23,274 reported cases in Ecuador and the API was 2.2 per 1,000 population, that is, it was 2.4 times lower than in 1988. This does not necessarily reflect a real reduction in malaria, since, due to labor problems, the malaria control program was paralyzed for several months in 1989, resulting in an annual coverage of less than 40%.

In view of the above, it is reasonable to postulate that the API in 1989 grossly underestimates the true malaria morbidity in the country. On breaking the API down by province, it can be seen that in Sucumbíos the API reached 45.5 per 1,000 population; in Los Ríos, 17.0; in Napo, 11.8; in Esmeraldas, 11.8; in Manabí, 4.2; and in Guayas, 1.4.

Among the principal risk factors for transmission, there stand out those related to the country's economic crisis, those linked to problems in the administration of the malaria program and the low operative capacity of the health services.

PERU

A total of 32,114 malaria cases were notified in Peru in 1989. The overall API for the country was 4.5 per 1,000 population. APIs in the interior were as much as 12 times the national average.

Thus, for example, the department of Junín, with 7,321 cases, had an API of 53.9. The department of Ayacucho had an API of 26.9; the department of Madre de Dios, 18.7; the department of San Martín, 15.4; and the department of Pasco, 14.8.

Among the principal risk factors mentioned as determinants of malarial transmission, were those related to the country's critical sociopolitical situation and the great economic deterioration affecting a major portion of the population.

In addition, an important role has been played by social factors related to violence and drug trafficking, population displacements and internal labor migration involving very precarious living conditions.

The economic deterioration and the social adjustments that have occurred in the 1980s in most countries of the Region of the Americas have had a significant impact on the epidemiological profile of health and on the malaria situation.

The needed diversification of the control measures requires a comprehensive epidemiological approach

that must combine the contributions of the social sciences and health services research with the advances achieved in basic immunology, entomology, and the clinical research.

Malaria stratification provides the rational basis for planning control activities. The epidemiological information and the socioeconomic profile of the risk areas are considered basic elements for the selection of control measures, which should be directed not only toward temporary reduction of malaria transmission, but primarily toward elimination of those risk factors responsible for the persistence of the disease.

References

(1) Pan American Health Organization. *Malaria en las Américas, Informe Final*. III Directors Meeting of National

Malaria Eradication Services. Oaxtepec, Mexico. Washington, D. C., Scientific Publication No. 405, 1981.

(2) Orlov, VS and Semashko IN. *Malaria Stratification as a Tool in Developing the Strategy and Tactics for Modern Long-term Malaria Control Programs*. WHO/MAL/86.1029, 1986.

(3) Kouznetsov, RL, Molineau L and Beales PF. *Stratification of Malaria Situations in Tropical Africa for the Development of Malaria Control within the Primary Health Care Strategy*. WHO/MAL/86.1028, 1985.

(4) Castillo-Salgado, C and Bayona-Celis, M. *Uso de la Investigación Epidemiológica en la Conformación de Estratos Epidemiológicos de Riesgo y de la Selección de Intervenciones de Control. Materiales sobre Estratificación de la Malaria*. Communicable Diseases Program, PAHO, Washington, D. C., 1989.

(Source: Communicable Diseases Program, PAHO.)

Fourth Annual Scientific Meeting on Epidemiology in Venezuela

This event, organized by the Venezuelan Epidemiology Society, took place during 24-26 October 1991 in Ciudad Bolívar, Bolívar State; it was the first time the meeting has taken place outside of Caracas. Selection of that state was based on the theme of the meeting, *Workers Health and Epidemiology*, and on the fact that it is home to a great many of Venezuela's basic industries. Approximately 80 epidemiologists from around the country attended.

Three conferences were delivered, two workshops were held on the central topic, and 24 open papers were presented.

Part of the Directing Board was elected during the event; Dr. Luis Echezuria will be president during the 1991-1993 period. The subject chosen for the next annual meeting was *Quality of Life*, and it was proposed that it be held in the city (and state) of Mérida, during the second half of October 1992.

Second National Scientific Meeting on Epidemiology in the Dominican Republic

With the theme *Epidemiology and Crisis: Impact on the Health Situation*, and with almost 300 participants, the Second National Scientific Meeting on Epidemiology was held during 19-22 November in the Dominican Republic.

Dr. Mervin Susser, of Columbia University, New York, delivered the inaugural address on the subject of *Health and Human Rights*. Over 60 open papers, conferences, round tables and seminars, as well as workshops and short courses, constituted a meeting of great national impact.

This second meeting had a markedly multidisciplinary nature, as did the first one, and numerous institutions from the governmental and nongovernmental sectors participated, in addition to 16 international guests from Argentina, Brazil, Cuba, Mexico, Nicaragua, Spain, United States, and Venezuela. Representatives of several PAHO/WHO programs and centers also participated.

The meeting provided a valuable opportunity for scientific exchange on the consequences of the crisis, from the

viewpoint of different disciplines, such as economics, anthropology, sociology, social psychology, administration, and epidemiology, among others.

