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Dengue in the Americas

Dengue-4 virus was reported in the Caribbean from February to April 1981 when serologic determinations were made from two tourists returning to the United States of America from St. Bartholomew and St. Martin; at about the same time, Guadeloupe appeared to be having a dengue epidemic. In May, Dominica reported a dengue outbreak which was laboratory confirmed at CAREC (Caribbean Epidemiology Center) as dengue-4. The disease occurred in a mild form, with symptoms of high fever, gastroenteritis, and rash and lasted a short time (2 to 4 days). There were no deaths.

Also in May, the Ministry of Health of Cuba reported a widespread outbreak of dengue-2. This epidemic has caused deaths, mostly in children, from shock and hemorrhage which appear to meet the WHO criteria for dengue hemorrhagic fever (dengue shock syndrome). By 20 August, 337,160 cases and 149 deaths had occurred. The majority of the deaths occurred in children under 15 years of age. On 6 July the outbreak reached its peak when 11,721 new cases started being reported. This is the first time that dengue hemorrhagic fever has been reported in the Americas.

Background

Dengue epidemics have occurred in the Americas since 1827. Some countries have fairly adequate epidemiological records, as the Bahamas, which experienced its first dengue outbreak probably around 1882, followed by subsequent outbreaks in 1921-1922 and 1946.

In 1941-1942 there was an outbreak of dengue-2 in Panama and epidemiological evidence indicates that dengue-1 may have occurred in previous years. In 1953-1954 dengue-2 was isolated repeatedly in Trinidad where it was endemic. Earlier, this same virus was endemic in the Upper Magdalena Valley, Colombia. By 1952, except for an area near Venezuela, *Aedes aegypti* was eradicated from Colombia and dengue disappeared.

Dengue-2 spread through the Caribbean and by 1968 was reported in most islands with epidemics in St. Martin, St. Bartholomew, Guadeloupe, and Martinique. In 1969-1971 dengue-2 caused epidemics in Haiti and the Dominican Republic and by 1971-1972 dengue-2 epidemics had occurred in coastal Colombia, reaching epi-

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demic proportions in 1975-1976 in the Upper Magdalena Valley.

Prior to 1970, there were no definite data available on dengue epidemics in the Leeward Islands of the Netherlands Antilles of Saba, St. Eustatius, and St. Martin. Although clinical observations indicate that an epidemic of dengue may have occurred in Cuba in 1943, a serologic survey done in 1975 showed no recent dengue virus activity.

Dengue-3 epidemics appeared in the Caribbean in 1963. Jamaica had a dengue-3 epidemic in 1963 and 1964 and a combination dengue-2 and -3 epidemic in 1968-1969. Puerto Rico had confirmed dengue epidemics in 1963, 1969, 1975, and 1977; from 1969 to 1976 only the dengue-2 virus was isolated on the island, but in 1977, cases of dengue-1 were registered and are still being reported.

Dengue-1 virus was isolated for the first time in the Americas in Jamaica in 1977. The earliest confirmed cases in Kingston were on 26 February, and by 30 May of the same year, epidemic foci existed throughout the Kingston-St. Andrews Corporate Area. The epidemic spread throughout the Caribbean. Cases soon occurred in Cuba, Bahamas, Dominica, Haiti, Puerto Rico, Barbados, Martinique, Trinidad, St. Kitts, and Guyana. By 1978, it had reached the northern part of South America and Central America. In August 1979 dengue-1 had spread to the States of Quintana Roo, Chiapas, and Oaxaca in southern Mexico and by 1980 cases were reported in Texas.

There is some evidence of severe thrombocytopenia and hemorrhagic phenomena associated with dengue-1 in Jamaica, Bahamas, and Puerto Rico. No deaths were attributed directly to dengue-1, but two possible cases occurred in Jamaica, and Honduras had five deaths with symptoms of initial high fever, hemorrhagic phenomena, ecchymases, petechiae, and circulatory insufficiency. However, the cases were not confirmed serologically as being caused by dengue and it is doubtful that they met the WHO criteria for hemorrhagic dengue or dengue shock syndrome.

Dengue Hemorrhagic Fever

Dengue hemorrhagic fever (DHF) or hemorrhagic dengue can be defined as an acute febrile illness characterized clinically by hemorrhagic phenomena and a tendency to develop a shock syndrome (dengue shock syndrome, DSS), which may be fatal. Thrombocytopenia with concurrent hemoconcentration is regularly observed.

Typical cases are characterized by four clinical manifestations: high fever, hemorrhagic phenomena, hepatomegaly, and frequently circulatory failure. Moderate to marked thrombocytopenia with concurrent hemoconcentration is a distinctive clinical laboratory finding which differentiates hemorrhagic from classical dengue fever, including the type presenting hemorrhagic manifestations.

In man, each of the four types of dengue viruses (DEN-1, DEN-2, DEN-3, and DEN-4) can cause either classical dengue or dengue hemorrhagic fever, and it is not known whether one virus type is more pathogenic than another.

The acute phase of the infection, which lasts about 5-7 days, is followed by an immune response. During the first attack, there occurs a predominant production of neutralizing antibodies against the virus type inoculated by the mosquito vector (primary dengue). The first attack gives only temporary, partial protection against the other three types and secondary or sequential infections are possible after a rather short period of time.

Although the four serotypes are antigenically very similar, they are sufficiently different to elicit only partial cross-protection after infection by one of them. After an incubation period of 4-6 days (minimum 3, maximum 10), the virus is present in the patients' blood during the acute phase of the disease, thus constituting a reservoir of virus readily accessible for transmission by mosquitoes.

Two main pathophysiologic changes occur in DHF/DSS. One is an increased vascular permeability, which causes a loss of plasma from the vascular compartment. This results in hemoconcentration, low pulse pressure, and other signs of shock if plasma loss is critical. The second change is a disorder in hemostasis which involves all three major factors, namely vascular changes, thrombocytopenia, and coagulopathy.

Since the number of dengue virus infections is unknown most of the time, the attack rate of DHF is difficult to evaluate. A retrospective evaluation of the impact of the disease during the May-November 1962 outbreak in Bangkok-Thonburi showed that in a population of 870,000 children under 15 years of age, there were an estimated 150,000 to 200,000 minor illnesses caused by dengue or Chikungunya viruses; 4,187 were hospitalized and diagnosed as dengue patients; and 4,000 additional cases were treated in private clinics or at home. Shock syndrome occurred in approximately one third of the hospitalized DHF cases.

