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Diarrheal Diseases in the Americas

Diarrheal diseases are one of the major health problems in Latin America and the Caribbean, particularly among children under 5 years of age, and especially those under 1 year (Table 1).

The designation "diarrheal diseases" covers a varied group of clinical syndromes of diverse etiology, including shigellosis, salmonellosis, amebiasis, as well as diseases caused by bacilli, protozoa, viruses, worms, and fungi.

Given the limited availability of laboratory resources for identifying etiologic agents, especially in Latin America and the Caribbean, most cases and deaths are reported as due to unspecified diarrheal diseases.*

The mortality data for 24 countries reflect the importance of diarrheal diseases as a cause of death in the age groups at greatest risk in various subregions of the Americas (Tables 2 and 3). In 15 of the 24 countries these dis-

*Codes 008 and 009 of the *International Classification of Diseases* (Ninth Revision, 1975). Geneva, World Health Organization, 1977.

Table 1. Number, rate per 100,000 inhabitants, and percentage of deaths due to diarrheal diseases, by age group, in subregions of the Americas, around 1976.

Subregion	Age in years								
	<1			1-4			<5		
	No.	Rate	%[a]	No.	Rate	%[a]	No.	Rate	%[a]
North America	700	19.0	1.4	85	0.6	0.9	785	4.6	1.3
Caribbean Middle America	2,100	438.9	15.2	584	27.7	15.0	2,684	103.8	15.2
Mainland Middle America	36,431	1,078.2	22.8	16,724	154.1	25.8	53,155	373.6	23.7
Tropical South America	21,154	1,066.5	20.3	11,630	151.5	21.5	32,784	339.4	20.7
Temperate South America	4,777	495.6	10.9	677	20.4	9.1	5,454	127.3	10.7
Total	65,162		17.5	29,700		21.3	94,862		18.5

[a] Percentages in relation to total number of deaths due to all causes.

IN THIS ISSUE ...

Table 2. Order of importance of diarrheal diseases among the five leading causes of death in the <1 year age group in 24 countries of the Americas, by subregion, around 1976.

Subregion	No. of countries	Order				
		1st	2nd	3rd	4th	5th
North America	2	—	—	—	—	1
Caribbean Middle America	7	—	4	—	3	—
Mainland Middle America	7	3	2	2	—	—
Tropical South America	5	2	3	—	—	—
Temperate South America	3	—	1	1	1	—
Total	24	5	10	3	4	1

eases are the first or second cause of death in both the <1 and <5 year age groups.

Despite the widespread nature of the problem, in 17 of the 22 countries for which detailed information is available the mortality rate in the <5 year age group has declined in recent years by annual proportions that have varied from country to country, while tending to rise in the other five countries (Table 4).

In May 1978, the Thirty-first World Health Assembly urged the Member States of WHO to consider diarrheal diseases as a priority problem and apply measures of recognized efficacy to combat and control them within the framework of primary health care. The Assembly also recommended the promotion of technical cooperation among the Member Countries and between them and WHO in the preparation, execution, and evaluation of programs and in the training of health personnel at various levels; it was urged that priority be given to research activities aimed at further improvement of suitable methods for the treatment, prevention, and control of these diseases.

WHO established an expanded diarrheal disease control program with the immediate objective of reducing diarrhea-related infant mortality and malnutrition through oral rehydration treatment provided as part of national primary health care activities.

In the Americas this high-priority worldwide program represented a complement to the efforts that PAHO had been carrying out in this field.

Table 3. Order of importance of diarrheal diseases among the five leading causes of death in the <5 year age group in 24 countries of the Americas, by subregion, around 1976.

Subregion	No. of countries	Order				
		1st	2nd	3rd	4th	5th
North America	2	—	—	—	—	—
Caribbean Middle America	7	2	2	—	2	1
Mainland Middle America	7	5	—	2	—	—
Tropical South America	5	3	2	—	—	—
Temperate South America	3	—	1	2	—	—
Total	24	10	5	4	2	1

Effective development of the program's activities is favored by recent advances in research, especially in the aspects of etiology and treatment, which have also significantly enhanced the short- and medium-term prospects for controlling acute diarrheal diseases in the infant population.

Two new etiologic agents—rotaviruses and enterotoxigenic *Escherichia coli*—have been discovered which together may account for more than 50 per cent of cases of diarrhea. With the development of the enzyme-linked immunosorbent assay (ELISA) technique, it is now possible to perform rapid and low-cost field diagnoses and to conduct definitive epidemiologic studies of enteropathogens.

Of even greater importance has been the discovery that a low-cost electrolytic oral solution appears to be a reliable and simple means of rehydration in cases of diarrhea, regardless of etiology.

Once a Member Country has agreed to prepare and implement a national diarrheal disease control program, PAHO assumes a collaborative role and works with the proper authorities at all stages of the program's execution. It is recommended that activities at national level be integrated into the existing primary health care infrastructure and that emphasis be laid on the following interdisciplinary strategies:

- Treatment of acute diarrheal diseases through oral rehydration based on use of the electrolytic solution of glucose recommended by WHO, with emphasis given to the need to continue this treatment throughout the entire course of the disease.
- Improved maternal and child nutrition, especially the promotion of breast-feeding and proper preparation of food during the weaning period.
- Improvement of water supply, sewerage, and food hygiene facilities, and adoption of measures to ensure their acceptance and use.
- Intensification of health education efforts, with emphasis on personal hygiene and the use of oral rehydration in the home.
- Establishment of epidemiologic surveillance systems to detect and control epidemics of diarrheal diseases and to evaluate the impact of the program, especially in rural and periurban areas.

Continuous monitoring and evaluation of activities are essential to assure the progress and effectiveness of national diarrheal disease control programs. Both types of indicators—operational and impact—should be taken into account.

In drawing up medium-term national programs, Member Countries should aim at reducing to less than 1 per cent the death rates in patients treated by personnel trained in the techniques for combatting diarrheal dehydration. Depending on local circumstances and needs, PAHO will provide technical cooperation to national

Table 4. Mortality rates for diarrheal diseases per 100,000 inhabitants for two years in <1-year-olds and 1-4-year-olds, by countries of the Americas,[a] and yearly average of total percentage variation.