Debate included not only aspects related to the phenomena of crisis, but also conceptual, methodological, and technical issues in the fields of epidemiology and public health, with relation to the study of the differential impact on the health status of different social groups, by age and sex, within the Dominican population.

Within the framework of this meeting, and beyond recognizing the effort of the organizers, participants repeatedly expressed interest in organizing a Dominican epidemiology society, having a scientific multidisciplinary nature and voluntary membership.

The final report of the meeting will be available early in 1992. Additional information may be requested from the Organizing Committee or the PAHO office in the Dominican Republic.

Public Health Theory and Practice.

A Proposal for its Development in the Countries of the Americas

In late 1989 the Pan American Health Organization entered into an agreement with the American Association of Schools of Public Health (ASPH) and the Latin American and Caribbean Association of Public Health Education (ALAESP) to conduct a joint preliminary assessment of the Region's situation and trends in the area of public health. This undertaking would ultimately form the basis for a broader proposal for cooperation. The present project serves as a corollary to lines of action implemented by a group of technical programs of PAHO and other institutions during the period 1987-1990 which made it increasingly apparent that there is need to implement a more comprehensive approach in the field of public health.

This new initiative of the Organization is an outgrowth of increasing world awareness that public health is currently in a state of crisis. In the face of changing circumstances, most societies are no longer able to promote and protect their own health. The initiative draws its justification from the insufficient progress that has been made by the countries toward the goal of Health for All by the Year 2000 and at the same time from the new demands being posed by the socioeconomic situation in the Region, which have made the aforementioned crisis all the more patent and have underscored the need to look for alternatives.

Originally the problem was thought to lie in the schools or in the public health education process--as was the case, for example, during the 1970s. However, evidence now places the issue in a far more complex dimension when judging the behavior of customary health practices and various available health indicators.

The fact is that a major portion of the Latin American population-- mostly the socioeconomic groups with the lowest standards of living--is at excessive risk of illness and death. This is true for all age groups and for most health problems, particularly those that should already have been overcome. In all the countries, including the most developed ones, there continue to be significant geographical differences in terms of mortality, morbidity, and access to basic health services, which are even more marked between the different social groups.

It has been estimated that more than 130 million people lack regular access to basic health services. Moreover, with the growth in population projected for 1990-2000, this figure is expected to increase by another 100 million. Thus the health services will have to gear up to meet the needs of 230 million more people in addition to those already being covered while at the same time improving the quality of the medical care

currently provided and giving increased emphasis to health promotion and protection.

It is now important to raise political and scientific awareness of the critical problems and deficiencies in public health and to focus on the practices and motivations that have characterized the situation in the Americas, in order to encourage the formulation of guidelines that will shape the decisions needed in the medium and long term. In keeping with processes currently under way at the global level, the project conceives of public health not just as a field of professional specialization but, more importantly, as a duty of the state and, above all, as a commitment of society to its health ideals.

The *objectives* are on the one hand, to describe and account for the situation of public health and its major trends in the Americas within the context of the new challenges posed by the social situation in general and by health in particular and, on the other hand, to identify ways of revitalizing or reorienting the conceptual, methodological, and operational practice of public health in the countries of the Region, especially through the promotion of sectoral leadership, research, and advanced training in public health.

Conceptual and Referential Framework

Public health is regarded as the means, whether organized or not, by which society translates into action its commitment to seek the attainment of its health ideals. It is recognized that the development of society's wealth of knowledge, attitudes, traditions, beliefs, and practices with regard to health is causally related to changes in the economic, political, and social context. At present, this context in the Region of the Americas is characterized by profound economic crisis, a growing trend toward democratization, and increasingly active social participation.

Even though the health situation differs markedly between subregions, countries, areas within a single country, and population groups, on the whole it is characterized by a decline in communicable diseases and a rise in noncommunicable diseases and damages or risks to the environment as a result of growing industrialization and urbanization, coupled with an aging population. In the health services, the perennial problems remain: the programs are largely vertical and disconnected from the infrastructure that should serve the population and the environment on a comprehensive basis; coverage is low; emphasis is placed on the curative approach; the quality of care remains poor; and the services have become progressively less accessible. The recent trend toward privatization of health care is

raising a number of questions and will undoubtedly undermine public services even further. Public health education has failed to keep pace with the social, economic, and political changes that are taking place, which necessitate a shift to new, more complex theory and practice. Finally, in most of the countries there is a sizeable gap between theory and practice.

Against this backdrop, a promising sign has been the attempt to reorient national health systems by developing and strengthening local health systems--a Regional political commitment that corresponds to an operational tactic within the primary health care strategy. Also encouraging is the clearer trend toward population-based intervention strategies, active health promotion, tapping into multisectoral potential and the potential of popular wisdom, recognition of the role of the family, and espousal of the values inherent in such concepts as health, participation, citizenship, social control, and others.

Principal Characteristics of Present Line of Action

The central focus of analysis, promotion, and development efforts under the project will be public health theory and practice as expressed through service, education, and research. The basic approach will move, scientifically, from the specific to the general and, geographically, from the national to the regional level.

