Epidemiological Bulletin

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Tuberculosis in the Americas

PART I: EPIDEMIOLOGY

The objectives of the tuberculosis control program in the Americas[1] are: to reduce morbidity and mortality through BCG vaccination and the detection and treatment of cases by the general health services.

BCG vaccination reduces by 80 per cent the vaccinees' risk of contracting the disease. Since it is basically applied to infants under one year of age for the purpose of preventing tuberculous meningitis and other serious (but non-contagious) forms of infant tuberculosis, it has very little effect on the chain of transmission of the disease and on the incidence and general mortality due to tuberculosis. Diagnosis and treatment, especially of active cases (which are the sources of infection), are the principal control methods. The recommended strategy is the detection of active cases through the systematic examination of the sputum of adults with symptoms who present themselves to the general health services for any reason and their out-patient treatment under the supervision of the general health service nearest their home.

[1] The policies and strategies for tuberculosis control in the Region of the Americas were set forth in the *Ten-Year Health Plan for the Americas 1971-1980* (PAHO Official Document 118, 1973) and are described in the *Ninth Report of the WHO Expert Committee on Tuberculosis* (Technical Report Series 552, 1974) and in the *Manual de normas y procedimientos para programas integrados de control de tuberculosis* (Scientific Publication 376, 1979).

Because of operating difficulties, chemotherapy is reserved for special cases such as contacts of active cases or recently infected persons, and is not a practical control measure in most countries, especially those that undertake BCG vaccination activities.

It has been estimated that the maximum impact that could be obtained would be an annual 14 per cent reduction in the problem—as has been achieved in some European countries—through the use of BCG vaccination (1 per cent), diagnosis and treatment (8 per cent) and improvement in economic and social conditions in general (5 per cent). However, in the Americas a 10 per cent annual reduction is believed to be the optimum possible and has already been achieved in some countries and areas where sound programs have been conducted on a sustained basis.

The epidemiological status of tuberculosis in the Region, as well as the trends of the disease, as shown by such indicators as mortality, morbidity, and annual risk of infection, is reviewed below.

Mortality

Data on tuberculosis mortality since the beginning of the century are available in a number of countries and

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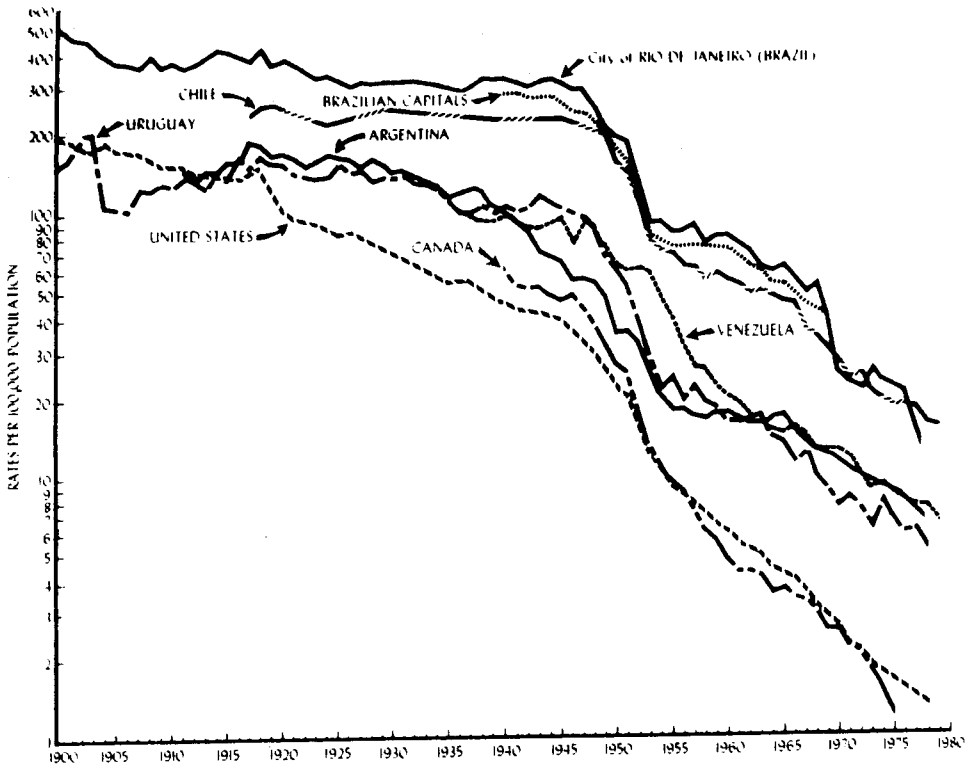
Figure 1. Tuberculosis mortality rates per 100,000 population in selected countries of the Americas since 1900.



reflect a decline in the absence of specific control measures (Figure 1). Between 1945 and 1955 the introduction of drugs into tuberculosis treatment produced a sharp fall in mortality. In some Latin American countries, the death rate was stabilized for several years, possibly because of late deaths of chronic patients that had been incorrectly treated. In the past decade, the downward trend has been more marked than in the prechemotherapy era and probably reflects the impact of control programs. However, an analysis of the information available for a group of Latin American countries (Table 1) shows a very moderate downward trend (5 per cent annually) in mortality, which is probably due to the fact that in those countries the problem is more serious, the program less developed, and financial resources limited. Table 2 presents the deaths reported by the countries in the last year for which statistics are available. In some countries such as Bolivia, Brazil, Haiti, Paraguay, and Peru, the use of death certificates is limited and in most of them a substantial proportion of deaths are not medically certified so the data are of limited value.

On the basis of the incomplete information available, it is estimated that in the Region there are about 45,000 deaths from tuberculosis every year (or 7.5 per 100,000 population).

The goal of the Ten-Year Health Plan for the Americas (1971-1980) was to reduce tuberculosis mortality by between 50 and 65 per cent, which implied an annual reduction of 7 to 10 per cent; the data available show that most of the countries did not achieve that goal.

Morbidity

Tuberculosis morbidity can be determined only on the basis of the reported incidence. Disease prevalence studies are too expensive and are not justified. Furthermore, the prevalence of patients under treatment varies according to the duration of the treatment and the updating of the registers; in addition, it is of little use as an epidemiological indicator since those patients do not represent sources of infection.

The recording of incidence on the basis of reports improves as the program increases its coverage and organization. During this process, which is underway in many countries, the reported cases increase every year until a level close to the real incidence that can be diagnosed with the medical resources available is reached. Furthermore, changes in the resources or the intensity of case detection can temporarily change the observed incidence

Table 1. Tuberculosis mortality rates per 100,000 population in countries of the Americas, 1970-1979.