Country		Age in years					
		<1		1-4		<5	
		Rate	%	Rate	%	Rate	%
Argentina	1969	760.0		26.6		173.3	
	1977	488.6	−4.4	26.0	−0.2	137.6	−2.5
Barbados	1968	219.2		4.2		44.2	
	1977	44.6	−8.8	10.8	+17.4	17.4	−6.7
Canada	1969	25.7		2.3		6.7	
	1977	15.2	−5.1	0.8	−8.1	3.9	−5.2
Chile	1968	1,379.5		39.2		308.2	
	1977	551.4	−6.6	11.8	−7.7	112.6	−7.1
Colombia	1968	1,438.2		257.0		489.1	
	1975	922.7	−5.1	119.6	−7.6	281.5	−6.0
Costa Rica	1968	1,778.3		104.8		429.2	
	1977	361.4	−8.8	25.2	−8.4	103.8	−8.4
Cuba	1968	499.2		12.0		108.7	
	1977	255.7	−5.4	5.4	−6.1	43.5	−6.6
Dominica	1969	1,967.3		306.8		647.7	
	1975	336.5	−13.8	18.3	−15.6	63.0	−15.0
Dominican Republic	1968	1,727.6		162.5		468.2	
	1976	628.6	−7.9	59.6	−7.9	175.7	−7.8
Ecuador	1969	1,096.6		203.1		387.6	
	1974	1,556.9	+8.3	302.7	+9.8	552.1	+8.4
El Salvador	1969	783.5		205.3		340.8	
	1974	1,276.1	+12.5	182.1	−2.2	428.9	+5.1
Guatemala	1969	1,738.7		975.8		1,158.3	
	1976	1,400.0	−2.7	511.5	−6.7	734.7	−5.2
Honduras	1969	650.9		210.2		310.3	
	1976	707.9	+1.2	161.3	−3.3	287.2	−1.0
Mexico	1969	1,573.5		245.1		551.7	
	1974	1,079.3	−6.2	125.1	−9.7	352.5	−7.2
Nicaragua	1968	2,090.8		197.8		678.2	
	1977	1,229.0	−4.5	103.7	−5.2	374.4	−4.9
Panama	1968	482.0		112.1		194.6	
	1974	306.5	−6.0	75.0	−5.5	120.0	−6.3
Paraguay[b]	1969	1,792.5		188.4		422.0	
	1977	2,540.0	+5.2	362.3	+11.5	711.7	+8.5
Peru	1969	1,188.9		189.4		395.7	
	1973	1,247.6	+1.2	189.7	0.0	404.8	+0.5
Trinidad and Tobago	1970	664.0		25.5		144.5	
	1976	791.9	+3.2	48.9	+15.2	207.2	+7.2
United States	1968	29.5		1.7		7.1	
	1977	19.4	−3.8	0.6	−7.1	4.7	−3.7
Uruguay	1968	688.8		13.4		158.7	
	1976	363.6	−5.9	7.8	−5.2	94.6	−5.0
Venezuela	1968	775.5		79.1		232.3	
	1977	738.4	−0.5	48.9	−4.2	202.3	−1.4

[a] Data not available for Bolivia, Brazil, Guyana, or Haiti. Bahamas, Grenada, Jamaica, and Suriname are not included because the information is incomplete.
[b] The information area covers approximately 50 per cent of the population.

diarrheal disease control programs in one or more of the following areas:

- Determination of the nature and extent of the problem.
- Compilation, evaluation, and distribution of the pertinent scientific information.
- Planning, implementation, and evaluation of national programs.
- Organization and conduct of training activities (seminars, meetings, and courses), including the preparation and provision of teaching materials.
- Establishment of installations and procurement of equipment for local production of oral rehydration salts.
- Production, standardization, and distribution of essential laboratory reagents.
- Support to countries that have identified water supply and sewerage services in rural and periurban areas with insufficient coverage as priority areas.
- Provision of other technical services by staff members or consultants.

Another important component of the PAHO program is extending support to qualified researchers in the Member Countries in the study of all aspects of diarrheal diseases.

Eleven clinical studies on etiologic and therapeutic aspects of diarrheal diseases are going forward or have been completed in five countries of Latin America and the Caribbean, and some have resulted in findings of worldwide importance. For example, an investigation carried out in Costa Rica showed that oral rehydration treatment is effective in neonates[1] and that sucrose can be safely substituted for glucose in oral rehydration solutions.[2] In Jamaica a significant reduction in the rate of hospitalization of children for diarrheal diseases took place after the institution of outpatient oral rehydration treatment.[3]

In addition, six operations research projects have been started in five countries of Latin America and the Caribbean for the purpose of determining the optimum strategies for diarrheal disease control programs and identifying various determinants of performance in this field. The subjects of the research range from determination of the degree of accuracy with which mothers prepare oral electrolytic solutions to evaluation of the impact of oral rehydration in diarrhea experienced by children in a refugee camp.

To date 18 Member Countries have expressed interest in initiating national diarrheal disease control programs. Eight have begun the programming of activities in the context of their health care systems; 11 are producing oral rehydration salts locally; and three others are planning to begin production in 1981.

As national programs get underway and additional experience is gained in this field, greater importance is being attributed to coordination with other programs at the level of primary health care.

(Diarrheal Disease Prevention and Control Program, PAHO)

[1] Pizarro, D. et al. Oral rehydration of neonates with dehydrating diarrheas. *Lancet* ii: 1209-1210, 1979.

[2] Nalin, D. et al. Comparison of sucrose with glucose in oral therapy of infant diarrheas. *Lancet* ii: 277, 1978.

[3] Asley, D. et al. Experience with oral rehydration at Bustamante Children's Hospital, 1979 (to be published).

Diseases Subject to the International Health Regulations

Cases and deaths caused by cholera, yellow fever, and plague reported in the Region of the Americas up to 30 April 1980

Country and administrative division	Cholera Cases	Yellow fever		Plague Cases
		Cases	Deaths	
BOLIVIA	—	*17*	*13*	—
La Paz	—	7	6	—
Cochabamba		10	7	
BRAZIL	—	*8*	*4*	*15*
Ceará	—	—	—	15
Goiás	—	7	4	—
Pará	—	1	...	—
COLOMBIA	—	*2*	*2*	—
Cesar	—	1	1	—
Norte de Santander	—	1	1	—
PERU	—	*6*	*6*	—
Ayacucho	—	1	1	—
San Martín	—	5	5	—

—None ... Data not available.