The analytical component will not only view a cross-section of reality but will go on to take a longitudinal look, both retrospective and prospective, at the challenges, processes, and most important actors in the field of health. One facet of this analysis will involve a study of the political, scientific, technical, and operational changes that have taken place, while another will look at the repercussions these transformations have had on the social processes of service, education, and research. It should be possible, therefore, to examine--or anticipate--the interaction over time between specific problems or ideals, on the one hand, and, on the other, specific actions or programs.

Information will be gathered from a number of sources (individuals, institutions, studies, publications) at the national, subregional, and Regional level. The counterparts for the different components of the present project may be either national (ministry of health, social security, university, research institutions) or international (for example, Economic Commission for Latin America and the Caribbean, World Bank, Inter-American Development Bank, Kellogg Foundation, United States Centers for Disease Control and other). In both previous dimensions, the focal points may be persons, groups, or institutions.

Expected Outcomes and Actions

As already indicated, the description and assessment of the situation and trends in public health theory and practice that will emerge from the present proposal are

expected to serve as a basis for the promotion and, hopefully, the generation of a movement aimed at the formulation and adoption of policy guidelines or directives for social action in this area in the Region of the Americas. The following intermediate outcomes and actions are expected:

1. Initial reflection (individual and collective contributions). Implementation of the present proposal will lead to the consolidation of previous PAHO work in this area and also to requests for contributions from selected experts. These contributions, taken as a whole, should represent the various views of public health theory and practice in the Region. On this basis, an attempt will be made to put together a collective picture. All the contributions will be widely disseminated in the hope of generating extensive discussion on public health theory and practice in the Region.

2. Fostering of critical awareness (national and subregional meetings). As an essential part of the process, group discussion and reflection will be promoted in selected countries or subregions in order to encourage the development of specific areas. The openings for action identified during this phase will constitute important reference points for channeling PAHO technical cooperation.

3. Partial description and analysis of the development of public health (line of research). Based on a document or proposed plan outlining the corresponding objectives, categories of analysis, variables, areas of study, and methods, national or subregional studies will be promoted according to the size and sociocultural characteristics of the populations as well as the availability of critical information.

4. Dissemination of conceptual, methodological, and operational materials (publications). These will include reports written by experts on experiences to date, institutional accounts, and summaries of meetings and studies planned or carried out in the course of the project.

5. Regional guidelines for the reorientation of public health (Region-wide scientific meeting). Presentations requested from institutions, groups, or invited experts will be discussed and analyzed in a major scientific conference. The basic documents, conclusions, and recommendations from this meeting will be widely distributed with a view to stimulating concrete action at the country level.

6. Creation of a political *momentum* (Consensus conference). A group of leaders in the fields of education and service, from the northern and southern parts of the Hemisphere will analyze a document on the public health situation and formulate a series of conclusions and recommendations for future development. The recommendations will take the form of a declaration or manifesto that will be widely disseminated.

7. Theoretical, methodological, and operational development (development networks). An effort will be

made to set up development nuclei in institutions or consortia of institutions wherever political, technical, and operational conditions are such that they will permit selective progress in the review of difficulties encountered or progress made toward filling the gaps identified during the process. Formation of an informal network will be encouraged in order to facilitate the exchange of theoretical, methodological, and instrumental information and to help ensure that the knowledge or technologies generated are applied to the specific institutional and social reality in each country.

Tentative Timetable

The proposal is intended to be implemented at three levels: conceptual and referential, with emphasis on understanding the problem; methodological, with emphasis on development; and operational, with emphasis on application and development. These levels comprise the various activities either under way or planned, as described below.

During the last quarter of 1990, a series of reference documents were prepared offering different perspectives on the basic values and determinants of public health theory and practice in the Region. These documents* were distributed to selected experts for review, and their comments or reactions were consolidated and presented at a meeting held in New Orleans, Louisiana, on 21-24 October 1991. This event was sponsored by the ALAESP and the ASPH, with the support of PAHO and participation by the authors of the respective documents.

The participants concluded that public health is currently in a state of profound crisis and that it is suffering from the following deficiencies:

- Inability to meet the needs of society. Fundamentally, the crisis lies in the polarization of theory and practice--in other words, the inability to use the knowledge that is produced in ways that will influence the social situation. But the crisis is more far-reaching than this: there is also a need to rethink theory and practice themselves.

- Inadequacy of current explanatory models. Public health is focused on the concept of disease. To get beyond this point will involve redefining its basic concepts, redefining the field of knowledge, and rethinking the theory in terms of disciplines that provide explanatory models drawn from the social sciences.

- Limitation of public health practice to patient care, with little concern for the prevention of disease. This reduces the health sector to a network of medical care

* The series will be published by mid-1992. Available from the Editor, PAHO *Epidemiological Bulletin*, 525 Twenty-third Street, N.W., Washington, D.C. 20037, USA.

services and public health to the management of these services. Public health is not in a position to take advantage of the opportunity for reconstruction that the civil society is currently procuring through organizations that are looking for ways to cope with disease, especially in the face of government cutbacks in the provision of basic services. The rethinking of public health practice will involve redefining such basic concepts as society, state, sector, and population, as well as articulating actions aimed at building widespread consciousness based on social control in response to the privatization of health care. It will entail advocating a form of government that will foster the democratization of power, participation by the people, and due regard for social movements.