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Argentina[a]	12.1		10.2		9.3		8.4		6.7	6.2
Canada	2.5	2.1	2.1	1.8	1.5	1.2	...	1.1	0.9	...
Chile	27.4	23.8	24.6	20.7	19.4	18.8	19.1	18.2	15.8	15.1
Colombia	12.8	...	13.8	13.4	13.3	11.7	10.7	10.0	...	...
Costa Rica	7.1	6.2	7.2	4.7	4.4	5.1	5.2	4.2	3.9	4.2
Cuba	...	5.3	4.6	4.3	3.5	2.6	3.0	2.4	2.4	...
Dominican Republic	6.6	5.7	6.1	7.0	6.7	6.2	6.7	6.2	8.1	...
Ecuador	18.3	18.2	18.8	18.0	18.3	...	17.9	16.7	...	...
El Salvador	11.2	11.1	10.2	9.3	9.2	...	6.7	...	...	5.2
Guatemala	20.9	20.1	...	...	...	18.3	15.4	12.2	13.9	...
Honduras	5.0	6.4	5.7	7.2	6.0	3.9	3.4	5.1	...	...
Mexico	19.2	17.3	16.7	15.8	14.8	14.2	13.2	...	...	...
Nicaragua	...	...	2.3	3.0	2.1	2.6	3.5	1.8	1.1	...
Panama	19.4	16.2	16.1	13.7	13.1	...	...	10.8	8.4	...
Paraguay	23.0	24.1	22.5	22.4	19.6	19.7	16.9	13.6	14.3	...
Peru	37.8	32.5	30.3	31.5	...	...	28.2	22.5	...	...
United States of America	2.6	2.2	2.1	1.8	1.7	1.6	1.5	1.4	1.3	...
Uruguay	7.5	8.1	7.3	6.3	7.8	6.3	5.7	6.0	5.1	...
Venezuela	11.3	10.0	8.7	9.1	8.2	7.8	7.5	7.4	6.4	...

[a]Biennial analysis, National Tuberculosis Institute, Argentina.
... Data not available.

although over extended periods the trend (especially in the youngest groups) is a useful indicator.

The discrepancy between the real trend and case reporting is obvious in a number of countries. In Brazil, for example, 47,797 cases were reported in 1979, whereas 56,484, 64,734, and 72,608 were reported in subsequent years because of better record keeping. The morbidity rate rose from 42.6 to 60.0 per 100,000 population in these years, but in the same period mortality fell without any fundamental changes having taken place in treatment. The incidence in the states in which coverage and notification are adequate was reduced or remained stable.

In other countries notification coverage is low and they have not yet reached the stage of extension. In Mexico, for example, up to 1978 the record keeping system included reports only of bacteriologically confirmed pulmonary cases registered by the official services of the Ministry of Health and Welfare, which represent less than half the patients detected and treated in the country.

An analysis of the reported trend in North America shows that the total incidence of cases fell by about 6 per cent annually up to 1978. Since then it has stabilized in the United States of America, probably because of immigration from countries in which there is a higher risk and prevalence of infection (Figure 2). In Latin America there has been a slow decrease in most of the countries, probably from 3 to 5 per cent annually (Figures 2 and 3).

Taking into account the larger natural growth and the smaller proportion of adults with old infections, the effect of control measures should be more rapid in the de-

Table 2. Deaths from tuberculosis in countries of the Americas, last year available.

Country	Year	Number	Rate per 100,000
Antigua	1978	—	—
Argentina	1978	1,959	7.4
Bahamas	1979	7	3.1
Barbados	1978	2	0.8
Belize	1979	12	7.6
Bermuda	1978	—	—
Canada	1978	220	0.9
Chile	1979	1,648	15.1
Colombia	1977	2,440	10.0
Costa Rica	1979	92	4.2
Cuba	1978	229	2.4
Dominica	1978	5	6.2
Dominican Republic	1978	416	8.1
Ecuador	1977	1,260	16.7
El Salvador	1979	233	5.2
French Guiana	1978	4	6.1
Grenada	1977	6	5.5
Guadeloupe	1978	4	1.2
Guatemala	1978	922	13.9
Guyana	1976	65	8.2
Honduras	1977	168	5.1
Jamaica	1975	63	3.1
Mexico	1976	8,213	13.2
Nicaragua	1978	26	1.1
Panama	1978	154	8.4
Paraguay	1978	231	14.3
Peru	1977	3,688	22.5
Saint Lucia	1978	19	17.0
Suriname	1978	4	1.1
Trinidad and Tobago	1977	27	2.4
United States of America	1978	2,914	1.3
Uruguay	1978	147	5.1
Venezuela	1978	838	6.4

Figure 2. Morbidity rates from tuberculosis as notified in selected countries in North and Middle America, 1970-1980, and curve showing a tendency of 5 per cent annual reduction.

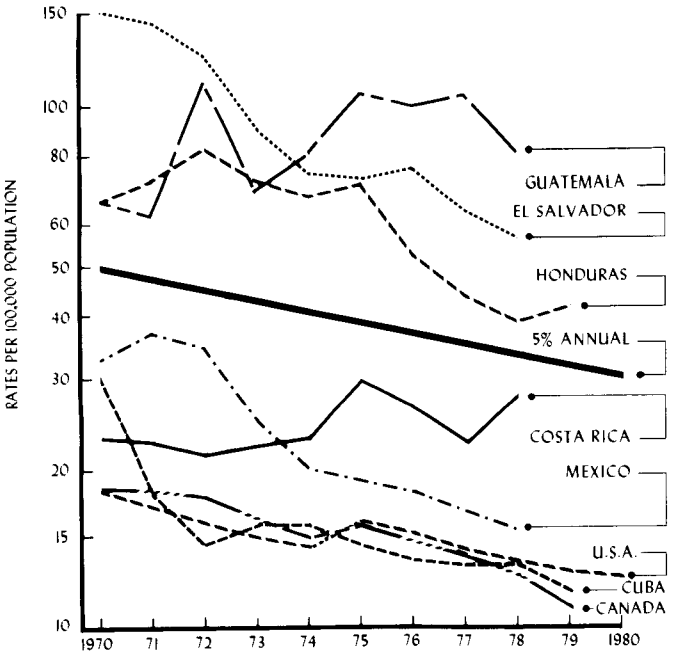


Figure 3. Morbidity rates from tuberculosis as notified by selected countries in South America, and curve showing a tendency of 5 per cent annual reduction.

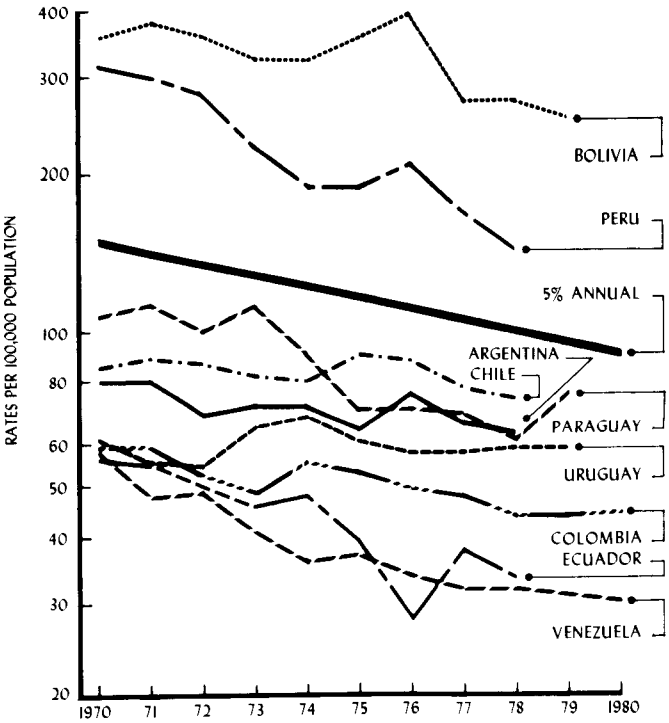


Figure 4. Number and percentage of new cases of tuberculosis by age group and site: pulmonary (PT), pulmonary with positive bacilloscopy (P+), and extrapulmonary (EP), in Middle and South America, 1979-1980.