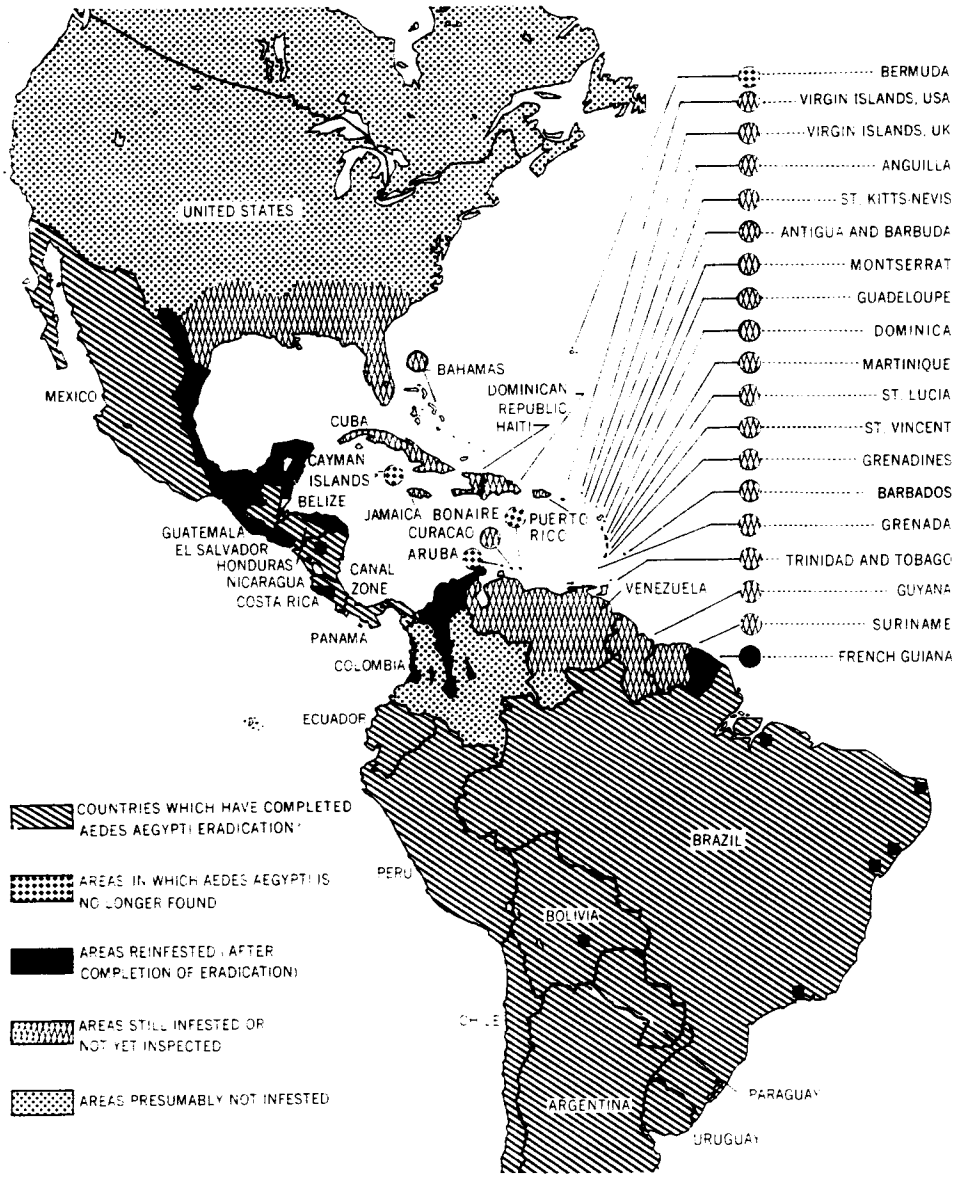
Aedes aegypti Campaign

In recent years dengue and yellow fever have appeared as growing problems in the Americas. At the same time many of the national programs for the control and eradication of *Aedes aegypti* have suffered serious setbacks. As a consequence *A. aegypti* has reinfested areas where it had been successfully eradicated and invaded others from which it had not previously been reported.

Brazil and Bolivia have recently been reinfested, and *A. aegypti* appears to be spreading in many countries. A number of factors are probably at play in each situation. However, a general relaxation of surveillance measures has contributed to this spread, for once firmly established it is exceedingly difficult to eradicate again. The figure below summarizes the present *A. aegypti* situation in the Americas.

Three programs can be cited as examples of adequate surveillance and immediate implementation of eradication measures. In 1977 Manta, Ecuador was found reinfested with *A. aegypti*. After a concentrated effort of source reduction, larviciding, and adulticiding, this

Figure 1. Status of the *Aedes aegypti* eradication campaign in the Americas, 1980.



***Eradication carried out according to the standards established by the Pan American Health Organization.**

focus was eradicated. Again in 1979 reinfestation occurred in the area of a transportation terminal. Although the mosquito may have come from ships docking in the port, it appears that the means of re-entry were buses coming from Colombia and Venezuela. Once more by using virtually all available means of control, *A. aegypti* was eradicated. Panama, especially the Caribbean coast ports and small islands, frequently either become reinfested or small boats are found with *A. aegypti* breeding on them. Late in 1979 Grand Cayman was reinfested in the airport, probably by mosquitoes carried on small private aircraft landing without notice for inspection. This reinfestation was discovered by using ovitraps as one of the surveillance tools. Eradication, although costly, was successful. A second reinfestation occurred early in 1980 in the vicinity of the seaport. Routine larval habitat inspections located this focus. Again, eradication was successful.

In each of the above examples, surveillance has been the key. In the present situation with rapid air and ground transportation as well as the more traditional means for *Aedes aegypti* spread, the ship, surveillance of *A. aegypti*-free areas must be strengthened. Of major importance is the location of areas at risk for re-invasion, such as bus terminals near frontiers between free and infested areas, seaports, especially those used by small ships, and airports. Some countries have border inspection of vehicles with insecticide treatment of potential breeding sources such as tires.

Surveillance includes an active inspection and treatment of ships and aircraft. This program is subject to breakdown due to slow communication between harbor or airport management and surveillance staff as well as the routine nature of the duty of inspectors. Continuous education of the importance of surveillance and evaluation of inspections can assist in reducing this danger.

One of the traditional means of surveillance is searching for larval habitats. More recently the placing of ovitraps in and around risk areas has been successfully used. A combination of the two methods is recommended.

The extension of *A. aegypti* into previously uninfested areas is another serious problem. This situation has been observed in Colombia. Although the exact nature of this rapid extension of range is not known, a number of factors are undoubtedly at work. Man is extending his own environment into new territories. At first he is peripatetic, but eventually villages and then cities are established. Transportation services improve and man soon produces ideal breeding sites for *A. aegypti*. Thus, the mosquito can arrive and find an environment conducive for colonization. Man's immigration into new areas and the subsequent establishment of suitable habitats for *A. aegypti* produce a new situation for surveillance.

Dengue in the Caribbean, northern South America, and Central America was characterized by a rapid spread of type I virus reaching epidemic levels in 1977 and 1978 but becoming less pronounced and endemic in some areas by 1979. Nevertheless, in the latter year, there has been a northward movement of the virus along the Pan American Highway in Mexico. Tapachula, Chiapas, suffered an epidemic of dengue (type 1) early in 1979. Ultra-low volume ground and aerial applications of malathion against the adult and temephos sand granule treatment of larval habitats were applied. Following these control endeavors, reported cases declined, only to peak again in July and August. Entomologic surveillance showed an increase in breeding sites in June about a month after the beginning of the rainy season. During 1979 there was a movement of virus activity into the state of Veracruz. There is concern that the movement of dengue will continue northward during the warmer months of 1980. Entomologic surveys show that *A. aegypti* can be found in the eastern coastal and some of the central areas of Mexico and in 10 of the southeastern states of the United States of America.

Human cases of jungle yellow fever have occurred in recent years in Bolivia, Brazil, Peru, Ecuador, Colombia, Venezuela, and Trinidad. Most of these cases appear to be related to the *Haemagogus*-monkey jungle cycle. However, in some areas of Colombia, for example in 1979 when yellow fever activity moved northward into the foothills of the Sierra Nevada de Santa Marta, a rural type of yellow fever appeared. In this area and in another in the general vicinity of Cúcuta, cases were reported in agriculturists not working in jungle conditions. The possibility of a reservoir other than monkey and of a new vector is being considered for investigation. Of additional importance is the gradual extension of yellow fever activity into areas infested with *A. aegypti* producing a potential risk of *A. aegypti* transmission in rural villages and urban areas.

The epidemic nature of both dengue and yellow fever calls upon the epidemiologist to locate potential risk areas. In addition to knowing the immune status of the population, migration patterns of man, availability of vaccine in the case of yellow fever, the epidemiologist should be familiar with vector surveillance and emergency vector control techniques. As mentioned previously estimates of larval populations is one of the best approaches. Larval surveys should be as extensive as possible and should define the major types of breeding habitats and the distribution and density of the breeding population of *Aedes aegypti*. Results of surveys are usually expressed in terms of per cent of houses positive for larvae (House Index), per cent of all water-holding containers positive for larvae (Container Index), and the number of positive containers per 100 houses (Breteau Index). It is believed that areas where the House Index is higher than 35, the Container Index exceeds 20, and the Breteau Index is greater than 50 could represent a potential high risk for *A. aegypti*-transmitted yellow fever

should the virus be introduced. However, lower indices could promote cases. The situation for dengue is probably similar.

Adult populations of *A. aegypti* may be indirectly assessed by means of ovitraps. These are jars with a capacity of about 500 ml which are painted on the outside with a glossy black paint. The usual size is 130 mm high with a 75 mm diameter. Clean water is added to a depth of 2-3 cm and a hardboard paddle 13 cm by 2 cm fastened to the inside of the jar. The paddles are collected every 5 to 7 days and examined for eggs. Care must be taken in the selection of sites for the traps.

Entomologic surveillance and survey techniques can be adapted for evaluation of either routine operational or emergency control measures. In both cases, the epidemiologist can use the information to evaluate effectiveness of the control program and should attempt to correlate this information with what is happening within the human population.