The participants also looked closely at trends in public health theory and practice with a view to suggesting modifications and proposing new strategies.

The group discussed the continuity of this initiative, pointing out, with respect to *analysis*, the importance of multicenter projects that will allow greater in-depth study of the determinants of the public health crisis and, in regard to *promotion*, the need to influence the grass-roots level and to expand debate in technical, scientific, and political terms as well as within the entities or institutions involved.

The foregoing individual and collective contributions will add a great deal to subregional and national discussion, which in turn will serve as a basis for determining the work that needs to be done in the areas of service, research, and education and for preparing a proposal (development plan) for the corresponding studies. These activities will receive technical and financial support from PAHO. The meetings and research that are planned for 1992-1993 will require the mobilization of special funds. It is expected that in 1992 a workshop for the promotion of research projects will generate proposals for consideration by the PAHO/WHO Research Grants Program.

One of the medium-term goals is to hold a Region-wide conference on the subject, tentatively scheduled for late 1994, which will include progress reports on the foregoing activities as well as the national and subregional studies. The consensus conference is expected to be held in 1995. The financing of these activities will require considerable external resources in addition to special PAHO funds.

Further activities related to theoretical and practical development, aimed at achieving the fundamental objective of the project, will be programmed later on, as theoretical, methodological, and operational gaps are detected and potential development centers are identified.

Cholera Situation in the Americas. An Update

Since publication of the last issue of the *Epidemiological Bulletin*, four additional countries were added to the list of cholera infected areas: Panama, Honduras, Nicaragua and Venezuela. Thus, ten months after the first case was reported in Peru, 14 countries of the Americas have been affected. As of 21 December 1991, a total number of 366,017 cases has been reported in the Region, with 158,739 hospitalizations and 3,892 deaths (Table 1).

In Peru the epidemic has reached every department, and it is estimated that at least 1.5% of the Peruvian population has been affected. Since April there has been a steady decline in cases (Figure 1), but transmission continues in some localities in the jungle region, and in Callao, and new outbreaks have been reported in the southern mountainous area. A small proportion of isolates of *V. cholerae* 01, El Tor Ogawa has been identified recently; it is assumed that this may be the result of a mutation of the predominant Inaba strain, with no significance for public health interventions. It is highly likely that in Peru cholera has established itself as an endemic disease.

While in Ecuador cholera cases have declined since May, relatively high transmission continued through August and September and new outbreaks have occurred during October, mainly in some of the provinces in the mountains. The latter has been attributed to religious ceremonies among indigenous populations living in Cotopaxi and Tungurahua provinces. The preparation and consumption of food

during funeral services of cholera cases in these communities, also were found to be associated with the occurrence of cases.

In Colombia the disease appears to have spread more gradually than in Peru or Ecuador; it took seven months for active transmission to reach Barranquilla and Riohacha (near the border with Venezuela) in the western Caribbean coast, since the first cases were reported in Tumaco.

Cases in the United States of America have been limited to four importations; 12 cases resulting from eating infected crabs brought in noncommercially from South America; three cases related to importation of contaminated coconut milk from Asia; and two isolated cases identified in Hawaii for which the source remains unknown.

No cases have been reported by Chile since 23 May; however, *Vibrio cholerae* 01 continues to be isolated from waste water and fresh vegetables at various locations in that country.

While in Brazil transmission was initially limited and confined to the Amazon region on the border with Peru and Colombia, during August and again in October sharp increases in the number of reported cases occurred (Figure 2) as the epidemic extended eastward along the Amazon River. Large cities such as Manaus and Belem as well as the states of Rondonia and Amapá are experiencing active transmission of cholera since November.

Table 1. Cholera Cases Reported for the Period 16 November to 7 December 1991 and Cumulative Cases, Hospitalizations, and Deaths, by Country, as of 21 December 1991.

Country	Reported from 16 Nov. to 7 Dec.	Cumulative		
		Cases	Hospitalizations	Deaths
Peru	7,382	301,277	114,352	2,840
Ecuador	2,246	44,126	35,471	672
Colombia	1,063	11,218	5,136	202
United States of America	0	24 ^(a)	11	0
Brazil	421	937	580	20
Chile	0	41	38	2
Mexico	423	2,605	836	34
Guatemala	881	3,530	1,470	47
El Salvador	198	921	478	34
Bolivia	47	175	94	12
Panama	351	1,177	276	29
Honduras	0	11	9	0
Nicaragua	1	1	1	0
Venezuela	1	13 ^(b)	0	1
Total		366,056	158,752	3,894

(a) 16 cases related to travel in Latin America, 6 to travel to other regions and two of undetermined origin, under investigation.

(b) 8 cases imported from Colombia.

Figure 1. Cholera cases and hospitalizations reported by week, Peru, through 30 November 1991.