Aedes aegypti Surveillance

Aedes aegypti is the most efficient of mosquito vectors because of its domestic habitat. The female mosquito

bites man during the day, and after feeding on a person whose blood contains the virus, it is able to transmit dengue immediately, by changing hosts when its blood meal is interrupted, or after an incubation period of 8-10 days, during which the virus multiplies in its salivary glands.

The *A. aegypti* is the only vector of dengue in the Americas. It is present in a number of countries of South and Central America, and is found in fairly high densities in most of the Caribbean islands.

Areas in which *A. aegypti* is known to exist should establish a surveillance system which includes dengue case detection and control of mosquito populations. Ideally, the landing rate and/or resting indices for adult *A. aegypti* at any given moment should be determined in risk areas. Unfortunately this has rarely been done in the Americas. Some countries are using ovitraps as an alternative means to monitor the density of adult mosquitoes. This method should be used in sea and air ports of entry, on border cities where *A. aegypti* is known to breed, and in areas of risk or where control activities are being carried out. This method also should be used in hospitals, especially if windows are not screened.

Traditionally *A. aegypti* surveys in the Americas have been directed toward the larvae. Three indices are used: (1) premises index (percentage of houses positive for *A. aegypti* larvae), (2) container index (percentage of containers positive for *A. aegypti* larvae) and (3) Breteau index (number of positive containers per 100 houses). Most *A. aegypti* control programs have records of premises and container indices. This information should be reviewed to determine areas where mosquito densities are high. Spot surveys should be made in these areas to determine the validity of earlier evaluations. The surveys should indicate the types of containers where breeding most frequently occurs.

Risk areas are usually crowded sections, slums, places with poor roads and inadequate solid waste facilities, and other areas of recorded high premises indices. The areas may be small and represent some specific socioeconomic condition. All areas under insecticide control should be evaluated and remedial measures applied where needed.

A. aegypti Control

Most routine operational programs are aimed at larval control through insecticiding, breeding source reduction, or a combination of both. When a potentially explosive situation exists, as at present in the Caribbean, larviciding and other appropriate measures to reduce breeding places should be intensified.

Temephos (Abate) is the only insecticide readily available for treatment of potable water. The preferred formula is 1 per cent sand granules. Fenthion, malathion, and other insecticides are being used in the Americas for treating non-potable water containers.

Reduction of breeding sources, combined with health education aimed at developing community participation, can be of value in areas where bottles, tires, cans, and other objects are the principal breeding sources rather than water-holding containers.

Adult mosquitoes can be controlled by residual or aerial spraying. Either thermal or ultralow volume equipment is used to apply the most common insecticides, malathion and fenitrothion.

In order to reduce breeding sources, long-term control should be based on health education and on community participation, supported by legislation and law enforcement wherever socioeconomic conditions permit. This can be accomplished by providing the communities concerned with adequate water supply and solid waste disposal. Use of larvicides should be considered as a supplementary measure. Temephos in 1 per cent sand granules can be applied to potable and non-potable water at a target dose of 1 ppm (e.g., 10 g of material to 100 liters of water), especially in high risk localities before periods of anticipated outbreaks. Other insecticides can be used for the treatment of non-potable water.

The community should participate in these activities by disposing all water containers no longer in use (e.g., old tires, empty tins and bottles, and broken jars), either through vehicle disposal units or simply burying the containers where they cannot be filled. Systematically changing the water or adding sand to flower vases on a weekly basis will eliminate this breeding source.

Water jars and drums that cannot be disposed of should be adequately covered or cleaned and scrubbed weekly to prevent oviposition by *A. aegypti*. When this is not possible because of their shape or size, *A. aegypti* larvae can be eliminated by transferring the water from one container to another and filtering it through a cloth.

Emergency Measures

1. To be effective, operations should begin when the first cases are detected or when there are sound reasons for anticipating an outbreak. Since virus activity is already known to exist in the Caribbean, it is not necessary to have laboratory confirmation.

2. The size of the area (or areas) to be treated should be determined through epidemiological and entomological information. Initially, if cases are scattered, adulticide aerial spraying should be implemented within

a minimum radius of 100 meters from houses which have had cases.

3. Two ultralow volume or thermal adulticide treatments can be made at 4-10 day intervals if resources are available or if they can be obtained. Vehicle-mounted or portable ultralow volume aerosol generators, thermal foggers, or mist blowers can be used to apply a suitable insecticide (e.g., technical malathion or fenitrothion) at the dosages recommended by the equipment manufacturer or insecticide label.

4. If necessary, use of ultralow volume spraying by local air force C-47 aircraft or smaller agricultural type planes and helicopters can be explored.

5. Priority areas for vector control are those with a concentration of cases and/or high vector density. Special attention should be given to areas where people congregate, for example, in hospitals and schools.

6. Hospital rooms with hemorrhagic dengue patients should be made mosquito-proof.

The following table provides estimates, based on field operations in South East Asia and the Western Pacific, of the relative size of the area that can be covered a day with different types of application equipment (subject to slight variation due to wind and temperature conditions):

Equipment	Possible daily coverage
Twin engine aircraft (e.g. C-47 or large helicopter), ULV	6,000 hectares
Single engine aircraft or small aircraft, ULV	2,000 hectares
Vehicle mounted cold fogger (e.g., LECO)	225 hectares
Vehicle mounted thermal fogger (e.g., Dyna-Fog)	150 hectares
Back-pack ULV mist blower (e.g., Fontan)	30 hectares
Hand carried thermal fogger (e.g., Swing Fog)	5 hectares
Hand carried indoor ULV aerosol generator (e.g., Mity Moe)	5 hectares or 250 houses

(*Source:* Parasitic Diseases and Vector Control, Division of Disease Prevention and Control, PAHO.)

Amendment of the International Health Regulations (1969)

As announced in the last issue of the Epidemiological Bulletin, *the Thirty-fourth World Health Assembly adopted a resolution introducing certain amendments to the International Health Regulations (1969), bearing in mind the worldwide erradication of smallpox. A transcript of the text of the resolution follows.*

AMENDMENT OF THE INTERNATIONAL HEALTH REGULATIONS (1969)

WHA34.13 The Thirty-fourth World Health Assembly,

Recalling resolution WHA33.3, which declares solemnly that the world and all its peoples have won freedom from smallpox;

Considering that, in consequence, the time has come for smallpox no longer to be included among the diseases subject to the International Health Regulations (1969), as amended by the Additional Regulations adopted on 23 May 1973;[1]

Recalling the amendments relating to Articles 18, 19, paragraph 2(e), and 47, paragraph 2, kept in abeyance in accordance with resolution WHA27.45;[2]

Having examined the report forwarded to it by the Executive Board at its sixty-seventh session;

Having regard to Articles 2(k), 21(a) and 22 of the Constitution;

1. DECIDES that smallpox shall no longer be included among the diseases subject to the International Health Regula-

[1] World Health Organization. *International Health Regulations (1969)*. Second annotated edition, Geneva, 1974.

