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Infant Mortality in the Americas

Background

It is the general consensus that health is both a product and a determinant of the overall developmental process, which has as its goal the common welfare. Increasing recognition is given to the close relationship between traditional indicators of health and factors in the socioeconomic environment, such that the former have come to be considered indices of social development. Infant and preschool mortality rates are especially viewed as such because of their attendant emotional overtones.

The relationship between the number of deaths among children under one year and the number of live births in the same period has a significance that transcends the mere interpretation of the vital statistics contained in the numerator and denominator. The fact that the infant mortality rate in one country is 60 per 1,000 live births and 15 in another not only points to biological phenomena but also suggests the influence of housing, nutrition, education, environmental health, and other aspects that characterize the style and quality of life within a particular society.

Recent years have seen the development of technologies to prevent and successfully treat the pathologies that cause a large number of infant deaths. Application of these technologies in developed countries brought about a significant and continuing decrease in mortality at an early age. This stirred great hopes in developing countries, where deaths due to these preventable diseases represented more than 60% of total deaths. It was then possible to envision a large reduction in mortality by applying "appropriate technologies" long before achieving changes in the conditions of socioeconomic underdevelopment prevailing in those countries. It was thought that "mortality trends are distinctly neutral with respect to socioeconomic events. Economic misery is no longer an effective barrier to a vast emergence of possibilities for survival in the underdeveloped areas" *(1)*. This thought, which Stolnitz expressed in the 1960s, seems overly optimistic in view of the results observed for that decade in Latin America. In the course of analyzing the goals the countries set for that period, the Pan American Health Organization found that barely one-third of the targed 50% reduction in infant mortality had been met: infant mortality was reduced by 18% in Middle America and 24% in South America *(2)*.

More accelerated progress began in 1970, however, especially in those countries that undertook integrated health programs emphasizing preventive measures and the application of appropriate technologies for maternal and child care. The decrease was more rapid in almost

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all of those countries, ranging from 2% to 86% during the period 1971 to 1975. Four showed reductions over 50%, thus reaching their goal for the decade. Ten countries achieved reductions of more than 30%. All the countries under consideration achieved their own national goals, which were set according to feasibility at the beginning of the decade.

In regard to mortality levels in children in the first years of life, Latin America and the Caribbean is in an intermediate position between the developed countries and Africa and Asia, with lower levels than the latter two regions. Latin America and the Caribbean is a region in transition, with relatively developed health systems and average coverage that provide numerous possibilities for the widespread application of appropriate technologies. As a result, it is interesting and useful to study mortality in this age group, since it yields greater results at lower cost.

Various deficiencies in record-keeping for both live births and deaths have, unfortunately, limited an adequate understanding of infant mortality. The lower the age, the fewer deaths are recorded, so that data on mortality from 1 to 4 years are generally more reliable than are data on neo- and postneonatal mortality.

The difficulties and valid limitations that must be considered when analyzing a numerical figure are multipled when interpreting differentials between countries with different recording systems and levels of development. Nonetheless, the consideration of the available figures provide interesting information. In the developing countries, knowing how to interpret health indicators correctly, despite their limitations, has been a constant challenge.

In recent years, infant mortality has decreased in all countries in the Region of the Americas. This decrease has not been even in all countries, and the disparity is repeated in the separate subregions.[1]

When the subregions are ordered according to the decrease they have experienced in infant mortality rates for the periods 1970-1975 and 1980-1985 (Table 1), Northern America appears in first place, with a 33%

Table 1. Infant mortality rate in the subregions of the Americas for the periods 1970-1975 and 1980-1985.

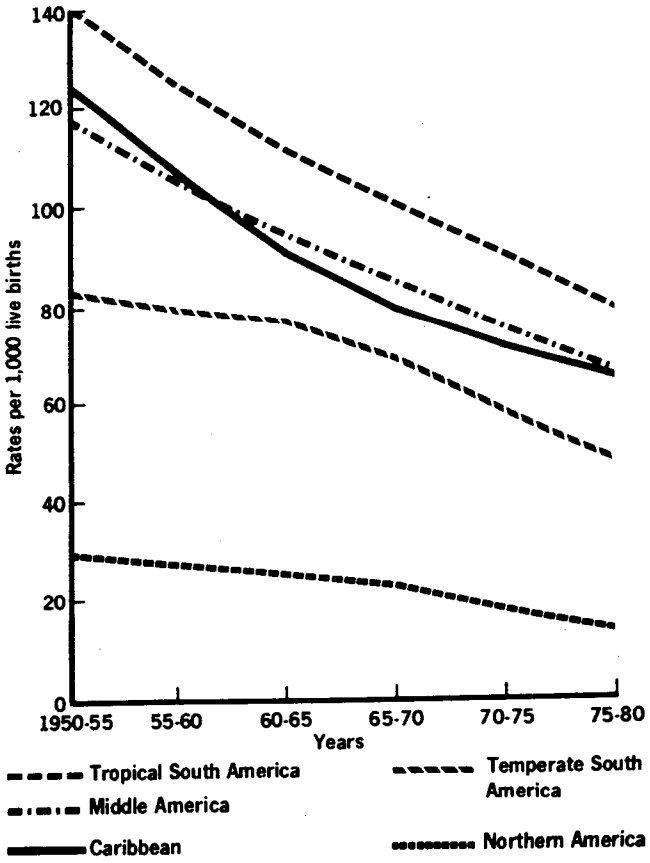
Percentage of observed decrease	Subregion	Infant mortality rate	
		1970-1975	1980-1985
33	Northern America	17.9	12.0
26	Temperate South America	56.4	41.8
25	Middle America	74.6	56.3
23	Tropical South America	90.7	69.7
18	Caribbean	70.7	57.8

Source: Maternal and Child Health Program. PAHO.

decrease; Temperate South America appears second with 26%; Middle America appears third with 25%; Tropical South America appears fourth with 23%; and the Caribbean appears fifth and last with 18%. Figure 1 illustrates the trend in the infant mortality rate for 1950-1955 and 1975-1980.

The disparity in the decline in infant mortality is also reflected in the different values for this indicator in Northern America and the other subregions. Comparison of mortality in Northern America with that in Tropical South America for the respective two periods in-

Figure 1. Trends in infant mortality in the subregions of the Americas, from 1950-1955 to 1975-1980.



[1]Subregions: *The Caribbean:* Anguilla, Antigua and Barbuda, Bahamas, Barbados, Cayman Islands, Cuba, Dominica, Dominican Republic, Grenada, Guadeloupe, Haiti, Jamaica, Martinique, Montserrat, Netherlands Antilles, Puerto Rico, Saint Christopher and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago, Turks and Caicos Islands, Virgin Islands (UK), Virgin Islands (US). *Middle America:* Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama. *Northern America:* Bermuda, Canada, United States of America. *Temperate South America:* Argentina, Chile, Uruguay, Falkland Islands. *Tropical South America:* Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Paraguay, Peru, Suriname, Venezuela.

Table 2. Infant mortality rates per 1,000 live births in some countries of the Americas, 1960-1985.