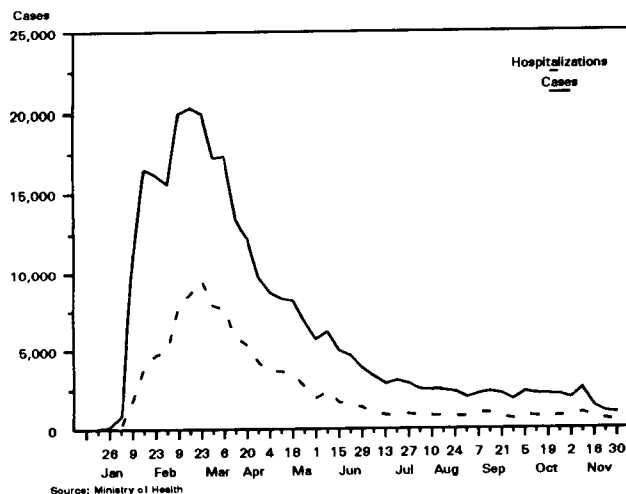
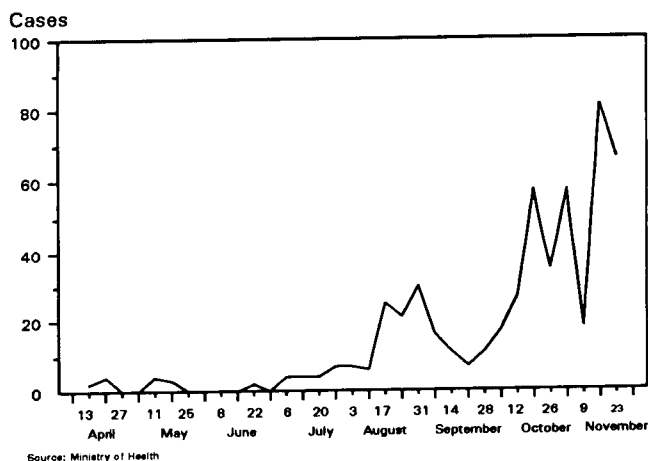


Figure 2. Cholera cases reported by week, Brazil, through 23 November 1991.



Mexico reported cholera in an isolated community in the state of Mexico in mid-June (Figure 3). In spite of vigorous control measures, the disease could not be confined to that community; via the Sultepec River basin and the Tula valley, cholera has spread to the Federal District and 16 other states. The affected areas have been concentrated along the southern Gulf coast and the Guatemala border.

Guatemala first reported cholera in mid-July (Figure 4). Initially the disease occurred along the western Pacific coast, but most recently it has spread to the eastern departments and around the capital. Guatemala, Retalhuleu, Suchitepéquez and Escuintla have presented higher attack rates than other departments. Migrant rural workers and indigenous population are considered the most vulnerable groups.

Seven months after the epidemic began in Peru, **Bolivia** reported its first cases in the region around La Paz, and the disease has remained confined to that area, although isolated cases have been registered in Oruro and Cochabamba.

Panama reported its first case in September in the Darién, the rain forest region on the border with Colombia, where 80% of the cases have been seen. Recently, new areas such as Panamá province and the city of Colón (on the Atlantic coast) have been affected.

Honduras detected its first case in mid-October near its border with Guatemala, and to date has reported only four additional cases.

Nicaragua isolated *V. cholerae* 01 from a 45-day-old infant with diarrhea, but has not found other cases or a source for that infection.

Venezuela reported its first case during the first week of December. The patient, a Colombian national, lives in Barranquilla and sought medical attention in Maracaibo, Zulia State, where samples were obtained

and the diagnosis confirmed by isolation of *V. cholerae* 01.

Cholera is almost always introduced into new areas by infected travelers. However, within infected areas, disease is transmitted from person to person by contaminated food and water. Case-control studies to provide information on specific modes of cholera transmission in Peru and Ecuador identified the following as risk factors for acquiring the infection: (a) drinking unboiled water from municipal systems and shallow wells; (b) consuming food and beverages sold by street vendors, especially drinking beverages containing ice; (c) eating food left for more than three hours at room temperature without reheating; (d) eating raw fish or raw shellfish; and (e) drinking water from a container into which other people had put their hands.

In all infected countries of the Americas, cholera has been predominantly a disease of adults and, except for Peru, where major cities have been affected, it seems to have stricken mostly rural areas.

Ecuador and Panama have identified the emergence of multi-drug-resistant *V. cholerae*, to include tetracycline.

The overall case-fatality ratio from cholera in Latin America remains around 1%, shaped largely by the figures in Peru, but has been as high as 7.5% in Bolivia, which has 9 deaths among 120 cases. The experience in the Americas has been similar to that of Asia, where the case-fatality ratio is 1.1%, and is much lower than the 10% case-fatality ratio reported in Africa.

The 3,600 deaths from cholera in the first 11 months of 1991 represent a small contribution to mortality, even among adults. From mortality data available between 1965 and 1990, it has been estimated that more than 6 million deaths have occurred in that period in Latin America from infectious diseases, a 9% of the total mortality. Of these deaths, a 20% have occurred in

Figure 3. Cholera cases reported by week, Mexico, through 30 November 1991.