[2] World Health Organization. *Official Records* 217, 1974, pp. 21, 71, and 81.

tions (1969), as amended by the Additional Regulations adopted on 23 May 1973;

2. INCLUDES smallpox among the diseases under international surveillance in accordance with resolution WHA22.47, the provisions of which apply in view of the global eradication of smallpox;

3. ADOPTS, this 20 May 1981, the following Additional Regulations:

ARTICLE I

The International Health Regulations (1969) are amended as follows:

PART I—DEFINITIONS

Article 1

"*diseases subject to the Regulations.*" Delete the words "smallpox, including variola minor (alastrim)," so that the definition reads as follows:

"'*diseases subject to the Regulations*' (quarantinable diseases) means cholera, including cholera due to the *eltor* vibrio, plague, and yellow fever;"

PART II—NOTIFICATIONS AND EPIDEMIOLOGICAL INFORMATION

Article 7

Paragraph 2, subparagraph (a). Delete the word "smallpox," so that the subparagraph reads as follows:

"(a) in the case of plague or cholera, a period of time equal to at least twice the incubation period of the disease, as hereinafter provided, has elapsed since the last case identified has died, recovered or been isolated, and there is no epidemiological evidence of spread of that disease to any contiguous area;"

PART III—HEALTH ORGANIZATION

Article 18

Delete, and renumber Article 19 and succeeding articles throughout the Regulations.

Article 19

Paragraph 2, subparagraph (e). Delete the words "for vaccination against smallpox, and facilities within the airport" and "cholera and," so that the subparagraph reads as follows:

"(e) facilities within the airport or available to it for vaccination against yellow fever."

PART IV—HEALTH MEASURES AND PROCEDURE

Chapter V—Measures concerning the International Transport of Cargo, Goods, Baggage, and Mail.

Article 47

Paragraph 2. Delete the words "Apart from the measures provided for in Article 64," so that the paragraph reads as follows:

"2. Goods, other than live animals, in transit without transhipment shall not be subject to health measures or detained at any port, airport, or frontier."

PART V—SPECIAL PROVISIONS RELATING TO EACH OF THE DISEASES SUBJECT TO THE REGULATIONS

Chapter IV—Smallpox

Delete, and renumber Article 83 and succeeding articles accordingly, throughout the Regulations.

PART VI—HEALTH DOCUMENTS

Appendix 3—International Certificate of Vaccination or Revaccination against Smallpox

Delete, and renumber Appendices 4 and 5 accordingly, throughout the Regulations.

Appendix 4—Maritime Declaration of Health

Health questions, No. 1. Delete the word "smallpox" so that the question reads as follows:

"1. Has there been on board during the voyage* any case or suspected case of plague, cholera, or yellow fever?
Give particulars in Schedule.

ARTICLE II

The period provided, in the execution of Article 22 of the Constitution of the Organization, for rejection or reservation shall be six months from the date of the notification by the Director-General of the adoption of these Additional Regulations by the World Health Assembly.

ARTICLE III

These Additional Regulations shall come into force on the first day of January 1982.

ARTICLE IV

The following final provisions of the International Health Regulations (1969) shall apply to these Additional Regulations: paragraph 3 of Article 94; paragraphs 1 and 2 and the first sentence of paragraph 5 of Article 95; Article 96; Article 97, substituting the date mentioned in Article III of these Additional Regulations for that mentioned therein; and Articles 98 to 101 inclusive.

(Adopted at the Fourteenth plenary meeting, 20 May 1981)

*If more than four weeks have elapsed since the voyage began, it will suffice to give particulars for the last four weeks." [*Footnote unchanged.*]

Diseases Subject to the International Health Regulations

Cholera, yellow fever and plague cases and deaths reported in the Region of the Americas up to 1 August 1981.

Country and administrative subdivision	Cholera Cases	Yellow fever		Plague Cases
		Cases	Deaths	
BOLIVIA	—	*91*	*21*	*17*
Beni	—	3	2	—
Cochabamba	—	5	5	—
Chuquisaca	—	2	1	—
La Paz	—	11	7	17
Santa Cruz	—	70	6	—
BRASIL	—	*13*	*2*	*3*
Ceará	—	—	—	3
Goiás	—	1	1	—
Mato Grosso	—	5	5	—
Pará	—	5	4	—
Roraima	—	2	2	—
ECUADOR	—	—	—	*8*
Chimborazo	—	—	—	8
PERU[a]	—	*14*	*6*	*7*
Cuzco	—	6	2	—
Junín	—	5	2	—
Loreto	—	1	1	—
Piura	—	—	—	7
San Martín	—	2	1	—
UNITED STATES	*3*	—	—	*5*
Arizona	—	—	—	1
Colorado	—	—	—	1
Hawaii	1	—	—	—
New Mexico	—	—	—	3
Texas	2	—	—	—

—None.
[a]A previously reported case of yellow fever in Madre de Dios has been eliminated.

Cholera in 1980

Despite annual variations in the number of countries reporting cholera and in the number of cases notified to WHO, the global cholera situation has not changed substantially during the last decade. Cholera is still present in many countries in an endemic form with periodic exacerbations.

According to the provisional notifications received by WHO until 18 March 1981, there were a total of 36,815 cases in 1980, as compared with 56,813 in 1979, and the number of countries reporting cholera declined from 43 in 1979 to 32 in 1980 (Tables 1 & 2). No new countries became infected in 1980.

In Africa, a total of 17,675 cases were reported by 14 countries, as compared with 21,075 cases reported by 18 countries in 1979. However, there was a considerable increase in some countries, notably Burundi, Kenya,

Liberia, and the United Republic of Tanzania. South Africa, which had remained free of the disease since 1974, was once again infected in its northeastern region.

There was a more noticeable decline in the number of cases in Asia, where 19,108 cases were reported in 1980, as compared with 35,397 in 1979, and the number of countries reporting cholera dropped from 21 in 1979 to 15 in 1980. The absence of notifications from Bangladesh and, more importantly, the very considerable decrease that seems to have been observed in Indonesia (5,541 cases in 1980 compared with 18,817 in 1979) have undoubtedly contributed to this decline. On the other hand, a rather large increase in cases was reported by Thailand. The regression was most evident in the Eastern Mediterranean area, where the number of affected countries declined from seven in 1979 to two in 1980: Democratic Yemen and Iran. A recrudescence of cholera was noted in the Republic of Korea, which had not reported the disease since 1970.