Country	1960-1965	1965-1970	1970-1975	1975-1980	1980-1985
Argentina	59.7	57.4	51.3	47.2	43.2
Barbados	60.8	46.4	33.8	27.0	25.5
Bolivia	157.5	151.3	151.3	138.2	124.4
Brazil	109.4	100.1	94.9	82.4	72.4
Canada	26.3	21.3	16.4	12.2	10.4
Chile	107.0	89.8	69.5	46.3	40.0
Colombia	84.5	74.2	66.9	59.4	53.3
Costa Rica	70.6	60.3	50.9	29.3	25.7
Cuba	38.7	39.2	33.8	22.5	20.4
Dominican Republic	110.0	96.3	83.6	73.1	65.5
Ecuador	132.3	114.5	100.1	86.0	77.2
El Salvador	128.0	112.0	101.0	86.0	77.2
French Guiana	–	–	57.6	47.9	40.5
Guatemala	128.1	115.3	90.2	79.0	67.7
Haiti	170.5	150.3	134.9	120.9	108.2
Honduras	136.8	124.0	110.7	95.4	81.5
Jamaica	54.4	47.0	42.0	30.1	26.2
Martinique	47.7	42.5	34.8	23.0	21.0
Mexico	86.3	78.5	68.6	59.8	52.1
Nicaragua	136.4	122.2	108.9	96.5	84.5
Panama	55.5	46.7	43.8	36.2	32.5
Paraguay	80.6	66.9	52.6	48.6	45.0
Peru	152.2	132.7	106.5	93.5	81.9
Suriname	63.5	54.6	46.7	39.2	33.8
Trinidad and Tobago	48.0	45.0	40.4	34.8	29.9
Uruguay	47.9	47.0	46.3	41.7	37.6
United States	25.2	22.2	18.1	14.0	12.1
Venezuela	76.9	64.9	52.4	44.8	38.6

Sources: Maternal and Child Health Program, PAHO. Mortality and Health Policy. Rome: CELADE, April, 1983. (IESA/ICP. 1984/EGIV/12).

dicates that the rates were 5.3 and 5.8 times higher in Tropical South America; the gap between countries with low and high infant mortality is widening.

The analysis by country (Table 2) indicates a general decrease in mortality, although there are significant fluctuations for individual countries. In Bolivia, for example, the decrease is only 21%, while it is 64% in Costa Rica.

During the period 1970-1975, seven countries had infant mortality rates in excess of 100 per 1,000 live births. Bolivia had the highest rate, with over 150 per 1,000. Canada and the United States were the only countries with infant mortality rates under 30.

For the period 1980-1985, only two countries in the Region show mortality rates over 100 (Bolivia and Haiti); nine countries have rates below 30. Only eight countries have mortality rates over 70, but 47% of the population of Latin America and the Caribbean lives in these countries which are all in the tropical region. In contrast, mortality ranges between 37 and 43 deaths per 1,000 births in Temperate South America.

At the beginning of the 1980s, two Latin American countries, Cuba and Costa Rica, had achieved rates below 20 per 1,000 live births. The records for both countries are considered reliable.

Neonatal and Postneonatal Mortality

It is common practice in analyzing infant mortality to break down mortality for children under one year of age into neonatal (under 28 days) and postneonatal (28 days to 11 months, 29 days). It is also commonly accepted that neonatal death is related more to biological factors (endogenous mortality), while postneonatal death is principally linked to factors related to socioeconomics and harshness of the environment (exogenous mortality). It is thus considered more difficult to reduce neonatal mortality, and significant efforts on the part of the more complex institutionalized services are required to do so. Postneonatal mortality could be significantly reduced by applying basic health care methods along with improvements in socioeconomic conditions. The study of postneonatal mortality is therefore of interest in characterizing levels of infant health.

Table 3 shows that only six countries had higher neonatal than postneonatal mortality rates in 1968. The number of countries increased to 15 in 1978, largely due to reduced mortality for the postneonatal group.

A comparison of neonatal mortality rates for 1968 and 1978 shows decreases in most countries. The decrease was most notable in Ecuador and Chile, which reduced neonatal mortality by 15 and 13 deaths per 1,000 live births, equaling a percentage reduction of 48% and 41%, respectively.

The same decreasing trend is noted for postneonatal mortality, but the changes are even more dramatic than they are in neonatal mortality. Chile showed the greatest decrease in the postneonatal mortality rate which went from 52 to 20 deaths per 1,000 live births (a percentage reduction of 61%).

It is difficult to study the causes of death for infants under one year because of problems involving underregistration and the absence of a death certificate. In addition, it is even more difficult to analyze the causes of death for infants under one year and children aged 1 to 4 in the developing countries of the Region because a large number of these deaths is categorized as being due to causes that are "ill-defined" or "unknown." For a selected group of countries, the percentage of deaths included under this category varied from 5 in Barbados, to 29 in Nicaragua, and to 30 in Ecuador. The effect that problems in classifying data have on the levels and trends for each specific cause of death is unknown. This should be kept in mind when analyzing specific health problems for infants under one year.

Table 3. Neonatal and postneonatal mortality rates per 1,000 live births in countries of the Americas for the years closest to 1968 and 1978.

Country	Neonatal mortality		Postneonatal mortality	
	1968	1978	1968	1978
Antigua	12.4	14.1	18.3	8.2
Argentina	25.7	22.2	35.4	18.6
Bahamas	32.9	21.7	13.0	14.0
Barbados	–	21.7	–	7.2
Belize	23.3	–	28.5	–
Bermuda	15.2	14.8	8.1	–
Canada	13.9	8.2	5.4	4.1
Cayman Islands	–	13.9	–	10.4
Chile	31.6	18.5	51.8	20.2
Colombia	–	18.8	–	20.5
Cuba	23.1	14.6	15.9	7.9
Dominica	23.4	15.0	34.5	6.9
Dominican Republic	–	15.9	–	14.9
Ecuador	30.4	15.9	55.7	41.6
French Guiana	13.7	–	33.8	–
Guatemala	–	29.6	–	42.6
Honduras	9.7	9.8	24.3	21.5
Martinique	–	9.8	–	13.0
Mexico	23.5	21.7	40.7	35.3
Montserrat	–	33.6	–	8.4
Nicaragua	11.9	5.5	41.2	16.3
Panama	19.9	17.6	19.7	15.3
Paraguay	–	–	–	–
Peru	26.5	–	40.5	–
Puerto Rico	–	16.3	–	4.5
Saint. Christopher and Nevis	–	22.6	–	18.9
Saint Vincent and the Grenadines	–	17.9	–	20.2
Saint. Lucia	–	13.5	–	15.7
Suriname	–	32.5	–	11.0
Turks and Caicos Islands	–	17.1	–	–
United States	16.1	9.5	5.6	4.3

Source: Statistics Office of PAHO.