PAHO has been involved in determining the efficacy of new insecticides and control technology. At present temephos as a formulation of coated sand granules is extensively used as a larvicide even in potable water. It has produced control for 1-3 months. Consequently, many control programs attempt to follow 8-week treatment cycles. Effective treatment centers on finding and treating all containers holding water and the acceptance of the people to allow the insecticide to remain in the container. The musty taste of temephos is disagreeable to some, and a certain degree of health education may be necessary.

Recently an insect growth regulator, methoprene, has been used successfully in small trials and may be considered safe as a larvicide for potable water. It has the advantage of being odorless and tasteless but it has a shorter period of activity and costs more than temephos. Source reduction may be implemented as a control measure.

Some programs supplement larviciding with perifocal adulticiding. With present costs of insecticide and labor, it has not been determined if perifocal spraying is advantageous. Residual spraying of houses, schools, and other public structures is done in routine and emergency situations. It produces a good level of control but is time-consuming, expensive, and is being met increasingly with public opposition. Most insecticides used in malaria control programs, if there is not resistance in the *A. aegypti* population, can be used.

Ultra-low volume (ULV) application of technical grade or special formulations of malathion, dibrom, pirimiphos methyl or fenitrothion have been used against *Aedes aegypti*. Applications can be made with airplanes and helicopters configured with special equipment or with agricultural equipment adapted for public health use. In severe epidemic conditions aerial application should be considered a method of choice. However, many countries have vehicle mounted ULV equipment and thermal foggers as well as potable ULV and thermal equipment in their control programs or in use in agriculture that could be used in emergency control operations. ULV and thermal equipment are of great value for emergency control as they are aimed at bringing the adult vector population to a level sufficiently low to reduce or halt viral activity in the nonimmunized human population. This approach has been used repeatedly during the recent dengue epidemics. In the event of the danger of urbanization of yellow fever, ULV and thermal space sprays could be used as a stop gap until the human population is immunized.

PAHO is preparing manuals for the emergency control of vector-borne diseases and operational control of *Aedes aegypti*. A guide to producing national contingency plans for vector emergencies by an established national disaster and emergency committee will be an important aspect of the manuals.

(Biology and Vector Control
Program, PAHO)

Diarrheal Diseases in Panama, 1970-1978

Morbidity and mortality data continue to be the best available indicator for evaluating the effectiveness of programs for the control of water-borne diseases, even when the information is not of the best quality and is not received with the desired uniformity and regularity.

Table 1 shows the number of cases and deaths caused by diarrheal diseases in Panama and the rates per 100,000 inhabitants from 1970 to 1978. As will be noted, the diarrheal disease morbidity rate apparently increased, while the mortality rate for diarrheal disease dropped during the period. This may be explained by wider coverage of the health services, which has made it possible to detect morbidity and mortality more precisely, and by better reporting of cases. On the other

Table 1. Number of cases and deaths due to diarrheal diseases in Panama, with rates per 100,000 inhabitants, 1970-1978.

Year	Cases		Deaths			
			With medical certification		Total	
	No.	Rate	No.	Rate	No.	Rate
1970	...		344	24.0	673	46.9
1971	...		271	18.3	574	38.8
1972	...		255	16.7	512	33.6
1973	...		284	18.0	530	33.8
1974	31,630	1,951.2	222	13.7	500	30.9
1975	27,442	1,645.5	201	12.0	427	25.6
1976	36,598	2,133.6	327	19.1	511	29.7
1977	33,426	1,896.1	214	12.1	395	22.3
1978	33,198	1,833.6	133	7.3	243	13.3

Sources: Cases—Ministry of Health, Bureau of Epidemiology; deaths—Office of the Comptroller General of Panama (preliminary data for 1976, 1977, and 1978).

hand, mortality declined also as a result of the better health care made available.

Although the data for 1976, 1977, and 1978 are preliminary, the declining trend in mortality rates would seem to be real (Figure 1). Since no significant changes have taken place in the percentage of medically certified deaths from diarrheal diseases, the factors responsible for the decline would not appear to be limited to medical care alone, but would seem to include others related to the social and economic infrastructure, such as construction of water supply systems, housing, and highways.

In 1978 there were clear seasonal variations in the monthly regional distribution of cases of diarrhea in the country (Figure 2). The highest incidence occurred in May and June, which are the start of the rainy season. This seems to hold true for most regions of the country. In interpreting the significance of the morbidity and mortality data by region, it is necessary to take into account wide variations in data compilation and reporting.

Figure 1. Morbidity and mortality due to diarrheal diseases, Panama, 1960-1978.

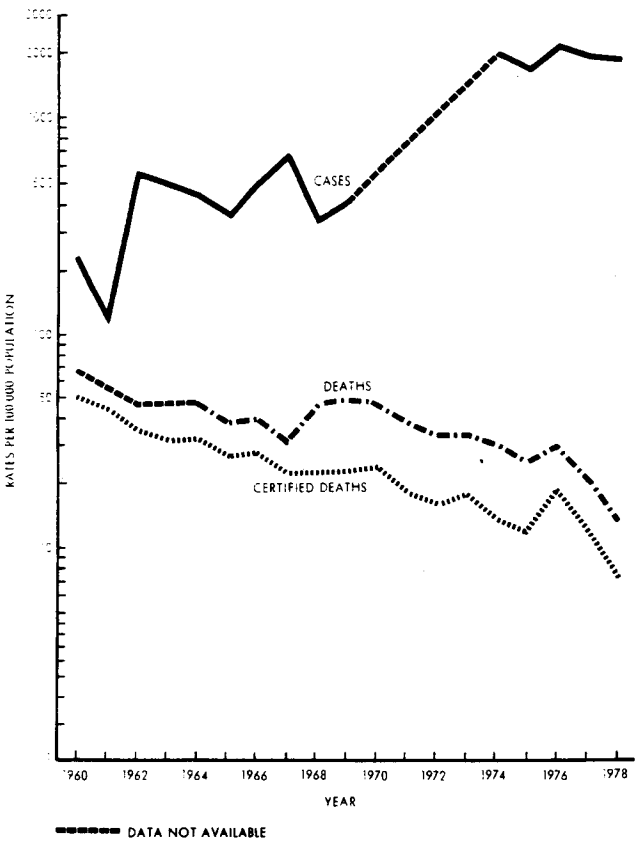


Figure 2. Cases of diarrheal diseases by month of occurrence, Panama, 1978.

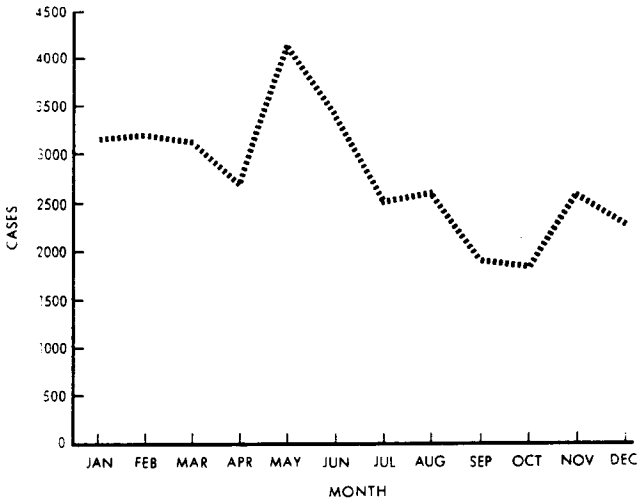


Table 2. Number of diarrheal disease cases and deaths, with rates per 100,000 inhabitants, by region, Panama, 1970-1978.