Canada reported three imported cases in 1980. The United States of America reported nine imported cases that year, most of which were identified in Indochinese refugees, and one indigenous case, which occurred in a 46-year-old woman in Florida. The responsible strain was *Vibrio cholerae* biotype *eltor*, serotype Inaba, as were the strains isolated from the cluster of cases that occurred in Louisiana in 1978. Oysters harvested in an approved area and consumed raw by the patient were the suspected vehicle of transmission.

An indigenous case was also reported by Australia in 1980, in a 2½-year-old boy from the town of Beaudesert, Queensland. The case was presumed to have originated from contact with the Albert/Logan River system where vibrios have been isolated intermittently since 1977, when a case was discovered in a town downstream of Beaudesert. No cases of cholera were reported by any other countries in Oceania in 1980.

The current recommendations of WHO with regard to cholera control measures are based on the views of the Technical Advisory Group of the Program for Control of

Table 1. Cases of cholera notified to WHO, 1980.

Countries and Areas	Total
AFRICA	17,675
Burundi	2,039
Cameroon, United Republic of	193
Ghana[a]	145
Kenya	2,808
Liberia[a]	2,398
Mozambique	1,212
Nigeria[a]	138
Rwanda	30
South Africa	859
Sudan	17
Tanzania, United Republic of	5,196
Uganda	1,539
Zaire	1,051
Zambia	50
AMERICA	13(12[b])
Canada	3[b]
United States of America	10(9[b])
ASIA	19,108(28[b])
Burma	1,018
China	46
Democratic Yemen	720
India[a]	5,960
Indonesia	5,541
Iran	-
Japan	17(16[b])
Korea, Republic of	145
Malaysia	97(10[b])
Nepal	1
Phillipines[a]	439
Singapore	18(2[b])
Sri Lanka[a]	33
Thailand	4,331
Viet Nam	735
EUROPE	16(13[b])
Belgium	1[b]
France	1[b]
Germany, Federal Republic of	4[b]
Spain	4(1[b])
United Kingdom	6[b]
OCEANIA	3(2[b])
Australia	2(1[b])
New Zealand	1[b]
World total	36,815(55[b])

[a]Incomplete figures.
[b]Imported cases.

Table 2. Global cholera situation, 1975-1980.

	1975	1976	1977	1978	1979	1980
Number of countries reporting cholera	29	27	35	40	43	32
Number of new countries infected	1	—	3	8	2	—
Number of cases	92,123	66,020	58,087	74,632	56,813	36,815

Diarrheal Diseases. This Group, after reviewing the current knowledge and experiences in cholera control, concluded that the development and implementation of national programs for the control of *all* diarrheal diseases was the best way to prevent and control cholera. Guidelines for Cholera Control are now available and can be obtained by writing to: The Program Manager, Program for Control of Diarrheal Diseases, World Health Organization, 1211 Geneva 27, Switzerland.

(*Source:* WHO, *Weekly Epidemiological Record*, No. 13: 97-98, 1981.)

Global Distribution of β-lactamase-producing *Neisseria gonorrhoeae*

The global spread of penicillinase-producing and chromosomal-resistant gonococcal strains is continuing. The number of countries where penicillinase (β-lactamase)-producing *Neisseria gonorrhoeae* (PPNG) strains have been identified up to May 1981 (See Table 1) appears to be limited by the capacity of the local laboratory service to isolate and test for these strains. Countries with a good surveillance system have observed a two to six-fold increase in the number of PPNG isolates within the last 18 to 24 months.

Gonococcal strains partially or totally resistant to penicillin and other antibiotics have been well known for a long time and infections caused by them had been dealt with by dose increases or alternative antibiotics. However, the situation has rapidly changed by an onslaught of gonococcal strains with combined chromosomal and plasmid-mediated resistance, causing an unacceptable proportion of ineffective treatments with penicillin and other antibiotics in many areas of the world. Alternative treatment regimens which could still be effective in the majority of gonococcal infections may not only be difficult to identify but may well result in an increase of treatment costs which can no longer be afforded by many countries nor by the patients. This, in turn, may lead to the use of an ineffective treatment which would further boost drug resistance and extend the period of infectivity and activity of the disease in the patient, a situation that will no doubt result in an increase in gonorrhea transmission and its complications. Gonococci are just one well-studied example of the development of antimicrobial resistance and similar trends can be observed in other bacterial species.

It should be remembered that delayed recognition of drug resistance in recurrent focal and epidemic outbreaks of Shigella dysentery and typhoid that have scourged South East Asia and Central America as well as Africa in recent years has, on several occasions, resulted in excessively high attack rates and case fatality rates.

Similar observations have been made of various bacteria causing acute respiratory infections and cerebrospinal meningitis, resulting in an increased case fatality rate. The incidence of resistance to different antibiotics of both gram-positive and gram-negative bacteria has increased considerably in recent years. The growing frequency of β-lactamase-producing *Haemophilus influenzae* has been noted in different geographic areas. Almost 50 per cent of these strains were resistant to penicillin. The investigation of penicillin proteins in clinical isolates of *Streptococcus pneumoniae* strains resistant to multiple antibiotics in South Africa and the United States revealed several changes that accompanied the development of the resistance. Of particular interest is the drug resistance of staphylococci, meningococci, and *Escherichia coli* isolated from patients and carriers in different

Table 1. Global Distribution of β-lactamase-Producing *Neisseria gonorrhoeae* up to May 1981.[a]

Countries with identified strains
Africa
Morocco (?)
Ghana
Mali
Nigeria
Central African Republic
Gabon
Zaire
Madagascar
Zambia
Senegal
Americas
Canada
United States of America (0.1%)
Mexico
Panama
Argentina
Colombia
East Asia
Philippines (10-40%)
Hong Kong
Taiwan
Guam
Japan
Republic of Korea (< 1%)
New Zealand
New Hebrides
Australia
South East Asia
Indonesia
Singapore (30%)
Malaysia
Thailand (28%)
India
Sri Lanka
Europe
France
Belgium
Netherlands (5%)
United Kingdom
West Germany
Denmark
Sweden
Norway
Finland
Poland
Switzerland
Middle East

[a]Information obtained through WHO Epidemiological Surveillance System.

geographic localities.