Table 4 shows the distribution of deaths in children under one year and from 1 to 4 years, according to groups of causes. Group A includes causes involving the respiratory system, excluding tuberculosis; Group B includes causes involving the digestive system, including enteritis and dysentery; Group C includes causes of perinatal mortality; Group D includes infectious and parasitic diseases; Group E includes accidents and other violent deaths; Group F includes neoplasms; Group G includes other causes, excluding ill-defined causes; and Group H includes ill-defined and unknown causes.

Following the classification proposed by Erica Taucher *(3)*, groups A, B, and D can be considered particularly susceptible to reduction through basic health measures such as oral rehydration and sanitation, early treatment at the primary level, and vaccination. In contrast, the causes of perinatal mortality require more complex and costly care and could be reduced when services are more developed. The discrepancy between the overall decrease in infant mortality and the percentage increase for death due to perinatal causes is an indirect measure of the effect of basic health care activities.

If perinatal deaths around 1979 are excluded, the most significant group of causes was B (diseases of the digestive system) which reached 25% in El Salvador, 25% in Mexico, 37% in Nicaragua, and 28% in Trinidad and Tobago. Group A, diseases of the respiratory system, appeared in first place in Colombia with 24%, Guatemala with 22%, and Mexico with 30%.

Excluding perinatal causes, it can be said that groups A, B, and D are still responsible for 45% of deaths in the first year of life where the diagnosis was recorded (these groups represented more than 70% at the end of the last decade).

General Comments

This study summarizes and analyzes relatively recent data on infant mortality in the Americas. The purpose is to update the figures, outline the trends observed over recent decades, note some changes in the pattern of infant deaths, and evaluate the effect that certain

health measures and programs have on changes in infant mortality. Although an overview of the Region indicates significant progress in terms of the coverage and validity of records, considerable imprecision and omission persist. Conclusions must therefore be drawn with caution.

In the 1970s, the large majority of countries in the Region experienced decreases in infant mortality at a more accelerated pace than in the preceding decade. Nonetheless, great differences still exist among the subregions and even among countries within the same subregion. It is also known that there are extreme variations in infant mortality in each country, and that in Latin America and the Caribbean there are large segments of the population in which children are exposed to avoidable high risks.

In general, the achievements of the 1970s in Latin America and the Caribbean exceed those of the 1960s. Reductions in infant mortality have occurred despite an unfavorable economic environment and sometimes, in countries whose socioeconomic evolution is regressive. Given a trend of increasing unemployment and decreasing distribution of income during that period, one would predict at least stagnation in the infant mortality figures, had the relationship between economic factors and health sector variables observed in the 1960s continued *(4)*.

Health measures alone cannot determine the level

Table 4. Percentage distribution of deaths in children under one year and from 1-4 years, by specific groups of causes,[a] in selected countries of the Americas, around 1979.

Country	Year	A	B	C	D	E	F	G	H	Total
					Under one year					
Argentina	1979	11.8	10.4	37.0	10.0	2.5	0.3	13.6	14.4	100.0
Barbados	1978	16.0	4.0	48.0	11.2	3.2	1.6	10.8	5.2	100.0
Colombia	1977	23.7	23.2	22.0	8.9	1.0	0.2	9.9	11.1	100.0
Costa Rica	1979	12.7	9.8	38.1	7.2	1.4	0.8	8.2	21.8	100.0
Cuba	1978	14.2	8.7	43.1	6.9	b	0.4	6.1	20.6	100.0
Dominican Republic	1978	8.3	17.2	17.5	14.4	0.6	0.2	11.0	20.8	100.0
El Salvador	1974	14.7	25.1	16.1	6.0	0.4	0.1	7.6	30.0	100.0
Guatemala	1978	21.7	19.2	29.1	10.6	b	0.1	5.8	13.5	100.0
Mexico	1976	30.1	25.3	17.3	6.9	2.0	0.2	3.0	15.2	100.0
Nicaragua	1977	10.2	36.5	2.1	14.4	0.7	0.2	7.3	28.6	100.0
Trinidad and Tobago	1977	13.8	27.5	40.8	2.0	2.2	0.2	7.0	10.9	100.0
Uruguay	1978	7.9	11.7	42.9	7.4	1.9	0.2	8.2	19.8	100.0
Venezuela	1978	11.8	18.0	32.5	8.5	2.8	0.2	9.0	17.2	100.0
					From 1 to 4 years					
Argentina	1979	13.4	10.9	–	11.9	17.8	5.0	9.7	31.3	100.0
Barbados	1978	34.6	–	–	–	19.2	15.4	7.7	23.1	100.0
Colombia	1977	23.7	23.0	–	17.4	7.3	1.2	3.7	23.8	100.0
Costa Rica	1979	13.1	10.2	–	15.3	21.1	4.0	3.6	32.7	100.0
Cuba	1978	20.5	6.3	–	12.3	b	8.4	5.9	46.6	100.0
Dominican Republic	1978	14.3	16.8	–	9.7	5.1	0.7	4.7	48.7	100.0
El Salvador	1974	11.8	31.8	–	6.1	2.5	0.4	2.7	44.7	100.0
Guatemala	1978	19.6	31.6	–	22.2	b	0.3	5.6	20.7	100.0
Mexico	1976	24.0	26.1	–	16.8	7.7	0.9	4.3	20.2	100.0
Nicaragua	1977	9.5	31.0	–	19.7	4.4	0.7	3.1	31.6	100.0
Trinidad and Tobago	1977	15.0	35.3	–	1.5	21.1	3.0	7.5	16.6	100.0
Uruguay	1978	11.8	8.3	–	4.8	21.4	8.7	8.8	49.4	100.0
Venezuela	1978	19.4	16.4	–	10.8	13.6	2.6	10.6	26.6	100.0

Source: Health Conditions in the Americas, 1977-1980. Washington, D.C.: Pan American Health Organization, 1983. (Scientific Publication No. 427).

[a]The groups are defined as follows:

A - Causes related to the respiratory system, excluding tuberculosis (ICD-9, 460-519);
B - Causes related to the digestive system, including enteritis and dysentery (008, 009, 520-579);
C - Perinatal mortality (760-779);
D - Infectious and parasitic diseases (000-007, 010-136);
E - Accidents and other violent deaths (E800-E999);
F - Neoplasms (140-239);
G - All other causes, except ill-defined and unknown diseases; and
H - Signs, symptoms, and ill-defined morbid conditions and unknown causes (780-799).

[b]Included in Group G.

of infant mortality, and in no way can they be considered a permanent remedy to the social inequalities and incongruities that accompany underdevelopment. Data that reflect a reduction in infant mortality should be viewed cautiously while seeking, on the one hand, to determine the validity of the data and, on the other, to analyze the effect of certain conceptual and technological advances on health services delivery.

Since the end of the 1960s, some Latin American and Caribbean countries have begun to formulate and apply a health services concept with a predominantly preventive focus, which emphasizes basic and highly effective measures, promotes the use of appropriate technologies, and seeks to involve the community. These ideas are contained in the strategy for primary health care already outlined in the III and IV Special Meetings of the Ministers of Health in the Americas held in 1972 and 1977, respectively *(5)*. The International Conference on Primary Health Care at Alma-Ata, USSR in 1978 *(6)* signified worldwide endorsement of this concept. At that Conference, various countries of the Americas gave an account of their achievements in applying the strategy for primary care. The effect of the primary health care strategy should be taken into account in any analysis of mortality trends in Latin America and the Caribbean over the past decade. Such an analysis should shed light on the strategy's effectiveness in different social situations and in different developmental contexts.