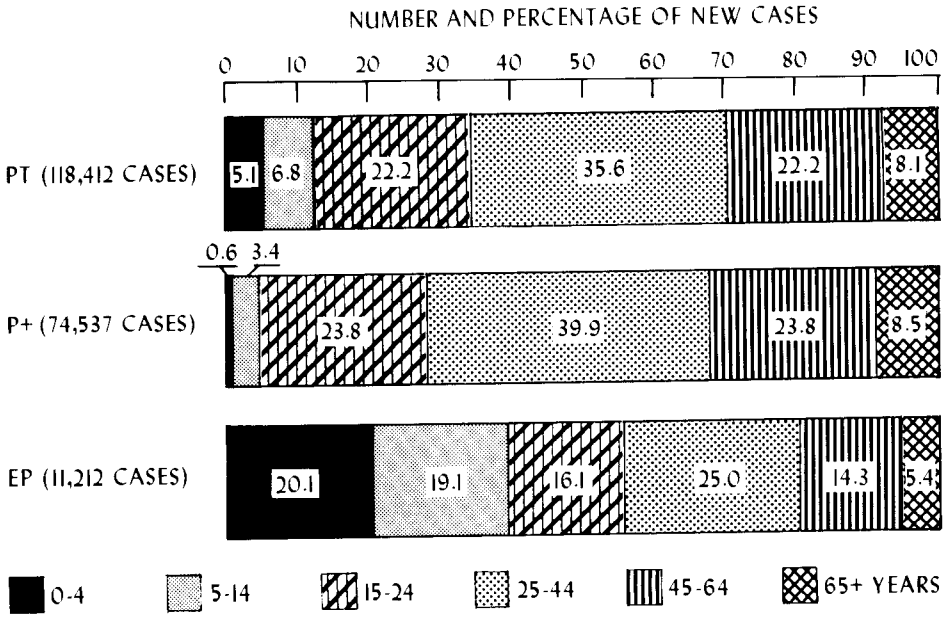


Table 3. Tuberculosis morbidity rates in countries of the Americas, 1970-1979.

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Argentina	80.3	79.3	67.9	71.4	71.6	63.8	75.5	66.0	61.7	62.0	63.5
Bolivia	360	379	361	324	322	349	395	267	267	248	...
Brazil	39.1	37.7	36.7	44.8	31.9	30.8	47.7	42.6	48.5	54.0	60.0
Canada	18.4	18.3	17.9	16.1	14.9	15.6	...	13.7	12.5	...	...
Chile	86	88.5	86.5	82.4	79.9	90.7	87.4	76.9	74.2	...	...
Colombia	59.4	59.5	51.9	48.3	55.2	52.9	49.6	47.4	43.4	42.9	...
Costa Rica	23.1	22.7	21.4	22.2	23.1	29.9	26.4	22.3	27.6	...	...
Cuba	31.2	17.8	14.5	15.7	15.6	14.3	13.4	13.1	13.0	11.6	...
Ecuador	57.4	55.7	...	45.9	48.2	39.5	28.1	37.8	33.5	...	...
El Salvador	153.0	144.3	123.3	90.6	74.9	71.7	77.2	62.4	56.2	...	...
Guatemala	67.6	62.8	110.2	69.9	81.0	104.2	99.2	104.0	80.8	...	...
Honduras	68.2	73.3	84.7	73.7	68.5	72.0	51.3	43.2	38.4	41.0	...
Mexico	33.0	37.1	34.5	24.6	20.0	19.0	18.2	16.6	15.2	...	...
Paraguay	115.1	124.2	103.0	124.9	91.2	71.0	71.4	69.2	61.3	75.7	...
Peru	317.0	299.8	...	223.6	191.8	189.8	206.0	169.7	144.9	...	...
Uruguay	60.4	56.3	55.4	64.9	68.6	61.3	58.0	57.9	59.1	58.9	...
United States of America	18.3	17.1	15.8	14.8	14.2	15.9	15.0	13.9	13.1	...	...
Venezuela	58	48	49	41	36	37	34	32	32	31	30

... Data not available.

veloping countries than in the developed countries. However, there are a number of factors that mask or limit that effect on incidence. First, there is the expansion of the coverage of health services, the greater demand for services by the population, the integration of case detection activities and of resources for the diagnosis of infant and extra-pulmonary forms of the disease, and the gradual improvement in the reporting, registration, and epidemiological surveillance systems. Among the factors that limit the effect of control measures are the socioeconomic conditions of the population and the limited accessibility, scarce resources, and inadequate organization of the health services.

It is estimated that about 250,000 new cases are diagnosed in the Region each year: 12 per cent of them in North America (with a rate of 13.0 per 100,000 population) and 88 per cent in Middle America and South America (with a rate of 67.0 per 100,000 population). The ratio between reported incidence and tuberculosis mortality is 10 to 1 in North America and 5 to 1 in the rest of the Region, probably because of lower levels of case detection and registration and a higher case fatality rate among the detected cases in less developed countries.

Figures 4 and 5 present information for South America and Middle America on notifications by age group and site (pulmonary-extrapulmonary), and according to method of diagnosis. The percentages depend on the age composition of the population, the ability to diagnose extrapulmonary and infant forms of the disease (radiological resources, pediatric clinic, chemical laboratory, culture methods, pathological anatomy examinations), the compulsory reporting of these forms and its enforcement, and the activity and coverage of the program as regards the detection of pulmonary cases by bacilloscopy. Table 3 shows the reported morbidity rates in the countries of the Americas between 1970 and 1980.

In the United States the proportion of cases is lower among young persons (12.6 in persons under age 25) and higher among persons over 65 years of age (28.6 in 1978). As for the diagnostic method, 80.6 per cent of the pulmonary cases proved to be positive on bacteriological examination, 12.4 per cent negative, and for 7 per cent no information was available.

Reliable information is, unfortunately, not available in the Region on cases of tuberculous meningitis in children, which is a good epidemiological indicator as well as an indicator of the impact of BCG vaccination.

Figure 5. Percentage of new cases of pulmonary tuberculosis according to the diagnostic method in Middle and South America, 1979-1980.

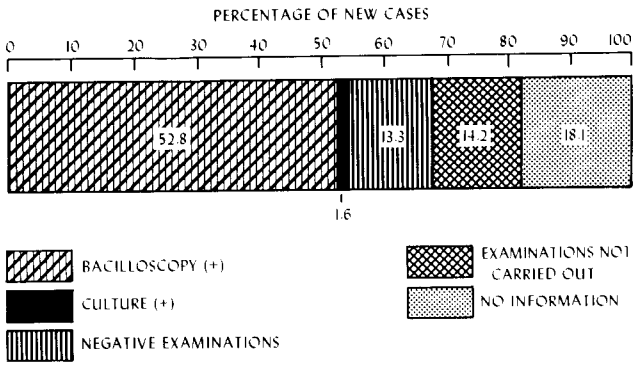


Table 4. Prevalence of reactions of 10 mm and more to the tuberculin test in countries of the Americas.