Antibiotics used indiscriminately and in inappropriate doses by physicians, health-related workers, and in self-treatment are assumed to be the root of the problem, providing the needed antibiotic pressure favorable to an ever-growing chromosomal resistance and promotion and maintenance of plasmid-mediated resistance.

In addition, the use of antibiotics in the prevention of animal diseases and in food preservation provides another parameter of a low level antimicrobial pressure directed mainly towards enteric pathogenic agents.

It is felt that it has become a matter of urgency to draw the Governments' attention to the gravity of the problems created by the antimicrobial resistance of bacteria in general and *N. gonorrhoeae* strains in particular and to propose effective measures to counteract this unfortunate trend toward increasing bacterial resistance.

To this end WHO intends to convene a meeting of experts before the end of the year. Furthermore, the group will review the complex questions of optimal gonococcal therapy and propose practical and cost-effective means of treating gonococcal infections that can be applied without delay.

(*Source:* Bacterial and Venereal Infections Unit, WHO.)

Meningococcal Disease in Canada, 1921-1979

National Trend

In the period from 1924 to 1979, a total of 13,671 cases of meningococcal disease have been reported in Canada. The yearly notifications by physicians have ranged from 86 (1966) to 1,465 (1941), with an average of 244 cases. Figure 1 shows that there has been no consistent pattern of periodicity, but increased activities are evident at 12- to 16-year intervals. The largest epidemic began in 1938 and peaked in 1941 with 1,465 cases and 206 deaths reported. This epidemic coincided with the Second World War. By 1947, reported incidences attained a level similar to that of the pre-epidemic period. This pattern began to change in 1950 when the incidence rose and remained at a higher level until 1958. It then declined and in 1965 reached the lowest rate (0.43 per 100,000 population) ever recorded in Canada. Subsequent to this, after a period of very low endemicity, a wave of increased activity started to appear in 1972. This reached a peak in 1973 with 446 cases (2 per 100,000 population). In 1979, 303 cases were reported.

Age and Sex Distribution

Meningococcal disease is a serious infection in children especially in the first year of life and results in significant morbidity and mortality. Figure 2 shows that infants suffer the highest morbidity, followed by 1-4 year olds. Since 1969, pre-schoolers and infants have followed a similar trend in age-specific incidence. Percentage distribution by age reveals that approximately one-quarter of the cases occurred in infants and over 55 per cent in those under 5 years of age. Figure 2 demonstrates a gradual shift in age distribution since 1960 with an increasing proportion of cases occurring in the older age groups. Males accounted for over 57 per cent of all cases.

Figure 1. Reported Incidence of Meningococcal Disease in Canada, 1924-1979.

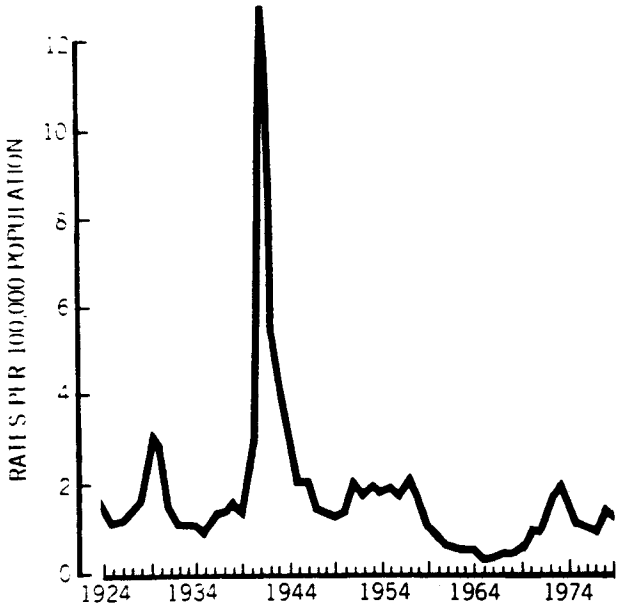
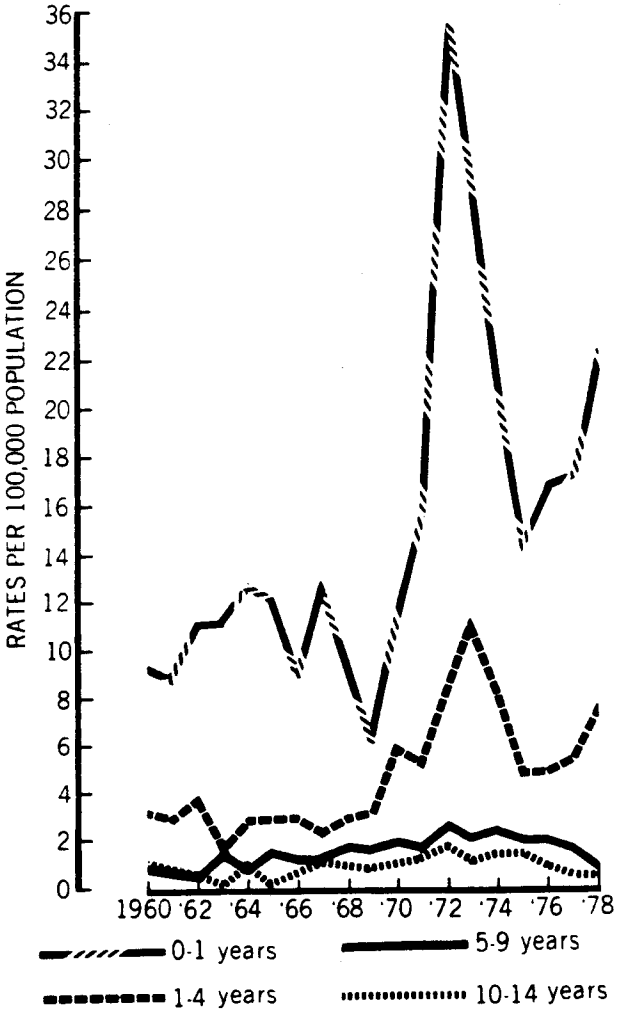


Figure 2. Age-Specific Incidence of Meningococcal Disease in Canada, 1960-1979.



Hospital Morbidity

Figure 3 shows that the number of hospitalizations has exceeded the notifications by physicians in all years since 1960. The difference was much greater prior to 1970. In recent years, while reporting has improved, hospitalization rates (per 100,000 population) are still 20 per cent higher. In 1977, hospitalized cases required an average of 12.7 days of hospital care.