In this respect, it is appropriate to ask what has been the effect of modern technology in preventing and treating disease, especially that which is systematized under the primary health care measures concept. Changes in the relative importance of different causes of death, as well as the decrease in deaths because of the application of specific techniques, suggest that the health sector's ability to reduce infant and preschool mortality has increased. This reduction would seem to derive from the health sector's real and increased capacity to apply its knowledge to wider segments of the population and to place priority on those who are exposed to greater risks *(7)*. The experiences of various countries in the Region point to a possible broadening of the effects of health intervention in infant mortality, which implies greater responsibility on the part of the health sector and its leaders. Failure to respond appropriately would be even more condemnable because effective tools for reducing infant deaths are available.

While the data presented permit only a preliminary understanding of the problem, they do provide a valid direction for research that should be undertaken to analyze the infant mortality problem in greater depth. This research would include case studies in countries that apply these technologies; studies of programs using them in defined geographical areas; an exhaustive study of the reciprocal relationships between economic development, distribution of income, employment, and community behavior; and the evaluation of technologies applicable to other diseases that are considered highly important factors influencing infant mortality.

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For additional bibliographic references on this topic, consult: Maternal and Child Health Program (HPM), PAHO, 525 Twenty-third Street, N.W., Washington, D.C. 20037, USA.

(Source: Maternal and Child Health Program, PAHO.)

Diseases Subject to the International Health Regulations

Cholera, yellow fever, and plague cases and deaths reported in the Region of the Americas up to 31 August 1984.

Country and administrative subdivision	Cholera cases	Yellow Fever		Plague cases
		Cases	Deaths	
BOLIVIA	–	*5*	*5*	*12*
La Paz	–	5	5	12
BRAZIL	–	*41*	*24*	*9*
Amazonas	–	9	8	–
Bahía	–	–	–	2
Ceará	–	–	–	5
Minas Gerais	–	–	–	2
Pará	–	31	15	–
Rondônia	–	1	1	–
COLOMBIA	–	*7*	*7*	–
Arauca	–	1	1	–
Casanare	–	1	1	–
Cesar	–	1	1	–
Cundinamarca	–	1	1	–
Meta	–	2	2	–
Santander	–	1	1	–
ECUADOR	–	–	–	*6*
Chimborazo	–	–	–	6
PERU	–	*19*	*15*	*145*
Ayacucho	–	1	1	–
Cajamarca	–	–	–	108
Huánuco	–	12	9	–
Junín	–	3	3	–
Madre de Dios	–	1	1	–
San Martín	–	2	1	–
Piura	–	–	–	37
UNITED STATES	–	–	–	*18*
Arizona	–	–	–	1
California	–	–	–	5
New Mexico	–	–	–	8
Texas	–	–	–	1
Utah	–	–	–	2
Washington	–	–	–	1

American Visceral Leishmaniasis in Colombia

The first case of American visceral leishmaniasis (AVL) known in Colombia was described by Gast Galvis to the National Academy of Medicine in 1944, and consisted of a finding in viscerotomy material from the Department of Santander. Later (1968) three cases of the disease were reported in the same Department (Gómez Vargas), and three more in the Departments of Santander and Cundinamarca (Castillo *et al.).*

Epidemiological studies in 1971 at Melgar and Coyaima, Department of Tolima (Corredor, Osorno, and Parra) revealed the following:

- The phlebotomines were represented chiefly by *Lutzomyia longipalpis* (mosquito) as in the foci studied by other workers in the Departments of Cundinamarca, Huila, and Tolima; and secondarily by *L. trinidadensis, L. rangeliana, L. gomezi,* and *L. cayennensis.*
- *L. longipalpis* was always found in the hollows of rocks, in shelters adjacent to dwellings, and was not seen at altitudes above 900 m.
- In El Aguila (Melgar), 15% of the dogs were infected, and in that of Santa Marta (Coyaima), 3.8%.
- In Santa Marta 10.6% of the human population showed titers above 1:20 by the complement-fixation test using BCG antigen. Reactions to the complement-fixation test for Chagas' disease were obtained for 25% of the population.

The antigen used in the complement-fixation test was the ketone extract of the BCG tubercle bacillus or of *Mycobacterium butyricum.* The test is highly sensitive, yielding results in cases that have been progressing for less than three months. It also gives cross reaction with leprosy, tuberculosis, Chagas' disease, and tegumentary leishmaniasis.

In Colombia AVL foci are located in areas in the consolidation phase of the malaria eradication campaign (Figure 1). This bears out the assumption that the disease has existed for years in that country, and its diagnosis must have long been masked by the visceral forms of malaria. It has become possible to diagnose cases of AVL more frequently in malarious areas in which the frequency of malaria has been reduced.

During the four years (1958-1962) of the attack phase of the antimalaria campaign using DDT spraying, the peridomestic transmission of leishmaniasis ceased, but a cycle of transmission continued among foxes and other animals in the wild. Within an indeterminate period following the suspension of spraying in October 1962, peridomestic transmission resumed, and canine and human cases reappeared.

The masking of this entity by malaria and the fact that it is not regarded as a diagnostic option suggest that many patients die of this pathology as the result of erroneous diagnoses.

A compilation of the cases on record from 1944 to 1980 by Corredor, Ronderos, and Rey contains 107 cases verified by clinical examination and by smear or culture in the laboratory (Table 1). The rural distribution of the disease covers the Upper Magdalena River Valley, the principal focus spanning the border areas between the Departments of Cundinamarca and Tolima and between Tolima and Huila, the central part of the Department of Santander, and Ovejas Municipality in the northwestern Department of Sucre.

What follows refers only to the five-year period 1976-1980, for which the available information is more complete. There are no exact data on the population exposed to AVL, since the foci discovered are in rural populations with no census. Moreover, other foci are believed to exist, but have not been identified owing to the limitations stated above.

Figure 1. Visceral leishmaniasis foci in Colombia, 1944-1980.

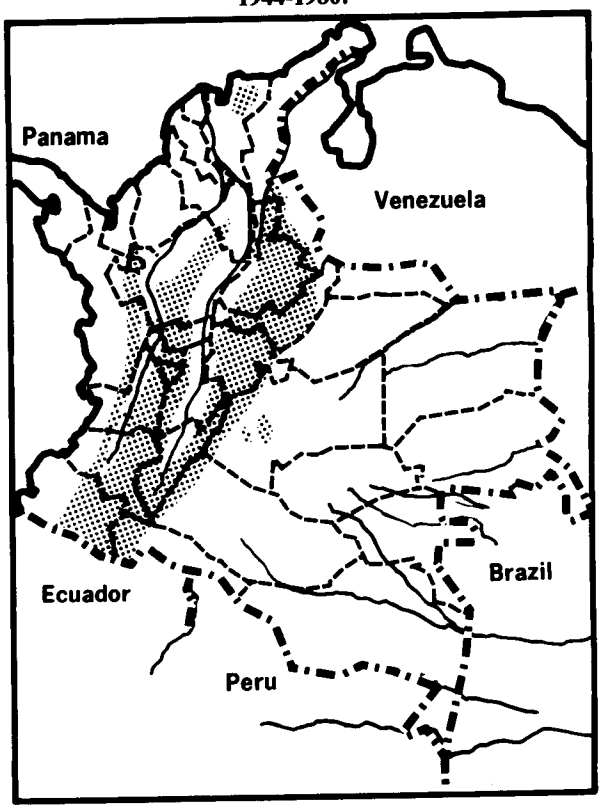

Table 1. Distribution of American visceral leishmaniasis by age groups and place of origin, Colombia, 1944-1980.