Country	Year	Age	Prevalence per 100
Argentina	1974-1978	6-7	3.6
Brazil (capitals)	1970-1973	6-10	12.8
Brazil (Belém)	1970-1973	6-10	26.5
Brazil (Rio Grande do Sul)	1971-1974	6-8	2.7
Chile (Santiago)	1969-1970	5-9	9.2
Costa Rica (urban)	1967	6	8
Costa Rica (rural)	1967	5-9	4
Peru (Lima)	1973	6-7	13.5
United States of America	1949-1951	17-21 (19,2)	9.1
United States of America	1961	17-21	4.1
United States of America	1968	17-21	3.1

Annual Risk of Infection

Little information is available about the risk and prevalence of the disease at the regional level. Although prevalence studies are common, the groups studied are usually not representative of the population at large. BCG vaccination and internal migration also interfere with the conduct and comparability of prevalence studies that are carried out at an interval of several years and are necessary for estimating the risk of infection and its trend.

Table 4 presents the information available on the prevalence of reactions of 10 mm or more to the tuberculin test in certain countries for which data are available. In none of them was information on the trend of the risk obtained. However, estimates based on prevalence of infection data that reflect a 3 to 5 per cent annual reduction would indicate for 1980 annual risks of less than 0.5 per cent in Argentina, 0.9 per cent in Brazil, 2 per cent in Peru, and 0.1 per cent in the United States.

If the population samples included in the tuberculin studies are representative and the trends are sustained, these estimates should be correlated with the incidence of new cases since there are approximately 50-60 active cases per 100,000 population for every 1 per cent of risk of infection.

Conclusions

The problem of tuberculosis is slowly but gradually declining in the Americas, with mortality falling somewhat more rapidly than the annual risk of infection and incidence.

Given the present trend (5 per cent annual reduction) and the expected increase in the population, it is estimated that there will be more than 150,000 new cases a year by the end of the century. The aggregate number of cases expected in the next 20 years is more than 2 million.

Since the simple technical resources for prevention, diagnosis, and treatment are available, tuberculosis control should be included among the priority activities of the short- and medium-term health plans of the countries.

The next issue of the *Epidemiological Bulletin* will contain Part II of this report and deal with the present status of tuberculosis control programs in the Americas.

(*Source*: Tuberculosis Control Program, Communicable Disease Unit, Division of Disease Prevention and Control, PAHO.)

Acute Hemorrhagic Conjunctivitis Epidemic

During July, August, and September 1981, Guyana, Suriname, Belize, Trinidad and Tobago, Guatemala, Honduras, Brazil, Costa Rica, and the United States reported the occurrence of large outbreaks of acute hemorrhagic conjunctivitis (AHC), possibly due to enterovirus 70 and/or adenovirus. Laboratory tests are now being performed at the Caribbean Epidemiology Center in Trinidad and at the Centers for Disease Control in Atlanta, Georgia, for confirmation.

Thousands of cases have been observed in some of these countries. In Suriname the epidemic started four months ago on the border with French Guiana and spread throughout the country to reach the border of Guyana within two months. The disease is mild with no reported cases of blindness or permanent sequelae.

Considering the epidemiology of acute hemorrhagic conjunctivitis and the limitations of available control measures, it is probable that the outbreak may reach additional areas of these and other countries.

Acute hemorrhagic conjunctivitis was first recognized in Western Africa in 1969. Outbreaks were seen in North Africa, England; Continental Europe, India, and South East Asia shortly thereafter. By 1971 large epidemics had been recorded in Singapore, Hong Kong, Indonesia, Japan, Malaysia, the Philippines, India, Korea, Thailand, Sri Lanka, Viet Nam, and the Republic of China (Taiwan). Enterovirus 70 has been the most frequently isolated etiologic agent in these epidemics, although a Coxsackie virus (A 24 variant) and adenovirus 11 have also been implicated.

In June 1981 India reported outbreaks of epidemic conjunctivitis in Calcutta, Madras, Bombay, and Delhi. This epidemic shows evidence of a viral etiology.

The disease is characterized by a short incubation period (under 24 hours), rapid involvement of both eyes, swelling of the eyelids, congestion and watering of the conjunctivae, and in a large percentage of the patients, subconjuctival hemorrhages. Follicular conjunctivitis and occasional punctate epithelial keratitis may also be seen on examination. There are usually no permanent ocular complications; however, radiculomyelitis has been noted on rare occasions. Steroids are not indicated for treatment and may, in fact, be harmful. Enterovirus 70 is highly contagious and is thought to be transmitted primarily by fomites from contaminated fingers, clothing, or towels. Large epidemics most frequently occur in densely populated, crowded, humid areas. Small outbreaks attributed to cross-contamination in medical facilities or physicians' offices have occurred in London, Moscow, and France.

Epidemic conjunctivitis due to enterovirus 70 infection (as well as adenovirus 11 and 8) occurred in 1975 on Guam among South East Asian refugees awaiting transportation to the United States. Conjunctivitis of unknown etiology occurred rarely among American medical personnel in intimate contact with those patients, and no documented acute hemorrhagic conjunctivitis infections were subsequently reported in the United States.

In mid-July 1980 an outbreak of conjunctivitis among South East Asian refugees arriving in Oakland, California, was reported. Following that report, a surveillance system was established on all charter flights arriving at that city and, later in the month, at all U.S. Quarantine Stations. Cases were found on 24 of the 220 flights carrying refugees, and as of 7 September, out of the 9,376 arriving refugees surveyed, 528 were found to have clinical conjunctivitis. Most of the cases were characterized by conjunctival infection, swelling of eyelids, and scanty white discharge in one or both eyes, with no systemic symptoms; 21 of the 528 cases had hemorrhagic manifestations. Viral cultures were taken from each refugee with hemorrhagic conjunctivitis and from a sample of refugees with no clinical evidence of hemorrhagic conjunctivitis. Four of the latter specimens revealed picornavirus; one of these was identified (by homologous-antibody neutralization) as enterovirus 70, the agent predominantly responsible for acute hemorrhagic conjunctivitis. This organism had not been previously isolated from a patient in the Western Hemisphere.

(*Sources*: Epidemiological Surveillance Programs, PAHO and WHO, and *Morbidity and Mortality Weekly Report* 29:37, 1980.)

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 October 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	—
BRAZIL	—	*13*	*12*	*13*
Ceará	—	—	—	13
Goiás	—	1	1	—
Mato Grosso	—	5	5	—
Pará	—	5	4	—
Roraima	—	2	2	—
COLOMBIA	—	6	6	—
Meta	—	4	4	—
Putumayo	—	1	1	—
Vichada	—	1	1	—
ECUADOR	—	—	—	*8*
Chimborazo	—	—	—	8
PERU	—	*91*	*41*	7
Cuzco	—	81	37	—
Junín	—	5	2	—
Loreto	—	1	1	—
Piura	—	—	—	7
San Martín	—	4	1	—
UNITED STATES	*3*	—	—	*9*
Arizona	—	—	—	2
Colorado	—	—	—	1
Hawaii	1	—	—	—
New Mexico	—	—	—	6
Texas	2	—	—	—

—None.