Mortality

Between 1921 and 1979, a total of 5,639 meningococcal deaths were recorded in Canada. Figure 4 shows that since 1921 mortality has declined progressively and in the 1970s the rates were only 8 per cent of those in the 1920. The number of deaths reported yearly has ranged from 24 (1961) to 341 (1929), with an average of 96. Mortality from meningococcal disease continues to occur despite modern therapeutic management. In the past five years, the average number of deaths recorded was 39, meningococcemia being responsible for two-thirds of all deaths attributed to meningococcal disease. The remaining one-third was due to meningococcal meningitis. Infants under 1 year of age accounted for almost 30 per cent of deaths, and children under 5 years, 55 per cent. Twenty per cent of all deaths were among adults.

Figure 3. Meningococcal Disease: Reported Incidence and Hospitalizations, Canada, 1960-1978.

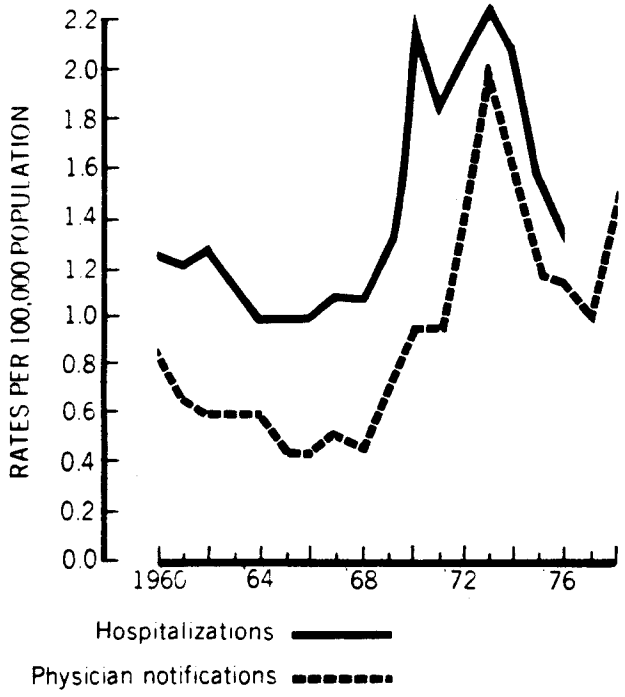
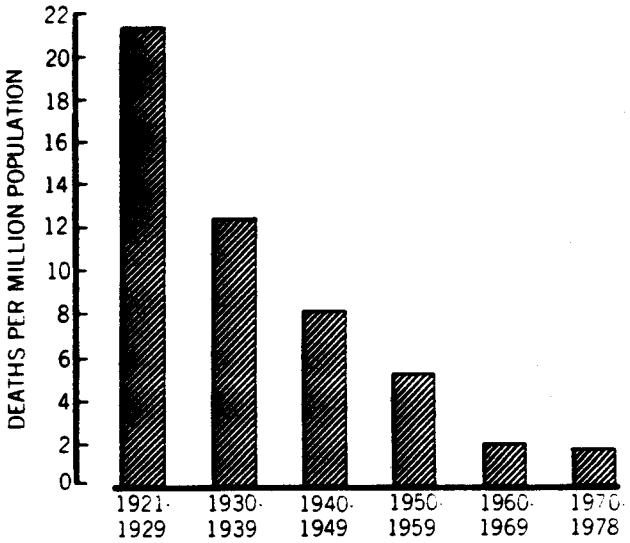


Figure 4. Deaths Due to Meningococcal Disease by Decade, Canada, 1921-1978.



Death-to-Case Ratio

The significance of a death-to-case ratio depends upon the accuracy and completeness with which deaths and cases are recorded. Since mortality statistics for acute infectious diseases are known to be more complete than cases notified by physicians, figures for death-to-case ratios are likely to be artificially high. In the three decades, 1940, 1950, 1960, there has been a progressive increase in the death-to-case ratios, 26 per cent, 30 per cent, and 34 per cent respectively. In the 1970s this ratio was only 16 per cent. Decline in death-to-case ratio may be explained by (a) improved physician notification of cases by physicians; (b) inclusion of meningococcal carriers; (c) possible inclusion of greater numbers of atypical meningococcal disease manifesting itself as pneumonia, arthritis, conjunctivitis, or genitourinary infection which normally have a low mortality rate; or (d) early detection and improved therapeutic management.

Distribution of Meningococcal Serogroups, 1974-1979

Of the 470 typable isolates obtained from cases between 1974 and 1979, group B accounted for 50.6 per

cent; group C, 26.6 per cent; group A, 13.8 per cent; and groups Y,Z,W-135 and 29_e for 9 per cent. Those few serologically rough, poly-agglutinating, "non-typable" or untyped strains could not be incorporated for determination of frequency distribution on a national basis.

During the past decade the most notable feature was the decline in group A serogroups from 30 per cent to 7 per cent of the total and the increase in group B distribution from 30 per cent to over 60 per cent of the total isolates.

Laboratory surveillance of meningococcal serogroups and serotypes is becoming increasingly important because of the introduction of vaccines which are serogroup specific. A change in the serogroup distribution warrants alteration in the recommendation.

Vaccine preparations for groups A and C have been licensed in Canada. There is no vaccine presently available for use in prevention of group B disease.

(*Source: Canada Diseases Weekly Report*, Vol. 6-49, 6 December 1980.)

Histoplasmosis in Mexico, 1979-1980

Primary pulmonary histoplasmosis in Mexico is a health problem that has not been accurately evaluated, both because of a lack of knowledge among medical and paramedical personnel concerning this mycosis and because it affects residents of rural areas, many of whom are not reached by health care services. In addition, it is not a disease for which reporting is compulsory.

The causal agent, *Histoplasma capsulatum*, grows abundantly in bat droppings that infect mines, tunnels, and caves. It frequently produces massive infection among workers, in whom the disease is usually serious and often fatal.

The problem causes losses of several billion pesos every year, and has become a serious hindrance to development

Table 1. Epidemic outbreaks of primary pulmonary histoplasmosis in Mexico in 1979.[a]

Epidemic outbreaks	No. of cases	Source of infection	Deaths	Case fatality ratio
Copalillo, Guerrero	15	Bat droppings (tunnel)	2	13.3%
Tepic, Nayarit	8	Bat droppings (abandoned mine)	1	12.5%
Ajijic, Jalisco	15	Bat droppings (tunnel)	—	—
San Luis Potosí, San Luis Potosí	30	Bat droppings (caves)	—	—
Tzitzio, Michoacán	1	Bat droppings (abandoned mine)	—	—
Chiapas	1	Chicken droppings(?)	1	100%
Huasteca, Potosina	1	Bat droppings (abandoned mine)	—	—
Cuernavaca, Morelos	2	Bat droppings (caves)	—	—
Jalisco	2	Bat droppings (abandoned mine)	—	—
Total	75		4	5.3%

[a]*Source:* Department of Epidemiology.

of the nation's mining, metallurgy, and economy. More than 2,000 large mines (most of them gold and silver) have had to be abandoned at the height of production because of *H. capsulatum* infestation from large chiropteran populations that spread the fungus on the floor of mines, tunnels, and caves.