Place of origin	Age groups				%	Total
	-1	1-4	5-14	15+		
Tolima	10	32	6	1	45.8	49
Cundinamarca	7	15	3	3	26.2	28
Huila	2	15	3	1	19.6	21
Santander	-	2	2	2	5.6	6
Sucre	-	2	1	-	2.8	3
Total	19	66	15	7	100.0	107

In recent years an increase in AVL reporting has been observed in Colombia. This is probably because of the launching of the specific case-finding program which has increased the availability of therapeutic care at the regional level, medical and paramedical education on the salient characteristics of the disease, and the dissemination of educational information in the communities, resulting in increased numbers of early diagnoses.

The hardest hit group during the five-year period (1976-1980) was that of children under five, who accounted for 86.5% of all cases. In this group, the incidence among infants under one year (1.75/100,000 inhabitants) exceeds the incidence among children 1-4 years (1.67/100,000 inhabitants) even though in terms of absolute numbers the reverse may appear to be the case. Since in these rates the denominator is the population at large and not the population at risk (that living in rural areas at an altitude below 900 m, where the vector is present), the specific rates are presumably much higher and point to a public health problem in the endemic areas.

The fact that children under five years of age are the most severely affected group is in line with the pattern in Brazil, Venezuela, and the subtropical zone. Several explanations for this have been outlined. One is that immunity to AVL correlates directly with the time of exposure, which would imply a high probability of immunity in adults and greater susceptibility to the disease in children.

It could also be that *Leishmania infantum* of the Mediterranean region and *L. chagasi* of the Americas strike children under five because of some characteristic in children that makes them susceptible to the infection, unlike *L. donovani,* which attacks individuals of all ages. Moreover, the infectivity of *L. chagasi* depends on the parasite strain, the susceptibility of the host, and other vector-related mechanisms.

It would seem that under natural conditions not all infections progress toward a clinical picture of visceral leishmanisis. Some cases are benign, asymptomatic, and result in spontaneous recovery yet acquire immunity.

In leishmaniasis, sterilizing immunity is imparted by cell-mediated reactions. From the appearance of the very first symptoms of the infection, leishmania antibodies can be detected. As the disease progresses, unspecific antibodies increase greatly along with specific ones, and are accompanied by a rise in gamma globulins and a reduction of albumins. Humoral antibodies do not sterilize, and the cure is concurrent with the appearance of cell immunity, delayed hypersensitivity, and resistance to reinfection.

(Source: Parasitology Section, National Institute of Health, Ministry of Health, Colombia.)

Editorial Comment

American visceral leishmaniasis is a generalized chronic infectious disease characterized by fever, hepatosplenomegaly, lymphadenopathy, anemia with leukopenia and progressive weakness, which produces high mortality among children. It is a zoonosis of canines, both wild (foxes) and domesticated (dogs), in which the infection is transmitted from animal to animal by *Lutzomyia longipalpis,* which bites both foxes, and dogs and man.

Man is an occasional host when he enters the vector's food chain. The leishmanias that cause visceral leishmaniasis are currently classed in three well-defined groups: *Leishmania donovani* (Laveran and Mesnil, 1903), *L. infantum* (Nicolle, 1909), and *L. chagasi* (Marqués de Cunha and Chagas, 1937).

This protozoosis was first diagnosed in 1913 by Migone in Paraguay in a patient from the State of Mato Grosso, Brazil. Since then it has been recorded in equatorial, tropical, and subtropical climates of the Americas, specifically in Argentina, Bolivia, Brazil, Colombia, Ecuador, El Salvador, French Guiana, Guatemala, Honduras, Mexico, Suriname, Paraguay, and Venezuela. Incidence is greatest in rural areas and in the peripheral sections of cities that retain certain rural features.

Identified AVL foci are located in mountainous regions at altitudes not usually above 800 m. The topography in these areas is generally rugged—valleys alternating with mountain spurs—and the climate is dry or moderately humid. These topographical features char-

acterize foci described in Brazil, Venezuela, Central America, and Colombia.

For proper control of the disease, countries with areas in which AVL is endemic should encourage the following activities:

Diagnosis. To the extent possible, the use of the fluorescent antibody technique (FAT) should be adopted as a standard procedure. Other serologic techniques, such as the enzyme-linked immunosorbent assay (ELISA), can be introduced.

Information Analysis. There must be increased epidemiological analysis and interpretation of collected data, with every effort made to avoid duplicate records. Analysis must emphasize the trend of the disease over time for places of incidence, most severely affected age groups and sex, social factors involved, etc. Maps should also be prepared showing the geographic distribution of the endemic foci.

Antibody Levels. Some positive cases can be monitored clinically and serologically to determine the levels and duration of specific post-treatment antibodies in the serum.

Special Epidemiological Studies. Serologic studies using the FAT or ELISA should be done to evaluate the prevalence and distribution of infection. These data can be entered on maps of irrigation zones, land use, and phytogeography.

Search for Reservoirs: It is recommended that the following studies be attempted:

- a study of the flora and fauna in the endemic area,
- special serologic and parasitologic studies in stray dogs to find signs of infection,
- examination of foxes and rodents in endemic and adjacent areas, and
- isolation and characterization of the leishmania in these animals.

Entomologic Studies. A well-conducted entomologic study should be done in an attempt to distinguish the vectoral densities of the different species of phlebotomi, their geographic and seasonal distributions, the preferred host of each species, and the vectoral capacity.

Vaccines: The Way Ahead[1]

Communicable diseases caused by parasites, bacteria, and viruses continue in the 1980s to impose a major burden of morbidity, mortality, and disability on the world's populations. The greatest hope of reducing this toll lies in immunization.

Acute diarrheal diseases are widespread and are the cause of more than 4.5 million deaths a year in children less than six years old; acute respiratory infections cause over 2 million deaths a year; while malaria, schistosomiasis, and other tropical diseases in warmer climates and tuberculosis—mainly in poorer areas—are major scourges.

Future improvements in environmental and nutritional standards may reduce the incidence and severity of some of these diseases. New drugs and antibiotics for prophylaxis and therapy will, of course, continue to be developed, but many will lose their efficacy as the infecting organisms become resistant.