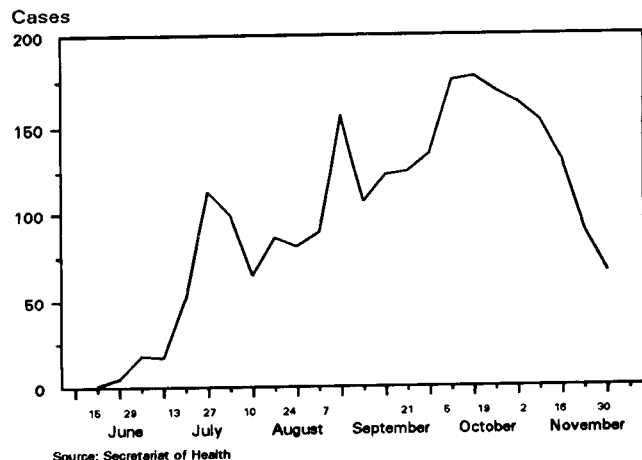
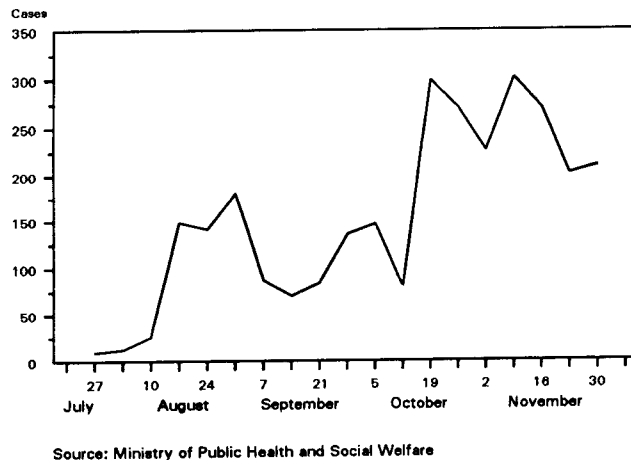


Figure 4. Cholera cases reported by week, Guatemala, through 30 November 1991.



adults. Although mortality from diarrhea has been reduced in that period, approximately 130,000 children under 5 years of age have died during 1985-1990.

Generally, cholera death rates have declined as medical staff have become more aware of the disease and its proper treatment, especially since oral rehydration therapy although well established in Latin America for treating diarrheal disease in children, is not always known and/or accepted by general practitioners.

The most important factor relating to cholera deaths has been access to and use of health services. In Peru, case-fatality ratios have ranged from under 0.5% in large urban municipalities to over 4% in remote departments with predominantly indigenous population. In several countries deaths occur among those who arrive too late for appropriate treatment at health services or who never arrive at all.

Ten months after the appearance of epidemic cholera in this Hemisphere, the disease has spread almost inexorably north and east in South America. It seems inevitable that it will extend further east in Brazil and reach the northernmost countries. The disease jumped to Mexico, then extended southeast and entered the Central American isthmus. Further spread in Central America seems certain. With cholera on two sides of the Caribbean Basin, it can be only a matter of time before the disease also spreads to the islands of that subregion.

Efforts to limit the extent and impact of the cholera epidemic have undoubtedly had an effect. Evidence of that is seen in the decline in cholera cases in most infected countries and the low death rate, which has

been maintained for the past 10 months. Indeed, reports indicate that, as a result of control efforts, there has been a decline in other diarrheal illness in many countries. However, cholera is a disease affecting those living under the poorest conditions, without safe water, adequate sanitation, the proper means to prepare and store food, and access to basic health care. The presence of epidemic cholera in the Americas in 1991 is clear evidence of the economic crisis of the past decade, with the resultant deterioration in water, sanitation and health services. To control the spread of cholera and limit its effects during the next few years, it is necessary to strengthen the detection and reporting of cases, support basic diagnostic and laboratory services, assure prompt and efficient treatment of diarrhea in all age groups, undertake emergency measures to provide safe water and food handling, and treat sewage in selected, high risk locations.

Even with these commitments to emergency interventions, cholera can be expected to spread to much of Latin America and the Caribbean. The elimination of cholera from the Region, which must be the ultimate goal, can only be achieved by major investments to improve water, sanitation and health services and extend them to that significant proportion of the population not now reached.

(Source: Information from country reports consolidated by the Health Situation and Trend Assessment Program, PAHO.)

Meeting of the Advisory Committee on Health Research

The Advisory Committee on Health Research (ACHR), made up of distinguished investigators from various fields related to health in the Region, is responsible for permanent review of the Pan American Health Organization's research policy. The Research Coordination Office at PAHO, advises the Director on matters concerning research policy and is responsible for administering the PAHO/WHO Research Funds Program, one of the principal instruments for cooperation in the field of research.

The XXVIII Meeting of ACHR was held in Montevideo, Uruguay, from 20 to 23 August 1991. Participants included the Chairman of Global ACHR, WHO, representatives of the national councils on science and technology (CONICYT), of the Network for the Exchange of Researchers for the Development of Latin America and the Caribbean (RIDALC), of the Regional Office for Science and Technology (ORCYT) from UNESCO, and other guests.