Foodborne Disease Surveillance in the United States

The reporting of foodborne and waterborne diseases in the United States began over half a century ago when state and local health officers, concerned about the high morbidity and mortality caused by typhoid fever and infantile diarrhea, recommended that cases of enteric fever be investigated and reported. The purpose was to obtain information about the role of food, milk, and water in outbreaks of intestinal illness; this information would form the basis for sound public health action.

Foodborne disease surveillance has traditionally served three objectives:

Disease Prevention and Control. Early identification and removal of contaminated products from the commercial market, correction of faulty food preparation

practices in restaurants and in the home, and identification and appropriate treatment of human carriers of foodborne pathogens are the fundamental prevention and control measures resulting from surveillance of foodborne disease.

Knowledge of Disease Causation. The responsible pathogen was not identified in over 60 per cent of foodborne disease outbreaks reported to the Centers for Disease Control (CDC) in each of the last five years, in many cases because of late or incomplete laboratory investigation. In others, the responsible pathogen may have escaped detection even when a thorough laboratory investigation was carried out either because the pathogen is not yet appreciated as a cause of foodborne disease or because it cannot yet be identified by available laboratory techniques. It is probable that these pathogens can be identified and suitable measures to prevent or control diseases caused by them be instituted if more thorough clinical, epidemiologic, and laboratory investigations are employed.

Administrative Guidance. The collection of data from outbreak investigations permits assessment of trends in etiologic agents and food vehicles and focuses on common errors in food handling. Comprehensive foodborne disease surveillance would result in a clearer appreciation of food protection priorities, institution of better training programs, and more rational utilization of available resources.

For the purpose of this report, a foodborne disease outbreak is defined as an incident in which 1) two or more persons experience a similar illness (usually gastrointestinal) after ingestion of a common food, and 2) epidemiologic analysis implicates the food as the source of the illness. An exception to this rule is that one case of botulism or chemical poisoning constitutes an outbreak.

Table 1 contains information on confirmed outbreaks

Table 1. Confirmed foodborne disease outbreaks by etiology, United States, 1975-1979.

Etiology	1975 (%)	1976 (%)	1977 (%)	1978 (%)	1979 (%)
BACTERIAL					
Aerobacter hinshawii	1 (0.5)	—	1 (0.6)	—	—
Bacillus cereus	3 (1.6)	2 (1.5)	—	6 (3.9)	—
Brucella	—	—	—	—	2 (1.2)
Clostridium botulinum	14 (7.3)	23 (17.6)	20 (12.7)	12 (7.8)	7 (4.0)
Clostridium perfringens	16 (8.4)	6 (4.6)	6 (3.8)	9 (5.8)	20 (11.6)
Enterobacter cloacae	—	—	—	—	1 (0.6)
Escherichia coli	—	—	—	1 (0.6)	—
Salmonella	38 (19.9)	28 (21.4)	41 (26.1)	45 (29.2)	44 (25.6)
Shigella	3 (1.6)	6 (4.6)	5 (3.2)	4 (2.6)	7 (4.0)
Staphylococcus aureus	45 (23.6)	26 (19.8)	25 (15.9)	23 (14.9)	34 (19.8)
Streptococcus Group D	1 (0.5)	—	—	1 (0.6)	—
Streptococcus Group G	—	—	—	—	1 (0.6)
Vibrio cholerae 01	—	—	—	1 (0.6)	—
Vibrio cholerae (non-01)	—	—	1 (0.6)	—	1 (0.6)
Vibrio parahaemolyticus	2 (1.0)	—	2 (1.3)	2 (1.3)	2 (1.2)
Yersinia enterocolitica	—	1 (0.8)	—	—	—
Other bacterial	—	—	—	1 (0.6)	—
Subtotal	123 (64.4)	92 (70.2)	101 (64.2)	105 (68.2)	119 (69.2)
CHEMICAL					
Heavy metals	4 (2.1)	6 (4.6)	8 (5.1)	1 (0.6)	1 (0.6)
Ciguatoxin	19 (9.9)	6 (4.6)	3 (1.9)	19 (12.3)	18 (10.4)
Scombrotoxin	6 (3.1)	2 (1.5)	13 (8.3)	7 (4.5)	12 (6.9)
Monosodium glutamate	3 (1.6)	2 (1.5)	2 (1.3)	—	—
Mycotic poisoning	5 (2.6)	1 (0.8)	5 (3.2)	1 (0.6)	1 (0.6)
Neurotrophic shellfish	—	—	—	—	—
Paralytic shellfish	—	4 (3.1)	—	4 (2.6)	—
Other chemicals	6 (3.1)	7 (5.3)	6 (3.8)	5 (3.2)	4 (2.3)
Subtotal	43 (22.5)	28 (21.4)	37 (23.6)	37 (24.0)	36 (20.9)
PARASITIC					
Anisakidae	1 (0.5)	—	1 (0.6)	—	—
Diphylobotrium latum	1 (0.5)	—	—	—	—
Trichinella spiralis	20 (10.5)	8 (6.1)	14 (8.9)	7 (4.5)	11 (6.4)
Subtotal	22 (11.5)	8 (6.1)	15 (9.5)	7 (4.5)	11 (6.4)
VIRAL					
Hepatitis non-B	3 (1.6)	2 (1.5)	4 (2.5)	5 (3.2)	5 (2.9)
Echo, type 4	—	1 (0.8)	—	—	—
Other viral	—	—	—	—	1 (0.6)
Subtotal	3 (1.6)	3 (2.3)	4 (2.5)	5 (3.2)	6 (3.5)
Confirmed total	191	131	157	154	172

of foodborne diseases in the United States by etiology, between 1975 and 1979, and Figure 1 shows the total number of outbreaks and cases over the last 10 years.

In 1979 there were 460 outbreaks (13,207 cases) of foodborne disease reported to the CDC. Reports were received from 38 states, as well as from the U.S. Virgin Islands, Guam, and the U.S. Trust Territories of the Pacific. New York reported 128 outbreaks, with 125 of those from New York City; California reported the next largest number of outbreaks (40), followed by Connecticut (30). Cases were reported from multiple states in three outbreaks.

An etiology was confirmed in 172 outbreaks (7,379 cases). Bacterial pathogens accounted for 69.2 per cent of confirmed outbreaks and 92.3 per cent of cases. In keeping with the pattern observed during the last several years *Salmonella* was responsible for the most outbreaks (44) and the most cases (2,794); *Staphylococcus aureus* was the next most common, with 34 outbreaks and 2,391 cases (Table 2). One outbreak (37 cases) was attributed to *Enterobacter cloacae*.

In 288 of the outbreaks (5,828 cases) reported in 1979 no pathogen was identified. The extent of the investigation in these outbreaks varied; in some instances no pathogen was identified even after an extensive laboratory investigation, while in other instances only minimal laboratory work was performed. Incubation periods were known for illnesses in 248 of the outbreaks: in 8 outbreaks the incubation period was reported as less than 1 hour; in 124 outbreaks the incubation period ranged between 1 and 7 hours; in 59 outbreaks the incubation period was 8 to 14 hours; while in 57 outbreaks the incubation period was more than 15 hours. Two deaths were reported in association with outbreaks of unknown etiology.