Passive immunity, conferred by the injection of preformed specific antibody, can last only while the antibody remains in the recipient. Such therapy or prophylaxis is expensive and brings its own range of undesirable side effects and is therefore not envisaged for general use.

In contrast, vaccination against viral and bacterial agents appears to be of wide applicability and is generally a safe procedure. Once economical methods are developed for their preparation, vaccines may be made in large quantities and usually cheaply. For example, trivalent live poliovaccine may cost a fraction of a dollar per dose. Immunity induced by one to three doses of vaccine is generally long lasting. Vaccination against parasitic diseases has still to be fully developed, but recent vaccines against malaria show considerable promise.

Mankind is now on the threshold of a new era in the technology of vaccine development and production, which stems from important advances in biotechnology, in particular recombinant DNA and cell fusion techniques. It offers hope of producing vaccines for many of the diseases that are yet uncontrolled and also of developing vaccines that are more effective, safer, and more cost-effective than those in current use.

[1]Reprinted from *World Health Forum* 4(4):408-413, 1983.

Conventional Vaccines

Classical immunoprophylaxis of bacterial and viral diseases may make use of inactivated vaccine or live attenuated vaccine. Sometimes both may be used simultaneously.

Inactivated vaccines consist of organisms treated physically or chemically to abolish infectivity and to remove many contaminating materials. Such vaccines have been sucessful against tetanus, diphtheria, pertussis, rabies, influenza, tick-borne encephalitis, Japanese encephalitis, and—more recently—meningococcal infections. Leprosy may soon be included in this list.

The efficient production of an inactivated vaccine generally requires, firstly, that the organism should be capable of cultivation *in vitro* so as to produce immunogenic quantities of the antigen; secondly, that an available inactivation procedure will destroy infectivity and/or toxicity, but retain antigenicity; thirdly, that the antigen can be suitably purified; and, finally, that the end product should elicit an immune state in man.

A unique case is hepatitis B vaccines. So far the only hepatitis B vaccines available are based on hepatitis B surface antigen (HBsAg), the viral surface antigen from human plasma, treated to remove unwanted plasma components and infectivity. Ultimate progress in the control of hepatitis B and its associated illnesses may depend on the new biotechnology.

The use of live attenuated organisms as vaccines has the potential advantage that the immune response generated is likely to resemble more closely that induced by natural infection, in contrast to the responses to inactivated vaccines. Live vaccines against tuberculosis, poliomyelitis, measles, rubella, mumps, and yellow fever are widely used. Live attenuated influenza vaccines are potentially valuable, but further research is required to establish their safety and efficacy.

A live attenuated vaccine must not induce significant disease, but it must replicate and induce an immune state. Further, attenuated vaccines must be genetically stable, since the appearance of genetic revertants of the original vaccine strain during production or in the vaccinee is clearly undesirable. Such an event has never yet been documented, but it should be emphasized that no live vaccine can be regarded as being absolutely safe. The degree of risk involved in the use of such a vaccine, however, is very much less than that arising from the disease it prevents. For live polio vaccines, a single case of vaccine-associated paralytic illness appears on average once every three million doses of vaccine administered.

Inactivated and live vaccines are prepared in batches using established seed strains of the organisms, and appropriate in-process control tests on the final product must be rigorously applied to ensure the safety and efficacy of the product. The World Health Organization formulates specific requirements for virtually all vaccines in regular use.

Although great progress has been made in the prevention and control of viral and bacterial diseases by the approaches described above, certain limitations are apparent as described in the following paragraphs.

Some organisms either do not grow *in vitro* or produce only small amounts of antigen. For example, the only source of hepatitis B antigen is human plasma from chronically infected persons. The production of the vaccine is technically complex and the yield is small. For products derived from human plasma there is a risk of contamination with pathogens present in donors. Indeed, the recent emergence of acquired immunodeficiency syndrome has focused much attention on the safety of blood-derived medicinal products.

The production of inactivated vaccines against highly pathogenic agents, such as those of African hemorrhagic fevers, may be hazardous to those engaged in this work.

There may be technical difficulties in detoxifying or inactivating vaccines. For example, in the early attempts to develop inactivated measles vaccine the viruses were treated with formalin. The resulting vaccine gave only partial or short-term protection but induced an abnormal immune state in recipients such that they developed severe atypical measles when subsequently infected with wild measles virus. Retrospective analysis suggested that formalin destroyed the fusion protein, one of the essential immunizing components of the virus.

As knowledge of the genetic basis of attenuation is meagre, vaccine strains have to be selected on arbitrary criteria. Live vaccine strains may have the potential to revert to virulence or to lose immunogenic activity. With greater knowledge of the genetic basis of virulence and the use of the new biotechnology, the selection of vaccine strains should improve.

Some viruses are associated with cellular transformation and potentially with the induction of malignancy. This is true of certain herpes viruses. Attenuated vaccines against these agents therefore call for rigorous safety tests.

Owing mainly to the complexity of the etiological

agents, little progress has been achieved in the control of parasitic diseases using conventionally produced vaccines. However, the new biotechnology may facilitate the development of vaccines against certain major parasitic diseases, in particular malaria.

Vaccine Development and the New Biotechnology

The new biotechnology has yielded two techniques of particular significance—the manipulation of defined coding sequences of DNA and their controlled expression in appropriate host cells and the use of cell fusion technology to produce immortal hybridoma cell lines that secrete monoclonal antibodies.

Recombinant DNA Technology

Genes that code for a specific product can be isolated and propagated by the insertion of naturally occurring or synthetic genetic material into a suitable vector organism, followed by the selection of individual clones of the vector that carry the required gene—the process of gene cloning. Most gene cloning work has been carried out in plasmids of *Escherichia coli*. Key steps in the process involve the insertion of the gene into the vector with the aid of highly specific restriction endonuclease enzymes, which cleave the vector DNA at predetermined sites, and ligases, which recombine the gene insert into the vector.

Techniques for the controlled expression of relevant microbial or cellular genes, after insertion into suitable vector systems, are now available. Using these methods, suitable cell systems can be made to produce defined microbial proteins or oligopeptides representing, for example, the epitopes of microorganisms relevant to immunization. These methods have the potential to be harnessed for the large-scale production of materials for use as vaccines and to provide the most powerful tools for vaccine development and production.

Some major applications of recombinant DNA technology are therefore:

- production of nucleic acids of defined microbial specificity for use as diagnostic reagents and tools for epidemiological research;
- modification of microbial genomes for the production of stable, safe, attenuated mutants as live vaccines;
- detailed identification of the chemical structure of antigens so that selected parts of the molecules can be synthesized by chemical methods and used as vaccines (synthetic peptide vaccines);
- production, by controlled gene expression in suitable vector organisms, of defined microbial proteins or oligopeptides for use as vaccines or as tools in diagnosis and epidemiological research; and
- production of "synthetic" antimicrobial antibodies, an approach that is considered feasible but has not yet been explored.