The following is a brief summary of the principal subjects discussed and the respective recommendations.

Health Research Situation Analysis in Five Countries in the Region

A discussion took place of the results of five studies financed by the PAHO/WHO Grants Program on the situation of health research in Argentina, Brazil, Cuba, Mexico, and Venezuela. These studies form part of a line of PAHO/WHO technical cooperation that seeks to enhance the definition of research policies in the countries of the Region. This line of cooperation is of great importance in the current situation in view of the difficulties faced by most of the countries in maintaining the scientific and technical infrastructure built up in recent years and in meeting the challenges they face in mapping out sound research policies that are consonant with the changes taking place throughout the world and the new models of development that are being implemented in the Region.

The results discussed on this occasion refer to the study of the research projects underway from 1987 to 1989, and the scientific output contained in articles published from 1972 to 1988. Among the common features observed was the predominance of an individual approach to the health problem as opposed to a population approach, which accounted for barely 5% of the projects; the small amount of research devoted to technological innovation; the absence of a multidisciplinary approach and the absolute predominance of the medical and biological sciences and of professionals in these areas; the predominance of

single researchers in the development of the projects; and the increase in the participation of women in scientific work. The data for projects in progress came from scientific and technical data banks in the countries. This led to certain difficulties, both because of the lack of information and the way it is organized, thereby making it difficult to formulate indicators that would allow deeper analysis of the characteristics of the research being performed in the Region.

In this context, the Committee recommended broad dissemination of the results of this study, given its importance for decision-making on health research policies. It considered the need for continuing to promote studies of this type of a more analytical and qualitative nature and recommended PAHO to encourage Member Countries to strengthen scientific information systems and to cooperate with them in this endeavor. As regards the difficulties encountered in developing health research, the Committee pointed out the absence of material incentives and professional recognition in maintaining existing cadres and attracting young scientists, noting that the origin of the problem lay not only in the lack of resources, but also in the absence of political will at the national level. The Committee recommended that PAHO encourage Member Countries to search for a solution to this overwhelming problem.

PAHO Technical Cooperation in the Field of Health Research

PAHO technical cooperation activities in this field were discussed both in general terms and with regard to specific initiatives, such as the Research Grants Program, the development of a Regional System of Vaccines (SIREVA) and the promotion of Health Systems and Services Research (HSSR).

With respect to cooperation activities related to research carried out by the various units in the Organization, it has been observed that such activities consist of an average of 10% of the resources programmed between 1988 and 1990. This percentage varies according to activity areas, reaching 9.5% in the Technical Programs, 26.3% in the Centers, and 7.6% in the Country Representative Offices. In view of the importance of research activities in PAHO cooperation as a whole, since they constitute the main core of the Organization's fundamental mission--the management of knowledge--the Committee recognized the need to establish an explicit policy for the Organization to follow in this area in orienting its activities and those of Member Countries and recommended setting up an ad

hoc subcommittee to work along these lines. Because of the magnitude and the importance of the research being carried out by the Pan American Centers, the Committee considered it appropriate to have a qualitative evaluation of these activities to be performed by external examiners. It also stressed the need for adjusting PAHO's method of programming in order to permit both rapid identification and a clear description of the activities and resources assigned to development of science and technology in the field of health and studies to evaluate their impact.

As regards the Grants Program, an analysis has been made of its effectiveness in terms of the projects submitted and approved since 1985 by country and subject area. It was observed that the index of approval of the proposals has been declining over the years and is currently around 30%. Several priority areas are very poorly represented because of the difficulty in obtaining good projects. The experiences in progress were discussed for greater dissemination and support for the preparation of projects, such as the agreements made with this aim with six CONICYT in the Region. The results of 11 projects in a priority area of the Program--biotechnology--were examined. After a discussion of the achievements observed in these 11 projects, the Committee drew attention to their importance and pointed out the isolation of HIV in the sera of patients in four countries, the formulation of two sets of reference sera for HIV, the development of a diagnostic test for HIV using recombinant antigens, and the development of monoclonal antibody tests for the diagnosis of hepatitis-B and malaria. This was achieved with very meager resources (approximately US\$200,000) and two years of work, which may be considered an exemplary experience.

With regard to the general situation of the Grants Program, the Committee mentioned the need for maintaining strict scientific criteria for all proposals submitted and recommended that advisory services be increased in order to improve the quality of the projects in less developed areas. It also recommended that the ceiling of US\$20,000 be reviewed for every project, in addition to the rule that prohibits increasing the salaries of the principal investigators. It suggested that intercountry collaborative projects be promoted that combine the work of high-level institutions of excellence with emerging groups.

The Committee emphasized the need for better coordination between the Grants Program and other PAHO research support activities so that the funds earmarked to support the training of human resources and institutional strengthening would be related to grants to projects in priority areas, thereby maximizing efforts that are poorly articulated at the present time. Recognizing the strategic importance of the training of

human resources, the Committee recommended designating a specific number of long-term fellowships for the training of investigators in centers of excellence at the doctorate and postdoctorate level in biomedical and social sciences, epidemiology, and research on health systems and services.