Region	Cases		Deaths			
			With medical certification		Total	
	No.	Rate	No.	Rate	No.	Rate
Metropolitan	7,681	1,228.8	26	4.2	27	4.3
Azuero	1,842	1,169.7	2	1.3	6	3.8
Bocas del Toro	1,772	3,169.9	14	25.0	23	41.1
Coclé	2,964	2,069.9	3	2.2	11	8.2
Colón	1,197	888.2	31	23.0	35	26.0
Chiriquí	10,261	3,611.9	35	12.3	71	25.0
Darien	447	1,746.1	2	7.8	2	7.8
Veraguas	3,232	1,857.9	5	2.9	39	22.4
Rest of country	3,802	1,806.9	15	7.1	29	13.8
Total	33,198	1,833.6	133	7.3	243	13.4

Sources: Cases—Ministry of Health, Bureau of Epidemiology; deaths—Office of the Comptroller General of the Republic (preliminary data).

Figure 3. Deaths due to diarrheal diseases, by region, Panama, 1970-1978.

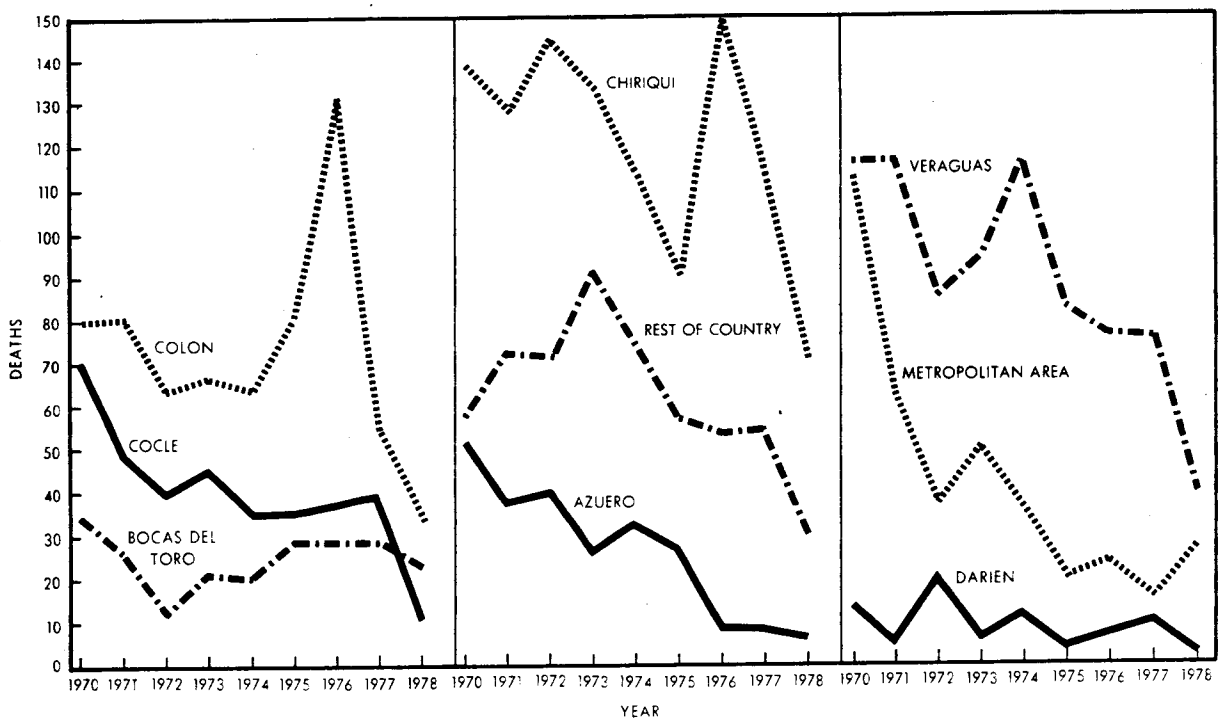


Table 3. Diarrheal disease morbidity and mortality, with rates per 100,000 inhabitants, by region and age group, Panama, 1978.

Region		Age											
		<1 year		1-4 years		5-14 years		15-48 years		50 years +		Total	
		No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Metropolitan	C[a]	2,542	15,130.0	2,495	4,216.0	720	510.8	1,636	499.8	288	356.2	7,681	1,228.8
	D[b]	18	107.13	5	8.45	1	0.71	1	0.29	1	4.42	26	4.16
Azuero	C	484	9,998.0	514	2,807.4	273	636.4	434	615.7	137	653.6	1,842	1,169.7
	D	1	20.66	—	—	—	—	—	—	1	4.8	2	1.3
Bocas del Toro	C	553	28,968.0	612	7,795.2	151	985.6	425	1,612.4	31	695.0	1,772	3,169.9
	D	7	366.7	6	76.42	1	6.53	—	—	—	—	14	25.04
Coclé	C	795	14,188.8	960	4,698.2	386	923.0	664	1,126.9	159	780.8	2,964	2,069.9
	D	2	35.7	1	4.9	—	—	—	—	—	—	3	2.22
Colón	C	239	5,675.6	391	2,492.8	147	429.1	364	604.0	56	275.0	1,197	888.2
	D	21	498.70	4	25.5	—	—	—	—	6	29.47	31	23.0
Chiriquí	C	2,969	29,068.0	3,010	7,709.4	1,133	1,382.4	2,672	2,179.5	477	1,575.5	10,261	3,611.9
	D	20	195.81	12	30.74	3	3.66	—	—	—	—	35	12.32
Darien	C	121	11,816.4	176	4,329.6	52	726.6	81	741.4	17	700.2	447	1,746.1
	D	1	97.66	—	—	1	14.0	—	—	—	—	2	7.81
Veraguas	C	767	12,661.0	1,163	4,912.1	415	827.5	679	901.5	208	1,109.0	3,232	1,857.9
	D	2	33.01	2	8.45	—	—	—	—	1	5.33	5	2.90
Rest of the country	C	1,244	17,151.5	1,310	4,407.8	423	703.5	700	771.8	125	694.4	3,802	1,806.9
	D	7	96.51	3	10.1	2	3.33	1	1.1	2	8.84	15	7.13
Total	C	9,714	16,773.1	10,631	4,877.4	3,700	719.5	7,655	908.2	1,498	689.9	33,198	1,833.6
	D	79	136.41	33	15.14	8	1.70	2	0.24	11	5.07	133	7.35

[a]C = Cases.
[b]D = Deaths.
Sources: Cases—Ministry of Health, Bureau of Epidemiology; deaths—Office of the Comptroller General of Panama (preliminary data); only medically certified deaths included.

For instance, Colón, a region where most of the deaths (88.6 per cent) are medically certified, has one of the highest diarrhea mortality rates in the country; however, the morbidity rate is the lowest, which indicates substantial under-reporting of cases (Table 2).

Since diarrheal disease can be easily detected, even by persons with no specialized training, the total number of deaths from diarrhea, both with and without medical certification, may be regarded as the most homogeneous and exact parameter of the extent of the problem in Panama.

In 1978 the regions of Bocas del Toro, Colón, Chiriquí, and Veraguas had the highest mortality rates. Chiriquí and Bocas del Toro had the highest morbidity rate. The lowest mortality rates were reported in Azuero, the Metropolitan Region, Darien, and Coclé.

The evolution of all deaths from diarrheal diseases in each region of the country from 1970 to 1978 is shown in Figure 3. In 1978, the number of deaths declined in all regions of the country except the Metropolitan Area.