Cell Fusion Technology

In 1975, Köhler and Milstein first reported the production of monoclonal antibodies from hybrid cells obtained by fusing mouse myeloma cells with lymphocytes from immunized animals. Such techniques establish immortal cell clones, which continually secrete large amounts of antibodies against specific antigens of bacterial, viral, or parasitic origin. Monoclonal antibodies serve as highly specific tools for the analysis of the gene sites of microbial antigens in order to identify those of greatest potential value for inclusion in vaccines. They are also of value in the purification of antigens by affinity chromatography for use in vaccines.

Among useful applications of hybridoma technology are:

- preparation of monoclonal antibodies for the analysis of microbial antigens, so that antigenic structures relevant to immunogenesis may be identified and used to produce vaccines;
- production on a large scale of defined antimicrobial monoclonal immunoglobulins for use in passive immunoprophylaxis or therapy or as diagnostic reagents;
- production of immunoglobulin linked to antimicrobial or anticellular toxins (i.e., targeted drugs) for use in therapy; and
- preparation of clones of immunocompetent cells

(B cells, T cells) that have a role in immunological research and potentially in disease control.

Parallel Research

Since some of the products of the above genetic engineering procedures may be small molecules that are themselves only poorly antigenic, it may be necessary to develop acceptable adjuvants, immunopotentiators, and antigen "carriers". The best use of the new vaccines will also depend on developments in immunology. Recent knowledge of the immune response to microbial antigens in man was reviewed by a WHO scientific group in July 1982 *(1)*.

Both humoral (immunoglobulin) responses and cell

mediated responses play a role in immunity and recovery from microbial infection. Indeed, the immune response depends on a complex network of interdependent components, and its characteristics differ widely for different types of microorganism. There is now, however, much new information on the cells involved in the immune response.

Some Priority Applications

In virology, an important application of the new biotechnology is the development of vaccines against agents that have not so far been cultivated or that grow poorly. Examples are the hepatitis B virus and rotavirus. The latter agent is a major cause of severe diarrheal disease in infancy but it grows too poorly to permit the preparation of conventional vaccines. By use of the new methods, vaccines against dangerous pathogens, such as African hemorrhagic fever viruses could probably be formulated without the risks of using infectious viruses.

The influenza virus presents special problems for immunoprophylaxis because of its high degree of antigenic variability. The modern techniques can be used analytically to study the problem of variation and to seek alternative approaches to vaccine design or chemotherapy. Further information is needed on host factors in infection, not only for influenza but also for other human respiratory viruses such as respiratory syncytial virus before rational immunoprophylactic approaches can be developed.

With certain medically highly important viruses such as the herpes viruses, latency and reactivation occur and are complicating factors in attempts at immunoprophylaxis. Some herpes viruses may also be associated with oncogenicity. So far, attempts to develop vaccines against these agents have made little progress. Methods of genetic engineering and modern immunology should be used vigorously to study the host/virus interaction and to develop a rational approach to control. This may call for entirely new concepts.

The development of small, synthetic peptides mimicking the antigenic structures of certain viruses has already provided encouraging results. Viruses that may be mimicked in this way include hepatitis B virus, foot-and-mouth disease virus (an agent with many of the features of poliovirus), and rabies virus. This field of work is worthy of careful exploration and development to determine the value of the peptides as vaccines.

Although many bacterial diseases are well controlled by the use of toxoid vaccines, the structural and antigenic complexity of bacteria and parasites is much greater than that of viruses. For some important bacterial agents vaccines are of low efficacy and acceptability, while little progress using conventional approaches has been made in developing vaccines against parasitic diseases. Genetic engineering methods are therefore of particular value for the control of disease caused by these agents and should be applied as a matter of urgency. For bacterial diseases, research is needed into vaccines against tuberculosis, pertussis, gonococcal infections, and leprosy. In the field of tropical medicine, the main priorities for vaccine development are the major parasitic diseases—malaria, filariasis, schistosomiasis, leishmaniasis, and trypanosomiasis.

A new vaccine development program started by the World Health Organization will commission research in selected areas where progress in disease control is dependent on the production of new vaccines, the improvement of existing vaccines, or the elaboration of specific drugs and other substances, such as interferons and modulators of the immune system. The Organization now has an unparalleled opportunity to guide the efforts of the biotechnology and pharmaceutical industries towards the diseases for which effective vaccines are most needed and of bringing the fruits of research within reach of everyone.

Reference

(1) Viral vaccines and antiviral drugs: report of a WHO Scientific Group. Geneva: World Health Organization, 1983. (Technical Report Series No. 693).

(Source: Dr. G. C. Schild, Head of the WHO Collaborating Center for the Standardization of Viral Products, and Head of the Division of Viral Products at the National Institute for Biological Standards and Control, London, England and Dr. F. Assaad, Director of the Division of Communicable Diseases at WHO, Geneva, Switzerland.)

Editorial Comment

This article draws attention to the potential benefits that the new biotechnology can bring to public health by generating new tools for the more efficient prevention and control of communicable diseases. A key application is the development of new vaccines using recombinant DNA technology. These vaccines can fill the great need for currently unavailable immunogens against several important diseases, or can replace existing vaccines which are not satisfactory. Favorable re-

sults recently documented in a clinical evaluation of a hepatitis B vaccine made by recombinant DNA procedures[2] clearly illustrate that practical applications of this new generation of vaccines are not far from reach. Another important application of the new biotechnology involves the production of nucleic acids of defined specificity for use as diagnostic reagents and tools for epidemiological research. The utilization of cell fusion technology has resulted in the production of monoclonal antibodies, some of which are already used for diagnostic purposes in several countries of the Region.

Modern biotechnology has created new opportunities that call for PAHO's involvement in the field. PAHO can be instrumental in selecting priorities for vaccine development, improvement, and evaluation. Moreover, the Organization can play a crucial role in transferring vaccine and reagent production technology to developing countries.

Although biotechnology offers considerable promise in the production of immunobiologics, conventional techniques still prove valuable. In this context, PAHO has played an active role in coordinating and supporting the development of new vaccines and the improvement of existing ones using conventional approaches. Substantial progress has been achieved in developing a live attenuated vaccine against Argentine hemorrhagic fever, and the first trials in volunteers are to be conducted in the near future. Another example of PAHO's involvement is the progress made in modernizing the current 17-D yellow fever vaccine produced in embryonated eggs by Colombia and Brazil. In addition, plans are under way to develop a thermostabilized yellow fever cell culture vaccine, which will represent an important technological achievement.

[2]Scolnick, E. M. et al. Clinical evaluation in healthy adults of hepatitis B vaccine made by recombinant DNA. *JAMA* 251(21):2812-2815, 1984.

Reports on Meetings and Seminars

Society for Epidemiologic Research Annual Meeting

The Seventeenth Annual Meeting of the Society for Epidemiologic Research (SER), 13-15 June 1984, was hosted by the University of Texas School of Public Health in Houston, Texas.

The meeting was structured around six symposia with the following topics: epidemiology of aging; infectious agents and chronic disease; controversies in reproductive outcomes; human biology and epidemiology; methods in occupational epidemiology; and epidemiology of injuries. Almost 200 papers were presented dealing with these and other issues such as cancer, maternal and child health, cardiovascular disease, blood pressure, diabetes, infectious diseases, and methods.