Because of its geologic structure, Mexico has one of the largest collections of caves in the world, some of which are very beautiful, and attract large numbers of explorers, tourists, speleologists, archaeologists, geologists, collectors of bat droppings, and students of biology, geology and other subjects. As in the case of the abandoned mines, caves house large bat populations; cave floors are usually covered with tons of droppings thus exposing visitors to the risk of infection by *H. capsulatum*. Except for Tlaxcala and Baja California Sur, every state in Mexico has reported epidemic outbreaks or isolated cases of the disease. But underreporting conceals the true magnitude and full extent of the problem.

Table 2. Epidemic outbreaks of primary pulmonary histoplasmosis in Mexico in 1980.

Epidemic outbreaks	No. of cases	Source of infection
Tecalitlán, Jalisco	8	Bat droppings (tunnel)
Etzatlán, Jalisco	4	Bat droppings (abandoned mine)
Guadalajara, Jalisco	4	Bat droppings (cave)
Torreón, Coahuila	4	Bat droppings (cave)
Tijuana, Baja California Norte	1	?
Guanajuato	4	Bat droppings (abandoned mine)
Juxtlahuaca, Guerrero	3	Bat droppings (cave)
San Joaquin, Querétaro	1	Bat droppings (abandoned mine)
Tzitzio, Michoacán	3	Bat droppings (abandoned mine)
San Luis Potosí	3	Bat droppings (abandoned mine)
Tamaulipas	30	Bat droppings (cave)
Yucatán	3	Bat droppings (cave)
Cases of undetermined origin[a]	13	?
Total	81	

[a]Inferred from serologic studies done at the Institute of Health and Tropical Diseases.

Source: Department of Epidemiology.

Probably because of the peculiar features of its transmission, the primary pulmonary histoplasmosis observed in Mexico is much more dangerous than that of other countries: in some outbreaks the case fatality ratio is over 40 per cent. Fatalities have decreased considerably in recent years, however, possibly because of an intensive campaign of hygiene education aimed at the population most frequently attacked.

In 1979, 11 epidemic outbreaks were studied, involving 75 victims and a case fatality of 5.3 per cent. The source of infection in all outbreaks was bat droppings (Table 1). The outbreaks—which occured in Chiapas, Guerrero, Jalisco, Michoacán, Morelos, Nayarit, and San Luis Potosí—involved many employees of the Mexican Telephone Company, the National Electicity Board, and a number of biology students.

Twelve epidemic outbreaks, involving a total of 68 persons, were studied in 1980. Another 13 cases were reported whose source could not be determined. Apparently none of the 81 patients died (Table 2). In every instance where the source of infection could be examined, it was found to be bat droppings.

The states involved were Baja California Norte, Coahuila, Guanajuato, Guerrero, Jalisco (three outbreaks), Michoacán, Querétaro, San Luis Potosí, Tamaulipas, and Yucatán.

(*Source: Boletín de Epidemiología*, Vol. 1 (4), 1 April, 1981. Department of Epidemiology, Under-Secretariat of Health, Mexico.)

Acute Communicable Diseases in Chile, 1980

The epidemiological characteristics of the communicable diseases customarily observed in Chile have changed only slightly in the past five years.

Since final statistics on the number of deaths are not yet available the following comments refer exclusively to morbidity from the major communicable diseases in 1980 (Table 1). Future corrections as a result of elimination or late reporting of cases may change the totals somewhat, but will have no effect on the study.

Typhoid fever is still the paramount epidemiological

problem, and has become increasingly so over the past five years. In that time the figures have almost doubled and hold rates close to or over 100 per 100,000 inhabitants, peaking at 13,114 cases at a maximum rate of 120.8 per 100,000. In 1980, for the fourth consecutive year the figures were in the five digits, with a total of 10,837 cases and a rate of 97.6 per 100,000. The estimated figures for January 1981 were even higher than for the same month in 1980, which indicates that the situation shows no signs of returning to normal.

The Ministry of Health is conducting a series of studies to examine the apparent contradictions in the epidemiological behavior of typhoid fever. Its mode of transmission—through the digestive system—is associated with the cultural and hygienic standards of a population; the disease should therefore be more prevalent in countries of less social, economic, and sanitary development, with higher average annual temperatures and prolonged hot seasons. However, Chile does not fit this description. Indeed, the highest incidence of typhoid fever is reported in the capital, Santiago, which has the best excreta disposal system and the most extensive potable water supply coverage in the country. The morbidity rate for Santiago in 1980 is 159.0 per 100,000, which is much higher than that of the country as a whole.

According to very recent studies by the Ministry of Health in conjunction with the seven largest hospitals in Santiago, 7.3 per cent of the bile cultures made in cholecystectomies disclose the presence of *Salmonella typhi* or *S. paratyphi* A or B. If this figure applies to all the cholecystectomies in the country—calculated at more than 1,200,000 (the highest rate in the world, along with Sweden and certain tribes of North American Indians)—it could mean that there are more than 100,000 carriers in Chile, and about 40,000 in Santiago alone. The situation is further aggravated by the fact that adult women are the most frequent victims of cholelithiasis, which affects almost 50 per cent of those over 35-40 years of age. Also, since women are more involved in handling food, they represent a greater epidemiologic risk if they are carriers of *S. typhi*.

Table 1. Morbidity from the major communicable diseases in Chile, 1980.[a]

Disease	Metropolitan Area		Entire country	
	No. of cases	Rate[b]	No. of cases	Rate[b]
Typhoid and paratyphoid fever	6,782	159.0	10,837	97.6
Diphtheria	102	2.4	246	2.2
Whooping cough	2,067	48.5	2,937	26.4
Meningococcal infection	72	1.6	147	1.3
Anthrax	—	—	35	0.3
Tetanus	11	0.2	28	0.2
Measles	1,895	44.4	3,939	35.5
Infectious hepatitis	1,974	46.3	4,348	39.1
Syphilis	2,868	29.7	8,434	75.9
Gonorrhea	5,149	120.7	12,468	112.9
Rheumatic fever	69	1.6	237	2.1

[a] Provisional data.
[b] Rate per 100,000 population.