A number of different microorganism-carrying vehicles were implicated in the 1979 outbreaks. The most common vehicle, beef, accounted for 20 outbreaks; the most common pathogen associated with beef was *Clostridium perfringens* (7 outbreaks). Outbreaks involving ham were most often associated with *Staphylococcus* (8 of 10 outbreaks); outbreaks due to other types of pork generally involved *Trichinella spiralis*. With the exception of one case of botulism, all outbreaks associated with fish were caused either by ciguatera or scombroid. *Seriola zonata* (amberjack) accounted for 8 of the 18 ciguatera outbreaks, while mahi-mahi (dolphin) was the most common vehicle in scombroid poisoning. No vehicle was identified in 41 of the 173 outbreaks of known etiology; 23 of these outbreaks involved *Salmonella*, and 50

Figure 1. Number of cases and outbreaks of foodborne disease reported to the U.S. Centers for Disease Control, 1970–1979.

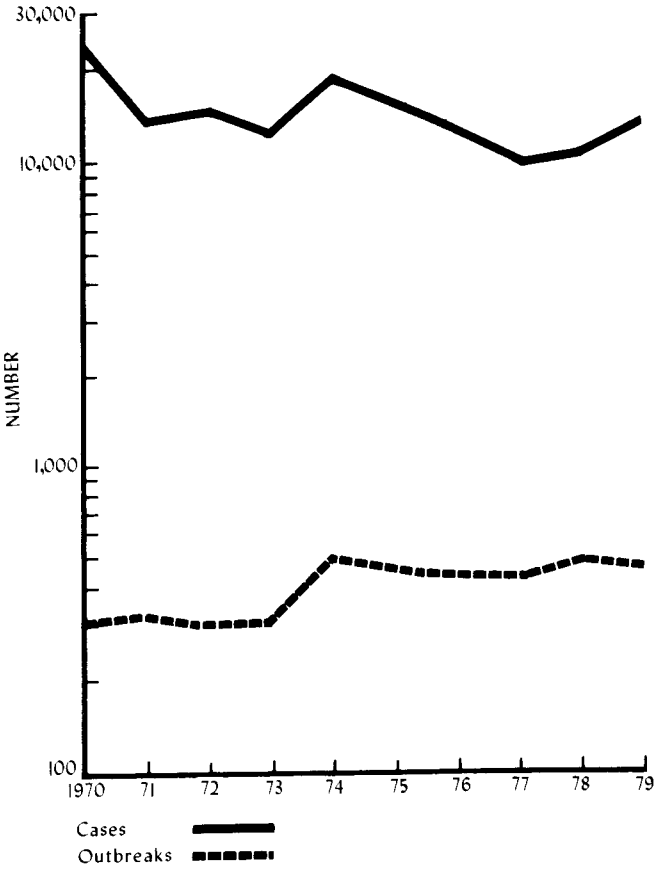


Table 2. Confirmed foodborne disease outbreaks and cases by etiology, United States, 1979.

Etiology	No. of Outbreaks (%)		No. of Cases (%)	
BACTERIAL				
Brucella	2	(1.2)	18	(0.2)
Clostridium botulinum	7	(4.0)	9	(0.1)
Clostridium perfringens	20	(11.6)	1,110	(15.0)
Enterobacter cloacae	1	(0.6)	37	(0.5)
Salmonella	44	(25.6)	2,794	(37.9)
Shigella	7	(4.0)	356	(4.8)
Staphylococcus aureus	34	(19.8)	2,391	(32.4)
Streptococcus Group G	1	(0.6)	73	(1.0)
Vibrio cholerae (non-01)	1	(0.6)	5	(0.1)
Vibrio parahaemolyticus	2	(1.2)	14	(0.2)
Subtotal	119	(69.2)	6,807	(92.2)
CHEMICAL				
Heavy metals	1	(0.6)	18	(0.2)
Ciguatoxin	18	(10.4)	85	(1.2)
Scombrotoxin	12	(6.9)	132	(1.8)
Mycotic poisoning	1	(0.6)	2	(0.03)
Other chemical	4	(2.3)	13	(0.2)
Subtotal	36	(20.9)	250	(3.4)
PARASITIC				
Trichinella spiralis	11	(6.4)	93	(1.3)
VIRAL				
Hepatitis (non-B)	5	(2.9)	74	(1.0)
Other viral	1	(0.6)	155	(2.1)
Subtotal	6	(3.5)	229	(3.1)
Confirmed total	172	(100.0)	7,379	(100.0)

per cent of the *Salmonella* outbreaks had an unknown vehicle. As might be expected, in 248 of the 288 outbreaks of unknown etiology, no vehicle of transmission was identified.

Two hundred twenty outbreaks were restaurant-associated, and 118 associated with foods eaten at home. Outbreaks associated with *S. aureus* presented an exception to this trend, with 11 outbreaks connected to food prepared in the home compared with 4 restaurant-associated outbreaks. Outbreaks of *C. botulinum* were all related to home-prepared foods. Scombroid poisoning outbreaks tended to occur in restaurants, and those attributed to ciguatera poisoning tended to occur at home.

Outbreaks of foodborne illness occurred more frequently in the spring and fall with the exception of *Salmonella*-associated outbreaks which occurred more frequently in the summer. In 165 outbreaks the reporting agency specified a factor or factors which they felt contributed to the outbreak. The most common factor in bacterial outbreaks cited in 52 (87 per cent) of 60 outbreaks was improper storage temperature. The next most common factor was poor personal hygiene, followed by inadequate cooking; a similar pattern was seen in other etiologic agents, and, with the exception of *T. spiralis* outbreaks, all were attributed to inadequate cooking.

It should be emphasized that there are limitations in the quantity and quality of the data presented in this report. The variability in reporting can be seen by looking at the distribution of outbreaks by state. New York City, for example, reported 98 per cent of the outbreaks occurring in New York State, although it accounts for only 50 per cent of the state's population; similarly, Connecticut reported 30 outbreaks, more than all of the southeastern states combined. While it is possible that New York City and Connecticut have an increased rate of foodborne disease, it is more likely that the discrepancy simply represents differences in reporting. The same variability in reporting can be seen when looking at the number of outbreaks by pathogen. The data show that *C. botulinum* is as common a foodborne pathogen as *Shigella*, a conclusion which can only be explained on the basis of more complete reporting for botulism than for shigellosis.

The number of outbreaks of foodborne disease reported to CDC per year over the last 10 years has remained relatively constant. Fluctuation in the number of cases reported each year can usually be explained by the occurrence of several large outbreaks involving 1,000 or more people. The distribution of cases by etiology has also remained fairly constant. Etiologies have been confirmed in 40 per cent or less of outbreaks over the last five years. When the etiology has been confirmed, bacterial pathogens have consistently accounted for approximately two-thirds of the outbreaks, and chemical etiologies for an additional 25 per cent. Excluding *C. botulinum*, *Salmonella* has remained the most common bacterial foodborne pathogen, followed by *S. aureus* and *C. perfringens*; there is a suggestion that *C. perfringens* outbreaks are possibly being recognized more frequently and *S. aureus* outbreaks less frequently recognized. Among chemical etiologies, ciguatera poisoning remains the most common, followed by scombroid poisoning.

Group G *Streptococcus* was implicated in an outbreak of pharyngitis which was epidemiologically associated with consumption of chicken salad; the cook who prepared the chicken salad had a positive throat culture for group G *Streptococcus*.