With respect to the initiative for the development of SIREVA, the Committee initially analyzed the prospects for the development of vaccines in Latin America, pointing out the difficulties in implementing a program of this nature, such as the lack of linkage between programs for the development of science and technology and those for economic and social development, the predominance of research based on individual interests and not on common goals, the lack of financial and human resources, and the lack of a tradition of intercountry cooperation. Notwithstanding these difficulties, elements favorable to an initiative of this kind were identified, such as the progress of scientific knowledge, which is making it possible to develop new, more effective vaccines at low cost; the success of the mass vaccination programs; the expression of political will to strengthen the scientific and technical capacity of the Region in this area in national and international forums; and the relative lack of commercial interest on the part of large companies to develop vaccines for diseases prevailing in the Region.

After a discussion of the goals and strategies of SIREVA and the activities already in progress for its implementation, the Committee manifested its full support for the initiative, recognizing its timeliness and importance, both for scientific and technical development and for basic public health needs. It recommended that the spectrum of candidate vaccines should be expanded as much as possible so as to achieve a better balance between bacterial, viral and parasitic vaccines, not only by virtue of the importance of these diseases, but also because of the need to expand and improve knowledge and technologies in the three fields. Other recommendations referred to strengthening the interest of the countries of the Region in making a political commitment to participate in this initiative; to promoting, concomitantly, the development of vaccines, the development of diagnostic methods for epidemiological studies, and field tests; and to strengthening the linking of relations between universities, companies, financing agencies, and other institutions. Finally, the Committee recognized that the principles that guide SIREVA should also guide behavior with regard to vaccines in general, and not only for those already selected. Experimentation with candidate cholera vaccines would be an example in this regard.

With respect to another PAHO initiative in an area selected for its strategic interest, the Committee

analyzed the HSSR and there was specific discussion of the contribution of the social sciences to HSSR, both with respect to new thematic nuclei and to new approaches and methodologies. It was recognized that along with the exhaustion of old paradigms and the surmounting of false dilemmas such as structural analyses versus microanalysis, an eclectic approach is gathering strength among social scientists that seeks to integrate several prospects as a means of expanding future possibilities. PAHO's initiative in this area seeks to take advantage of these possibilities by selecting the implementation of local health systems as the central theme, which should be understood as areas for the encounter of various rationales, essentially consisting of those deriving from the health institutions and those forged by diverse social groups. This perspective makes it possible to focus on the study of the transactions that take place between these rationales, which in turn should orient the organization of local health systems that minimize the differences between both and create the conditions for a synthesis to neutralize them.

The Committee showed its interest in this approach, strengthening the commitment to change inherent in HSSR and recommending that it should be promoted on the basis of a strategy of articulation between academic groups and the health services. It conceded that although local health systems should continue to be considered as the main objective, other subject areas should also be included, such as those that refer to the impact of the

adjustment measures and the process of privatization of the health services, among others. Finally, the Committee mentioned the importance of seeking bridges between PAHO initiatives related to the biological area, such as SIREVA, and those that promote HSSR. Articulation between both would permit greater integration of biological and social approaches and result in mutual enhancement.

Other Subjects

Other subjects were reviewed during the meeting, such as the activities being carried out by RIDALC, which has been recognized as an important mechanism of exchange for the training of researchers that should be taken better advantage of by the countries and by PAHO. Also discussed were some of the activities of the Regional Office for Science and Technology from UNESCO; the activities of the Global Advisory Committee on Health Research of WHO, particularly those being carried out in implementation of resolution on health research approved at the last World Health Assembly (WHA 43.19); and the activities of the Study Group on Health Research for Development, set up to implement the recommendations of the International Commission for Health Research.

(Source: Office of Health Research Coordination, PAHO.)

Diseases Subject to the International Health Regulations

During year 1991, **Bolivia** reported a total of 83 cases of yellow fever and 52 deaths, from the Departments of Cochabamba (3 cases and 2 deaths), La Paz (15 cases and 15 deaths), and Santa Cruz (65 cases and 35 deaths). **Brazil** reported a total of two cases of yellow fever and two deaths from Pará State. Ecuador reported a total of 19 cases of yellow fever and 10 deaths, from the Provinces of Morona Santiago (2 cases and 2 deaths), Napo (9 cases and 5 deaths), Pastaza (4 cases and 3 deaths), and Zamora Chinchipe (4 cases and no deaths). In the **United States of America**, 6 cases of plague have been reported, from the State of Arizona (one case), Colorado (two cases), New Mexico (one case) and Utah (two cases). For information on reported cholera cases and deaths, see article on cholera situation in this *Bulletin*.



PAN AMERICAN HEALTH ORGANIZATION
Pan American Sanitary Bureau, Regional Office of the
WORLD HEALTH ORGANIZATION
525 Twenty-third Street, N.W.
Washington, D.C. 20037, U.S.A.