The rates shown in Table 3 indicate the age groups at greatest risk of contracting and dying from diarrheal diseases. The <1 age group shows the highest morbidity and also mortality rates. The morbidity rate in this group is nine times and the mortality rate 18 times the corresponding rates for the total population.

Next in point of incidence is the 1-4 year group, but in this case the risk of contracting diarrheal disease is 2.5 times that faced by the total population, while the risk of dying is only twice that of the total population.

The 5-14 and 15-49 year age groups have relatively low morbidity and mortality rates, particularly the 15-49 year group (mortality rate 0.24 per 100,000 inhabitants).

The 50 and older group has the lowest morbidity rate but follows the 1-4 year group in terms of mortality. Even so, the risk of dying from diarrheal diseases is lower in this group than for the total population and the deaths are associated with other debilitating factors in this age group.

(*Source: Boletín Epidemiológico*, Vol. IV (4), 1979, Ministry of Health of Panama.

Meningitis in Brazil, 1976-1978

The number of Brazilian states participating in the meningitis epidemiologic surveillance system has increased steadily since 1976. To the 14 states that were participating in the system that year, five were added in 1977 and two more in 1978, raising the total to 21.

The cases were classified into three major groups for study: meningococcal meningitis, meningitis from other known causes, and unspecified meningitis. The three groups taken together were designated as meningitis in general.

From 1976 to 1978, the number of cases of meningococcal meningitis declined by nearly 50 percentage points as a percentage of the number of cases of meningitis in general (Table 1); however, the proportion of meningitis due to other known causes more than doubled. These changes reflect a trend of the disease to regress to the endemic levels prevailing before the latest epidemic. They also indicate a progressive increase in the number of cases in the second group, which in turn suggests a better use of the laboratories for diagnosis.

The high proportion of cases of unspecified meningitis may be a consequence of the inclusion in the system of new reporting areas served by personnel having less experience with the problem, or of the inability to perform a laboratory test to determine the causative species.

The mortality rates in 1978 were lower than in 1977 but higher than in 1976 (Table 1).

Figure 1 shows the monthly meningitis mortality rates, in terms of number of cases per 100,000 inhabitants reported in Brazil each month during the period under study. Individual rates are shown for each etiologic group. It will be noted that the number of cases of meningococcal meningitis increased in the coldest months (from May to August), while the number of cases due to other known causes tended to increase in the warmest months (from September to January).

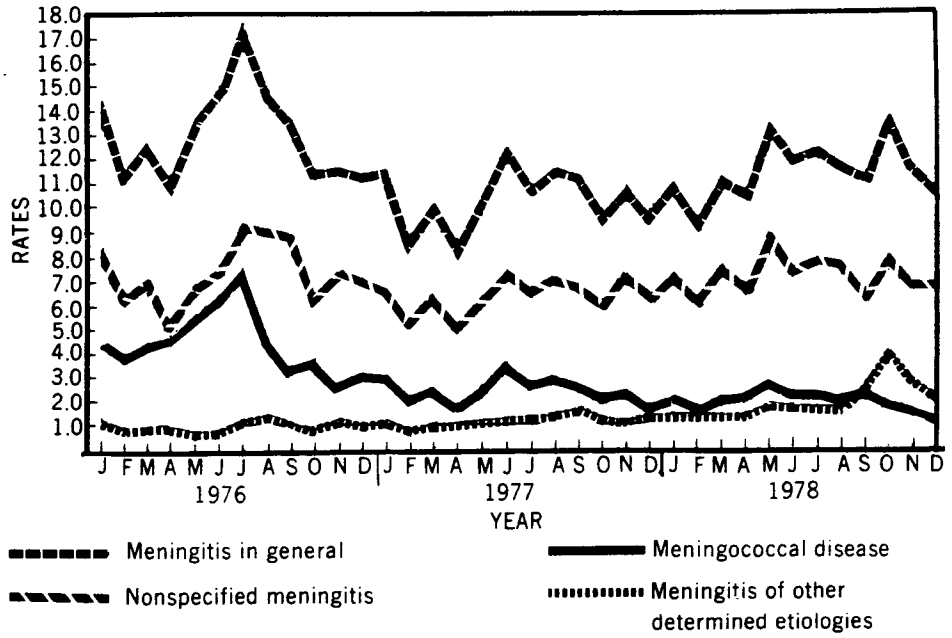
According to the data for 1977, of the total of 2,299 cases of meningococcal disease, 1,920 (83.5 per cent) were classified as meningococcal meningitis and 379 (16.5 per cent) as meningococcemia; 498 and 123, respectively, occurred in the municipalities including the state capital; and 1,422 and 256, respectively, in other municipalities of the state (Table 2). The fatality rates for meningococcal disease (18.5 per cent), meningococcal meningitis (15 per cent), and meningococcemia (36.1 per cent) were all higher than in 1976. The same holds

Table 1. Number of cases, deaths, and death rate, by type of meningitis, Brazil, 1976–1978.

Type of meningitis	1976					1977					1978[a]				
	Cases		Deaths		Death rate	Cases		Deaths		Death rate	Cases		Deaths		Death rate
	No.	%	No.	%	%	No.	%	No.	%	%	No.	%	No.	%	%
Meningococcal disease	2,768	33.9	428	28.8	15.5	2,299	24.6	425	17.5	18.5	1,931	18.3	349	14.2	18.1
Meningitis due to other known causes	687	8.4	153	10.3	22.3	1,216	13.0	397	16.3	32.6	1,893	18.0	534	21.8	28.2
Nonspecified meningitis	4,716	57.7	907	60.9	19.2	5,824	62.4	1,608	66.2	27.6	6,719	63.7	1,568	64.0	23.3
Meningitis in general	8,171	100.0	1,488	100.0	18.2	9,339	100.0	2,430	100.0	26.1	10,543	100.0	2,451	100.0	23.2

[a]Provisional data.

Figure 1. Cases per 100,000 population of meningococcal disease, meningitis of other determined etiologies, nonspecified meningitis, and meningitis in general by month, Brazil, 1976–1978.



true when the municipalities including the state capital and other municipalities in the states are considered separately.

The distribution of cases of meningococcal disease in 1977 by age group, broken down by incidence in the municipalities including the state capital and other municipalities, is shown in Table 3. Of all the cases, 71.9 per cent occurred in the <15 year group, which was higher than in 1976 (68.6 per cent). In the municipalities including the state capital this proportion was substantially the same in each of the two years (76.7 and 76.6 per cent, respectively).

In the <1 year age group the sharpest difference was observed between the proportion of cases registered in 1977 (18.4 per cent) and in 1976 (13.9 per cent), which probably indicates that the incidence of meningococcal disease was regressing to endemic levels after the epidemic that began in 1971. This difference becomes more apparent when the rates per 100,000 inhabitants, adjusted by age group (Figure 2), are analyzed. It will be seen that for all age groups except the <1 year group the rates in 1977 were lower than in 1976.