Five deaths were reported in association with outbreaks of *C. perfringens*, all deaths occurring in one large outbreak which involved a number of weak patients in a state mental hospital. One death was reported in association with an outbreak of *Shigella*.

Chemical etiologies accounted for 20 per cent of the total confirmed outbreaks, but only 3 per cent of the cases. Ciguatera poisoning was the most common etiology, accounting for 18 outbreaks and 85 cases. In 1979 *T. spiralis* was the only parasitic pathogen reported, accounting for 11 outbreaks (93 cases). Viral pathogens were implicated in an additional 6 outbreaks (229 cases).

E. cloacae and *Streptococcus* Group G were both included as foodborne pathogens for the first time in this year's report. Although neither has been clearly shown to be a foodborne pathogen, the circumstances in the outbreaks listed strongly suggest that they were the responsible pathogens. Additional work is needed to characterize these and other possible foodborne disease pathogens; non-01 *Vibrio cholerae* and *Bacillus cereus*, for example, have been generally accepted as pathogens only within the past decade.

The large number of outbreaks in which no pathogen was identified should serve as a challenge to improve investigative skills so that known pathogens are identified more frequently, and new pathogens are more readily discovered.

(*Source: Foodborne Disease Surveillance Annual Summary 1979,* Centers for Disease Control, U.S. Department of Health and Human Services, April 1981.)

Efficacy of Human Diploid Cell Vaccine in Anti-Rabies Treatments in Ontario, Canada

During the period June-October 1980, the Ontario Ministry of Health provided 142 courses of human diploid cell vaccine (HDCV) for post-exposure anti-rabies treatment; 96 of the people treated had been exposed to positive rabid animals, 9 of which presented bite wounds. The interval between the biting incident and the onset of treatment varied from one day in one case to 18 days in two cases; the other six were treated within 2-5 days.

Physicians administering the vaccine on days 0, 3, 7, 14, and 30 were asked to submit blood samples from their patients on day 45 in order to determine their titers, and boosters were provided to those exhibiting titers $<$ 1:128. Reactions to the vaccine were recorded on the laboratory submission form. Since it was necessary to send reminder notices for the blood samples, most of the samples were submitted between day 60 and day 90.

A total of 128 blood samples were received, and the results obtained are shown in Table 1. With the currently accepted level of protection at $\geq$ 1:16, 99.2 per cent of those treated were adequately protected. It is interesting to note that these levels of protection were achieved in spite of the administration of passive immunity in the form of rabies immune globulin (RIG).

Only five instances of patient reaction to HDCV were noted on the laboratory submission forms:

1. Local reaction increased with each injection.
2. Mild systemic malaise, fever, and myalgia following last injection.
3. Mild fever after days 3 and 7.
4. Fever after initial vaccine.
5. Erythema and wheals; severe after day 7 injection with some malaise.

While there may have been other "minor" reactions which were not considered sufficiently important to record, it would be fair to assume that significant adverse reactions would have been reported.

Table 1. Rabies post-exposure prophylaxis: serologic response to human diploid cell vaccine (HDCV).

Titer at 45-90 Days[a]	HDCV		HDCV RIG	
	Number	%	Number	%
1:256	78	60.9	62	57.9
1:128	28	21.9	27	25.2
1:64	12	9.4	10	9.3
1:32	5	3.9	4	3.7
1:16	4	3.1	4	3.7
1:8	0		0	
1:8	1	0.8	0	
Total	128	100	107	100

Percentage with titer $\geq$ 1:16 ("Protective titers") = 99.2%

[a]Rapid fluorescent-focus inhibition test (REFIT).

It is important to note that blood samples were not received from 10 per cent of those receiving treatment, *even when* reminder notices were sent out. All people receiving treatment for rabies exposure should be serologically tested within 2-3 weeks after the completion of the course of treatment, which includes any recommended booster (except the 90 day booster) in order to determine the efficacy of the treatment and the need, if any, for further therapy.

(*Sources*: Ontario Ministry of Health, Toronto as reported in the *Communicable Disease Control Report*, 27 February 1981, and *Canada Diseases Weekly Report* 7:14, 1981.)

Leprosy in Mexico

Leprosy is a chronic contagious disease that was introduced into Mexico during the colonial era. At present, patients are registered in all the states; at the end of 1978 there were 15,340 patients on the active register in the country as a whole.

The detection in 1979 of 657 new cases confirms the sharp downward trend in leprosy incidence in the past decade, since in the period 1972-1978 new cases averaged 709 annually.

The states that reported the most cases in 1979 were:

Sinaloa 125 (18.9 per cent), followed in descending order by Jalisco 107 (16.3 per cent), Guanajuato 98 (14.8 per cent), Michoacán 76 (11.5 per cent), and Colima 51 (7.7 per cent). Together the five states accounted for 69.2 per cent of the new cases reported throughout the country.

Of these patients, 54.6 per cent (355) were identified by the mobile teams of the leprosy program and 38.7 per cent (254) by dermatological centers. The Mexico City General Hospital, which comes under the authority of the Ministry of Health and Welfare, reported 6.7 per cent (40 patients).

Of the cases, 42.3 per cent (278) were diagnosed during dermatological consultations, 25 per cent (164) during the examination of contacts, and 32.7 per cent (215) were reported by various institutions and private practitioners. The patients in the last-mentioned group had been diagnosed in earlier years and were receiving sulfone treatment.

Although the examination of patients with symptoms makes it possible to detect a large number of leprosy cases, their disease is usually advanced and the attack rate is low: in 1979 it was 1.5 cases per 1,000 consultations. In contrast, the examination of contacts led to the detection of 7.4 cases per 1,000 consultations, and also resulted in their diagnosis at an early stage. These data highlight the importance of increasing the periodic examination of contacts.

In Mexico the open forms of leprosy are the most common. In 1979 their distribution was as follows: lepromatous 52.7 per cent (346 individuals), tuberculoid 15.2 per cent (100), dimorphous 6.2 per cent (41), and indeterminate forms 25.9 per cent (170). Of the 387 lepromatous and dimorphous patients registered, the results of bacilloscopy were negative on the date of diagnosis in 32 per cent since they had been given specific treatment.

The age distribution of the patients was: 93.3 per cent (613) over 15 years of age and 6.7 per cent (44) aged 15 years or less.

The foregoing data show that the cases are not detected promptly and that when diagnosed are already infectious. In 41.6 per cent of the patients examined, the evolution of the disease was less than two years; in 19.5 per cent between three and five years; and in 38.9 per cent five years or more.

During the period studied, 805 patients were removed from the register: 187 by reason of death, 112 because of cure, 21 because of change in residence, and 485 because they could not be located or for other reasons. At the end of 1979 the active register contained 15,237 persons, which represents a prevalence rate of 0.22 per 1,000 population.

In Colima and Sinaloa, where the prevalence rate is higher than 1 per 1,000, the endemicity of leprosy is highest. At the end of 1979 the number of leprosy patients in those states was 2,779 (18.2 per cent of the national total). Next in importance were 15 federal units where the endemicity is average (11,508 patients or 75.5 per cent of the total), since the prevalence rates range between 0.10 and 0.99 per 1,000 population. In the other 15 states the problem is of little importance; the prevalence rates are below 0.10 per 1,000 population and together they account for 950 patients (6.2 per cent). Among the last group of states, only Mexico, Oaxaca, San Luis Potosí, and Nuevo León carry out specific leprosy control activities; it is, therefore, to be assumed that there are still patients that have not been identified.