The 1985 and 1986 SER meetings will be held in Chapel Hill, North Carolina and in Pittsburgh, Pennsylvania, respectively.

International Symposium on *Salmonella*

An international symposium on *Salmonella* was held in connection with the annual meeting of the American Veterinary Medical Association on 19-20 July 1984 in New Orleans, Louisiana, USA. The symposium was broad in scope and included a review of the worldwide *Salmonella* situation with regard to livestock production, meat and poultry processing, and public health.

One of the principal aims of the symposium was to identify practical ways of preventing or reducing *Salmonella* infections in major food animal populations and of curbing contamination of products derived from such animals. The gathering also considered the impact of *Salmonella* on world trade, the utility of various national and regulatory programs for controlling the species, and the problems posed by important host-adapted organisms such as *S. dublin* and *S. gallinarum*.

Overall, the symposium was a vehicle for developing a more coherent understanding of approaches that are useful in seeking to contain the worldwide *Salmonella* problem. A separate one-day meeting on food hygiene, which included papers on *Salmonella*, was held the day before the symposium began.

Additional information may be obtained by contacting Dr. G. H. Snoeyenbos, General Chairman, International Symposium on *Salmonella*, Paige Laboratory, University of Massachusetts, Amherst, Massachusetts 01003, USA.

Calendar of Courses and Meetings

Beyond Health Care: A Working Conference on Healthy Public Policy

The Canadian Public Health Association (CPHA) and the Local Board of Health of the City of Toronto will sponsor this Conference to mark the 10th anniversary of the Lalonde Report, the 75th anniversary of CPHA, the centenary of the Local Board of Health, the City of Toronto's Sesquicentennial, and Ontario's 200th Birthday. The event will take place on 9-12 October 1984 in Toronto, Ontario, Canada.

The Conference has the following goals: conceptualize and define the field of healthy public policy; raise awareness of the issues of healthy public policy; make health an issue on the agenda for public policy-making; and develop proposals and recommendations for action. To achieve these goals, registrants will work in small groups exploring four themes: healthy people, healthy work, healthy communities, and healthy countries.

For more information, write to: Canadian Public Health Association, 1335 Carling Avenue, Suite 210, Ottawa, Ontario, Canada KlZ 8N8.

Latin American and Caribbean Workshop on Research in Health

The Ministry of Public Health of Cuba and the Pan American Health Organization are sponsoring this research workshop in health to be held 5-9 November 1984 at the Convention Palace in Havana, Cuba.

The workshop will include plenary sessions with reports presented by participants from various countries, discussion of the presentations, and round tables on current topics of interest such as scientific-technical indicators. At or about the same time, there will also be offered a course on research methodology, special conferences, and visits to research institutes.

Additional information can be obtained by writing to: Taller Latinoamericano y del Caribe de Investigación en Salud, Palacio de las Convenciones, Apartado Postal 16046, Zona 16, La Habana, Cuba.

II National Meeting of Virology, Brazil

The meeting will be held in São Lourenço, Minas Gerais, from 9-13 November 1984, under the auspices of the Brazilian Society for Microbiology. Some of the topics to be covered include:

- Current virus problems (black fever of Labrea, pseudorabies, viruses from citrus plants, etc.)
- National immunization program
- Immunomicroscopy and virology
- Antiviral agents and immunotherapy
- Epidemiology, diagnosis, and control of viral diseases.

The meeting will address important aspects of human, animal, and plant virology and will be of interest to researchers and public health workers.

For further information please contact: E. W. Kitajima, Department of Cellular Biology, I.B., University of Brasília, 70910 Brasília, D.F., Brazil.

Scientific Meeting on Sexually Transmitted Diseases

A meeting on "Current Concepts for Consultants and Clinics on Control of Sexually Transmitted Diseases" will be held in Vancouver, British Colombia, 26-27 November 1984. The meeting is sponsored by the Division of Sexually Transmitted Diseases of the Canadian Public Health Association.

The program will cover topics such as research, clinical advances, epidemiology, control and education, and ethical and legal problems involved in sexually transmitted diseases. Participants will also discuss scientific studies presented as part of the agenda.

For more information, contact: Ms. Ruth Sutherland, Canadian Public Health Association, STD Conference, 1335 Carling Avenue, Suite 210, Ottawa, Ontario, Canada, KlZ 8N8.

Publications

Bibliographic Series on Respiratory Infections in Children

The Pan American Health Organization, with the collaboration of the U.S. National Library of Medicine, has begun publishing and distributing a semiannual bibligraphic series on respiratory infections in children. The series basically covers aspects of acute respiratory infections and tuberculosis in children, which are a high priority in developing countries.

Each copy contains a subject index of the publications listed in the *Index Medicus* and an author index with a summary of each article. Volume I covers works listed in the *Index* from 1978 to 1982. Subsequent volumes will consist of two semiannual issues. Volume II (No. 1 and No. 2) for 1983* is now available.

This publication may be obtained from the Maternal and Child Health Program (HPM), Pan American Health Organization, 525 Twenty-third Street, N.W., Washington, D.C. 20037, USA.

Ports designated in application of the International Health Regulations (1969): Situation as on 1 January 1984. Geneva, World Health Organization, 1984. 36 pages. ISBN 92 4 058009 3. Sw.fr. 8.-. Bilingual edition (English and French).

According to the *International Health Regulations*, the health administration of every country must ensure that a sufficient number of ports in its territory have at their disposal adequate personnel competent to inspect ships for the issue of the Deratting Exemption Certificates referred to in Article 53, and the health administration has a duty to approve such ports for that purpose.

Each health administration must also designate a number of these approved ports, depending upon the volume and incidence of its international traffic, as having at their disposal the equipment and personnel necessary to derat ships for the issue of the Deratting Certificate referred to in Article 53.

This booklet lists the ports designated for these purposes and thus is invaluable to shipping companies and to the health authorities of maritime nations. It replaces the previous edition published in 1979. Any amendments to the list of designated ports are published by WHO when necessary in the *Weekly Epidemiological Record*.

Epidemiology of the Rheumatic Diseases. Reva C. Lawrence and Lawrence E. Shulman. New York, Gower Medical Publishing, 1984. 381 pages. ISBN 0-912143-02-9. US$39.00.

The American Rheumatism Association inaugurates its *Current Topics in Rheumatology* series with this publication, which presents the proceedings of the fourth international conference on the epidemiological aspects of the rheumatic diseases. Each disease is reviewed and discussed from both the clinical and epidemiological viewpoint by an interdisciplinary group. Conference participants focused on the state of knowledge and gaps in that knowledge, identified research strategies, and recommended required resources. Epidemiological and clinical perspectives on disability from rheumatic diseases are included here along with chapters on the role of multi-institutional studies and data resources as they relate to epidemiological research in rheumatic diseases. A longitudinal perspective on these studies is provided by Professor J. H. Kellgren, whose summarizing remarks conclude the work.

*PNSP/83/118, Vol. II, No. 1, January-June 1983 and No. 2, July-December 1983.

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