In response to the foregoing, exhaustive epidemiological research will be conducted throughout the country with live and attenuated typhoid vaccines such as Ty 21a, which in previous tests have proved safe and have yielded a good immune response; the vaccines have also afforded intestinal protection against local multiplication of the pathogen and its subsequent propagation in the environment.

Diphtheria morbidity declined in 1980 to only two thirds the rate for the preceding year (246 cases compared with 337), partly as a result of widespread vaccination campaigns. The morbidity rate is expected to drop even more because recent regulations governing the purchase, distribution, and storage of vaccines guarantee that those administered will be of high potency.

The same observations apply to *whooping cough*. The incidence in 1980 was five times higher than in the preceding year (2,937 against 453), but this is partly a result of periodic epidemic fluctuations; 1980 was an epidemic year, particularly in the nation's capital.

A standing alert is required against *meningococcal infections* because their epidemiological behavior is unpredictable; 147 cases were recorded in 1980 and 203 in 1979. Capsular polysaccharide vaccines from groups A and C have been administered and research is in progress to determine the degree and duration of the protection conferred.

The number of annual cases of diseases transmitted by domesticated herbivores, such as *tetanus* and *anthrax*, is very low. Tetanus toxoid is given under national child immunization programs, as part of the triple vaccine administered to infants and preschool children. It, along with diphtheria toxoid, is also administered in the vaccination of school children.

In 1980, 3,939 cases of *measles* were reported, establishing one of the lowest totals in the country's history. 1979 was an epidemic year that left a large number of naturally immune persons in addition to the many who had been vaccinated; 34,573 cases of measles were recorded. Mass vaccination, instituted in 1964, sharply reduced the magnitude of this problem, which was noted in the increasing number of deaths—over 3,260 in that year, particularly from bronchopulmonary complications in infants under one year of age. It is expected that future use of the vaccine in two doses together with proper storage methods to ensure full potency will soon mark the end of epidemic outbreaks which,

although of limited severity and geographic extent, still recur with certain periodicity.

The reported morbidity from *infectious hepatitis* was lower in 1980 than the previous year: 4,348 and 6,100 cases respectively. In the absence of specific control measures, this can only be attributed to spontaneous fluctuations of the viral infection.

Venereal disease levels are more or less stable. Annual variations in the number of cases reported are responsible for erroneous shifts in trends. The success of a control program cannot be measured by an initial drop in the figures, since the first result is an increase in the number of cases as others come to light which had been previously concealed.

Rabies is now in process of eradication. Isolated cases of animal rabies are only sporadically found in very restricted geographic areas. The last case of human rabies was reported more than five years ago.

The epidemiological behavior of acute communicable diseases during 1980 indicates that, besides activities designed to maintain and, as far as possible, increase the high levels of active protection, and besides technical and administrative measures for the proper preservation of vaccines and the increase in venereal disease campaigns, the greatest attention should be given, in the immediate future, to the control of typhoid fever, the country's priority epidemiological problem.

(*Source: Boletín de Vigilancia Epidemiológica* Vol. VIII, (1 and 2), January-February 1981 Ministry of Health of Chile.)

Courses

Principles of Epidemiology for Disease Control

As announced in the *Epidemiological Bulletin* (Vol. 1, No. 6, 1980), the Divisions of Disease Prevention and Control and of Human Resources and Research at PAHO have completed the final revision of instructional material on "Principles of Epidemiology for Disease Control," which is now available to interested countries and institutions.

General information. The material was selected and initially reviewed by PAHO staff in consultation with a number of national epidemiologists who have service and teaching experience.

Trials carried out in Uruguay (August 1980), Mexico and Cuba (October 1980) and, lastly, in Mexico (April 1981) were essential to the final revision of the content and adjustment of the methodology.

The material is organized in five modular units:

Unit 1—Disease in the Population
Unit 2—Quantification of Health Problems
Unit 3—Epidemiological Surveillance
Unit 4—Epidemiological Research
Unit 5—Disease Control in the Population.

The methodology consists primarily of reading, active discussion, and problem solving as set forth in the outline. A group dynamic is essential in that it emphasizes the experience of the participants and develops their understanding of the real-life situations that make up their respective services and communities. In the authors' opinion, no textbook, however elaborate, can take the place of the participants' experience. For this reason, the self-teaching approach is not used. .

This is no new course or basic textbook in epidemiology, but rather a collection of ideas and concepts which, to be put into practice, should be discussed in groups of professional health service staff.

If necessary, further local examples and problems may be added at the country or regional level.

Duration. The material requires approximately 30 hours of work. It is suggested that participants meet to discuss the material in groups of eight or ten for five consecutive days.

While the material could be discussed on five nonconsecutive days (for example: meetings on Saturdays with personnel from a health area, center, etc.,) the interchange of ideas would lack the intensity of five consecutive days of work.

Multiplier strategy. The health staff who are to participate in the discussions should be selected at the central coordination level of the epidemiological area. It is suggested, however, that the professionals from provincial areas at the central level take part in the opening

stage of the discussion. Because of the participants' experience, probably fewer than the five days required under normal conditions will be needed.

In subsequent stages it is suggested that some of the professionals trained in the first stage participate as monitors in new discussion groups. To continue the multiplier effect, this second generation of professionals should then organize additional groups at either the central or provincial level, as dictated by convenience and the availability of resources.

The fundamental purpose is the multiplication of discussion groups so that the entire professional staff, particularly those employed at the most peripheral levels of the health system, may participate in them.

In the discussions doubts usually arise about the structure of services and standards for the surveillance and control of diseases that exist in the country. It is most desirable to stimulate this kind of discussion, since it provides an opportunity to explain the rules and directives of health care programs, and identifies problems and needs for disease surveillance and control work at the local level.

As part of the discussion strategy it is suggested that a summary of the structure of health services, plans, and principal programs be provided at the end of the material. The level and content of this supplementary material should be determined by the health authorities of each country.

In certain cases, if sufficient interest is expressed, at the end of the discussions the groups may work out special research projects on a particular disease or health problem. This can have the practical result of improving the recording of data and strengthening communication among the various levels of the system.

After the course is over, refresher discussions should be organized as part of a simple continuing education scheme.

It is hoped that this educational process will stimulate confirmation or reorganization of ideas, provide health care staff with additional motivation in their daily tasks, identify the needs of staff members in peripheral service areas and, primarily, improve disease surveillance and control programs.

The material is available in both Spanish and Portuguese, and may be obtained through the PAHO Textbook Program. Requests for additional information should be directed to PAHO offices in the various countries.

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