Table 4 shows that most of the cases of meningococcal disease (82.3 per cent) were confirmed in the laboratory in 1977, 4 percentage points more than in 1976 (78.3 per cent), despite the fact that in the municipalities including the state capitals the proportion of cases diagnosed in the laboratory was identical (85.6 per cent) in the two

Table 2. Meningococcal disease cases and deaths in municipalities including the state capital and in other municipalities in 1977, and fatality rates in 1977 and 1976, by clinical form, Brazil.[a]

Clinical form	Capitals				Other municipalities				Total			
	Cases No. and (%)	Deaths No. and (%)	Death rate (%) 1977	1976	Cases No. and (%)	Deaths No. and (%)	Death rate (%) 1977	1976	Cases No. and (%)	Deaths No. and (%)	Death rate (%) 1977	1976
Meningococcal meningitis	498 (80.2)	70 (62.0)	14.1	12.8	1,422 (84.7)	218 (69.9)	15.3	12.9	1,920 (83.5)	288 (67.8)	15.0	12.9
Meningococcemia	123 (19.8)	43 (38.0)	34.9	31.4	256 (15.3)	94 (30.1)	36.7	30.9	379 (16.5)	137 (32.2)	36.1	31.1
Total	621	113	18.2	17.9	1,678	312	18.6	14.7	2,299	425	18.5	15.5
(Meningococcal disease)	(100.0)	(100.0)			(100.0)	(100.0)			(100.0)	(100.0)		

[a]1976 data for 14 states; 1977 data for 19 states.

Table 3. Incidence of meningococcal disease, by age group, in municipalities including the state capital, in other municipalities, and total for 19 states, Brazil, 1977.

Age group (years)	Capitals[a]				Other municipalities				Total			
	No. of cases	% Partial	% Cumulative	Rate per 100,000	No. of cases	% Partial	% Cumulative	Rate per 100,000	No. of cases	% Partial	% Cumulative	Rate per 100,000
< 1	140	21.0	21.0	27.8	282	17.3	17.3	13.3	422	18.4	18.4	16.1
1- 4	181	27.2	48.2	9.1	305	18.7	36.0	3.6	486	21.1	39.5	4.7
5- 9	120	18.0	66.2	4.9	326	20.0	56.0	3.2	446	19.4	58.9	3.5
10-14	70	10.5	76.7	3.3	230	14.1	70.1	2.5	300	13.0	71.9	2.7
15-19	47	7.1	83.8	2.5	160	9.8	79.9	2.1	207	9.0	80.9	2.2
20-39	78	11.7	95.5	1.8	206	12.6	92.5	1.1	284	12.4	93.3	1.2
40 +	29	4.4	99.9	0.9	90	5.5	98.0	0.7	119	5.2	98.5	0.7
Unknown	1	0.1	100.0	—	34	2.0	100.0	—	35	1.5	100.0	—
Total	666	100.0	—	4.3	1,633	100.0	—	2.3	2,299	100.0	—	2.7

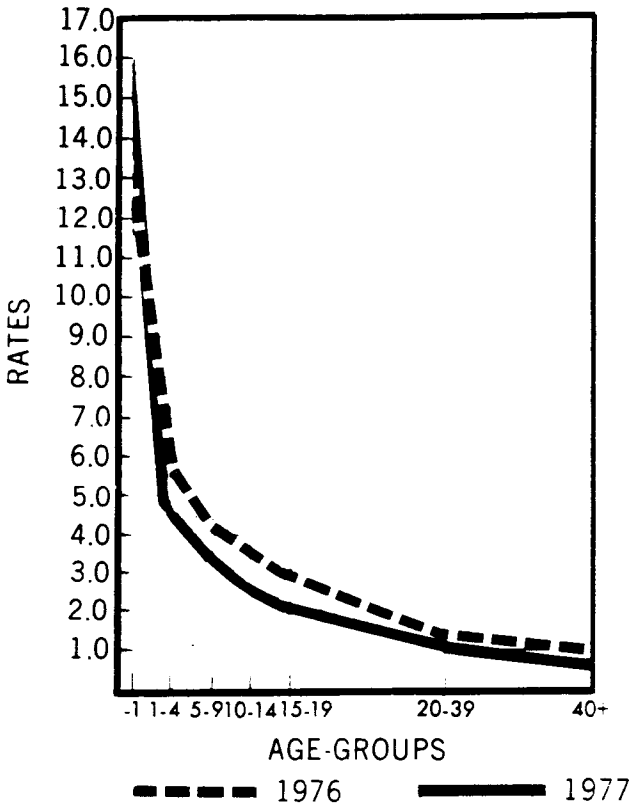
[a]Except Curitiba, the data for which refer to the entire metropolitan area (+45 cases).

Table 4. Number and percentage of cases of meningococcal diseases in the municipalities including the state capital and in other municipalities, classified according to diagnosis confirmation criterion, Brazil, 1977 and 1976.[a]

Diagnostic criterion	Capitals[b]				Other municipalities				Total			
	1977		1976		1977		1976		1977		1976	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Clinical diagnosis only	96	14.4	96	14.4	311	19.0	361	25.5	407	17.7	490	21.7
Laboratory diagnosis	570	85.6	572	85.6	1,322	81.0	1,056	74.5	1,892	82.3	1,772	78.3
a) culture	311	46.7	289	43.2	363	22.2	242	17.1	674	29.3	571	25.2
b) counter-immuno-electrophoresis	8	1.2	8	1.2	15	0.9	11	0.8	23	1.0	24	1.1
c) serology	1	0.1	—	—	1	0.1	—	—	2	0.1	—	—
d) bacterioscopy	225	33.8	233	34.9	860	52.7	681	48.0	1,085	47.2	1,012	44.7
e) cytochemistry	25	3.8	42	6.3	83	5.1	122	8.6	108	4.7	165	7.3
Total	666	100.0	668	100.0	1,633	100.0	1,417	100.0	2,299	100.0	2,262	100.0

[a]1976: 14 states; 1977: 19 states.
[b]Except Curitiba, the data for which refer to the entire metropolitan area (+45 cases).

Figure 2. Incidence of meningococcal disease (rates per 100,000) by age-groups, Brazil, 1976 and 1977.



years. In addition, there was an increase in the utilization of culture tests both in the capitals and in other municipalities, as well as in the use of spinal fluid bacterioscopy in municipalities other than those including the state capital. This test continued to be the most commonly used laboratory test for the confirmation of cases in 1977.

In 1977 the samples for 447 cases from 10 of the 19 states that supplied information were submitted for a determination of *Neisseria meningitidis* serogroups. (In 1976, 11 of the 14 states supplied this type of data.) In 322 (72 per cent) of the total number of cases the serogroups were identified, in 120 cases (26.8 per cent) a classification was not possible, and in 5 (1.2 per cent) other serogroups were determined to be the causative agent but were not specifically reported.

Table 5. Cases of meningitis of known etiology, excluding those of meningococcal origin, and agents identified, Brazil, 1977.[a]

Etiologic agent	Cases	
	No.	%
Pneumococci	160	35.6
Tuberculosis bacillus	130	29.0
H. influenzae	56	12.4
Enterobacteria	23	5.1
Staphylococcus sp.	19	4.2
Streptococcus sp.	14	3.1
Epidemic parotitis virus	13	3.0
Gram-positive cocci	11	2.4
Salmonella sp.	5	1.1
Gram-positive diplococci	5	1.1
Pseudomonas sp.	4	0.9
Escherichia coli	3	0.7
Gram-negative bacilli	2	0.4
Klebsiella sp.	1	0.2
Brucella sp.	1	0.2
Proteus sp.	1	0.2
Gram-negative bacilli	1	0.2
Cryptococcus neoformans	1	0.2
Total	450	100.0

[a] Supplementary information supplied by the departments of health of 14 states.

Some 65.2 per cent of the cases corresponded to serogroup A, 30.1 per cent to serogroup C, and 4.7 per cent to serogroup B. There was an increase in the proportion of serogroup A cases compared to that in 1976, a year in which the percentages registered for the three groups were 58.9, 37.3, and 3.8, respectively.

Of the 1,216 cases of known etiology, excluding meningococcal origin, supplementary information was obtained in 1977 on the etiologic agent identified in 450 cases from 14 states (Table 5): 64.6 per cent of the cases corresponded to meningitis due to pneumococci and to tuberculosis bacillus (35.6 and 29 per cent, respectively).

(*Source: Boletim Epidemiológico.* Vol. XI (18 and 20), 1979. Ministry of Health of Brazil.)

Hepatitis in Costa Rica, 1978-1979

In 1978, a total of 1,870 cases of viral hepatitis were reported in Costa Rica, the rate of incidence being 100.22 per 100,000 inhabitants. Viral hepatitis is, after infections of the respiratory tract, the infectious disease with the highest incidence in Costa Rica. It is present in virtually all parts of the country, with the highest incidence in the southern area.

According to surveys carried out in the city of Limón and the Santa Ana district of San José, the cases were due to virus A.

In 1979, 1,813 cases were reported, a rate of incidence of 90.0 per 100,000 inhabitants. The age group most affected was the 5-9 year group (Table 1).

The rate of incidence of hepatitis ranged from 78.4 to 147.0 per 100,000 inhabitants in the five regions of the country.

Table 1. Cases of viral hepatitis and rates per 100,000 inhabitants, by age group, Costa Rica, 1979.

Age in years	Cases	Rate
1	58	96.3
1-4	241	108.9
5-9	528	171.8
10-14	337	113.2
15-19	166	69.9
20-29	219	69.9
30-39	98	47.6
40-49	52	33.9
50+	92	42.2
Unknown	22	—
Total	1,813	90.0

(*Source: Semana Epidemiológica,* Vol. VII (8) and Vol. VIII (3 and 4), 1979. Ministry of Health of Costa Rica.)

National Survey on Disease Surveillance in the United States

In April 1979 a questionnaire was distributed to 55 epidemiologists of states and territories of the United States for the purpose of examining the disease surveillance activities being carried out and obtaining suggestions for improving them. All but two of the epidemiologists returned the questionnaires duly completed.

The epidemiologists indicated that both national and state data were used extensively for disease control efforts, while national data was also used for archival purposes and program development. The information in the *Morbidity and Mortality Weekly Report* was used weekly in about 60 per cent of the states. Approximately 80 per cent of the epidemiologists believed that, if surveillance against noncommunicable diseases were to be intensified, useful data would be obtained for national program policy; approximately two-thirds were of the opinion that this would contribute to a reduction of mortality and morbidity due to these diseases. One-fourth of the respondents expressed willingness to participate in a three-year program of surveillance of environmentally induced or chronic diseases.

More than three-fourths of the epidemiologists said that automated data processing would be useful in their surveillance activities. Although fewer than half of the states are using computers for data analyses, this technology should be used more extensively, according to the replies.

(*Source: Morbidity and Mortality Weekly Report,* Vol. 29 (9), 105-106, 1980, Center for Disease Control, Atlanta, Georgia, U.S.A.)

Courses

Epidemiology and Public Health Administration for Disease Control, 9-27 June 1980. Center for Disease Control (CDC), Atlanta, Georgia, U.S.A.

Admission requirements: Physicians or health professionals coming from or working in a country other than the United States; English.

Objectives: To explain the methods used in communicable disease surveillance and control at the CDC; to offer participants an opportunity to consult on the eradication or control of communicable diseases and other preventable health problems; and to analyze various trends in the field of disease control in the United States that may be adaptable to other countries.

Course content: Concepts of surveillance and research techniques; epidemiology of selected diseases; immunization practices; nutrition surveys; medicine in disaster situations; training methods; population dynamics; and basic principles of administration and management.

Epidemiology, Fifteenth Annual Summer Session for Postgraduates, 22 June-12 July 1980. University of Minnesota, Minneapolis, U.S.A.

Admission requirements: Instructors, postgraduate fellows, graduate students and residents from schools of medicine, public health, dentistry, veterinary medicine, etc., medical students, qualified staff of the department and other health institutions; English.

Course offerings: Fundamentals of biostatistics; fundamentals of epidemiology; epidemiology of infectious diseases; hospital epidemiology and control of infections; epidemiology of diseases due to drug and other therapies; communicable disease surveillance and control; clinical tests: design, operation, and analysis; epidemiology of cancer; occupational epidemiology; epidemiology of traumas; advanced statistical methods in epidemiology; and epidemiology of cardiovascular diseases.

Principles of Epidemiology and Their Practical Application, 18-29 August 1980. University of Ottawa, Ottawa, Canada.

Admission requirements: Physicians, nurses, laboratory specialists, and other professionals participating in epidemiologic research, medical research, teaching, and community health programs; English.

Program for Specialization in Epidemiology of Diseases Related to Environmental Factors.

The Department of Environmental and Industrial Health of the School of Public Health, University of Michigan is offering a two-year program leading to the degree of Master's in Public Health with a concentration in epidemiology of diseases associated with environmental factors.

The course is being organized as follows: 35 per cent of the study hours devoted to epidemiology; 37 per cent to environmental and industrial health; 14 per cent to biostatistics; and 15 per cent to public health in general. Courses on epidemiology, biostatistics, and public health are relatively fixed; those on environmental and industrial health are flexible. The student can elect to participate in a general program of environmental epidemiology or to specialize in one of the following areas: toxicology, industrial hygiene, use of radiology in health, water quality, environmental chemistry, and air pollution.

Calendar of Meetings

Seminar for Statistical Officers in Charge of Disease Surveillance Activities.

Port-of-Spain, Trinidad, 28 April-1 May 1980

The seminar will bring together officials performing similar functions in the various member countries of the Caribbean Epidemiology Center (CAREC) for the purpose of expanding their knowledge in specific areas and examining general problems pertaining to the development of information systems for disease surveillance. The possibility of utilizing a new minicomputer to be installed at CAREC will be examined.

The principal topic this year is "Surveys and Sampling," since such methods are, in many cases, the most helpful means of obtaining the information required for

determining the needs and assessing the effectiveness of health programs.

The following topics will also be examined: effects of the smoking habit on health; notification of diseases subject to compulsory reporting; immunization coverage; information on accident traumas, and codification according to the International Classification of Diseases, Ninth Revision, including its application and its differences with the Eighth Revision.

4th Annual Seminar for Laboratory Directors.
Suriname, 12-16 May 1980

CAREC is organizing the seminar as part of its technical cooperation program and inviting the directors of the government laboratory in each member country and in the French and Dutch Caribbean territories to participate.

The subjects to be examined include communication among laboratories in the region, appropriateness of automating their operations, administration of the laboratories. The 1979 recommendations and the UNDP and USAID projects pertaining to laboratories in the Caribbean will be reviewed.

Seminar for National Epidemiologists.
Port-of-Spain, Trinidad and Tobago, 26-30 May 1980

With the participation of selected epidemiologists from various Caribbean countries, a meeting will be held at CAREC to discuss the present status of the programs on malaria, leprosy, tuberculosis and diseases preventable by vaccination. The following subjects will also be reviewed: status of yellow fever in Trinidad; outbreaks of food poisoning; nutritional surveillance; potable water quality; hospital infections in Trinidad and Tobago and the Caribbean area; traffic-accident traumas; and the role of the epidemiologist in preparedness for and relief following natural disasters.

Meeting on Economic Aspects of the Prevention of Blindness.
Washington, D.C., 7-10 July 1980

The group of experts in the economics of health and the prevention of blindness participating in this meeting will prepare a basic reference document for use in setting priorities in social and health planning related to the prevention of blindness.

First Meeting of the PAHO Advisory Committee and Fourth Brazilian Congress on the Prevention of Blindness.
Belo Horizonte, 25-26 July 1980

The purpose of the meeting will be to advise the Director on the PAHO prevention of blindness program.

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