Colima, Sinaloa, Guanajuato, Jalisco, and Michoacán have the largest number of patients on the active register; 10,155 (66.6 per cent of the total of the country). Among the cases documented, the open forms of leprosy also predominate: lepromatous and dimorphous 63.4 per cent (9,650 patients), tuberculoid 14.4 per cent (2,198), and indeterminate 22.2 per cent (3,389).

According to the records, 76.8 per cent (7,259) of the lepromatous patients, 79.2 per cent (156) of the dimorphous, 75.6 per cent (2,562) of the indeterminate, and 67.7 per cent (1,489) of the tuberculoid were receiving drug treatment in 1979.

(*Source: Boletín de Epidemiología*, Vol. 1, No. 5, 15 April 1981, Epidemiological Directorate, Under-Ministry for Health, Mexico.)

Rapid Tests for the Diagnosis of Acute Bacterial Respiratory Diseases

When antibiotics were introduced into the treatment of infectious diseases, with the promise of prompt control or eradication, it appeared that a specific etiological diagnosis would be unnecessary. Nevertheless, experience has shown that although the incidence of certain microbial diseases has declined, others have appeared to take their place. The availability of new chemotherapeutic substances against certain bacteria, viruses, and parasites requires the rapid identification of those agents if the proper therapeutic regime is to be established.

In order to disseminate the present methods of etiological diagnosis of acute bacterial infections of the respiratory tract, the World Health Organization convened a meeting of experts to discuss the methods most frequently used, their sensitivity, specificity, and cost. A summary of those methods is presented below (see Table 1).

There are two types of laboratory methods for the etiological diagnosis of acute bacterial diseases of the respiratory tract: conventional bacteriological methods and rapid laboratory methods.

Table 1. Rapid tests for the diagnosis of acute respiratory diseases caused by bacteria, by type of specimen.

Bacterial species	Sputum	Pleural liquid	Serum	Urine
Streptococcus pneumoniae	CIE	CIE LA	CIE LA ELISA	CIE
Staphylococcus aureus	—	CIE	CIE RIA	—
Haemophilus influenzae	CIE	CIE LA	CIE LA CA	CIE CA
Legionella pneumophila	ELISA	—	CIE ELISA	CIE ELISA
Klebsiella pneumoniae	CIE	—	CIE	—
Pseudomona aeruginosa	—	—	CIE RIA	RIA
Mycoplasma pneumoniae	CIE	—	—	—
Mycobacterium tuberculosis	RIA	—	—	—

CIE: Counterimmunoelectrophoresis.
CA: Coagglutination.
RIA: Radioimmunoassay.
LA: Latex particle agglutination.
ELISA: Enzyme-linked immunosorbent assay.

Conventional Bacteriological Methods

The agent responsible may be identified by direct microscopic examination or by culture for subsequent identification.

• *The direct microscopic examination* can be used for sputum or pleural liquid. Occasionally, this simple test can provide the diagnosis, if there are numerous pneumococci in the sputum or pneumococci and staphylococci in the pleural liquid.

• *Culture.* In the case of a pleural fluid or hemoculture the pathogenic agent isolated is most likely to be responsible for the lung infection. Although positive results are very reliable, one disadvantage of the method is its cost, its slowness, and sometimes negative results make it necessary to repeat the test, even if no previous antibiotic therapy has been given.

Cultures of sputum specimens are more difficult to interpret because of their intense contamination by the normal flora of the mouth. To overcome this difficulty, some technicians recommend that specimens diluted to 10^{-6} be used and that they be considered positive only when pathogenic bacteria are found under these conditions.

Rapid Laboratory Methods

The tendency nowadays is to abandon the conventional methods for the detection of visible or viable bacteria and to use immunological methods that make it possible to detect soluble bacterial antigens. These antigens, which are located in the capsule or outer layer of the bacterial cellular wall, are highly resistant and their presence can be detected not only in the infected tissues, (lung, pleural liquid, sputum), but also in different areas of the body (serum, urine, etc.). Their resistance means that they can be tested for in transported specimens or samples stored in the laboratory.

A number of rapid immunological tests are used to demonstrate bacterial antigens such as:

• *Counterimmunoelectrophoresis.* This method, which is also known as electroimmunodiffusion or electrosynaeresis, was described in 1959 and has been used since 1971 to detect the polysaccharides of the pneumococcal capsule. In essence, it is a gel precipitation test which can be defined as a double immunodiffusion performed under the influence of a difference in electrical potential.

• *The passive agglutination method* consists of fixing the immune serum on immunologically inert particulate media. When these media are challenged by a specific antigen, a macroscopically visible agglutination reaction takes place. The following procedures are used in the test:

(a) *Latex particle agglutination.* Sensitized 0.81 μm particles are agglutinated in the presence of the antigen (*Haemophilus influenzae, Streptococcus*) in 2-3 minutes.

(b) *Coagglutination with Staphylococcus aureus.* The *S. aureus* strains that synthesize protein A in large amounts fix the IgG on it by means of their Fc fraction and leave the Fab free. If these staphylococci, which are the carriers of immunoglobulin, are put in the presence of the specific antigen, the latter fix on the Fab fraction to produce an agglutination visible to the naked eye. There are other tests which call for a more advanced technology and are more expensive.

• *ELISA* (enzyme-linked immunosorbent assay). The demonstration of the antigen is based on the use of specific immunoglobulins conjugated with an enzyme. The specific antibodies of the antigen being tested for are fixed on a surface and the pathological product is added; then a specific immunoglobulin conjugated with an enzyme (peroxidase, alkaline phosphatase, etc.) is added. If the product does not contain the antigen, the immunoglobulin conjugated with the enzyme disappears when washed. If, in contrast, the immunoglobulin reacts, the

enzyme acts on the substrate and it is revealed by a colorimetric reaction.

• *RIA* (radioimmunoassay). The test consists in fixing the antibodies for the bacterium tested for on a surface. The pathological specimen and specific antibodies, labeled with ^{125}I, are then added in turn. If the antigen is present, labeled antibodies remain and radioactivity is observed.

Persons interested in obtaining additional information on these tests should get into touch with the Laboratories Program, Division of Disease Prevention and Control, PAHO.

(*Source*: Laboratory Program, Division of Disease Prevention and Control, PAHO.)

Risk Approach in the Extension of Health Service Coverage

The idea that certain individuals or population groups are more likely to become ill than others dates from very remote times. More than 120 years ago, Little drew attention to the influence of specified conditions and antecedents of a mother on the mental and psychological health of her child and identified the first risk factors in perinatal morbidity. However, it is only since the second half of this century that systematic epidemiological studies based on the idea of prediction which characterizes risk studies have been carried out.

This approach is valid for all health activities, but it is especially used in primary health care programs and has been developed most fully in maternal and child health care and in particular perinatal care. Women and children, the vulnerable groups of the population, are exposed to special risks arising from the processes of reproduction and of growth and development, respectively. For example, it has been observed that certain characteristics of a mother such as advanced age, multi-parity, presence of diseases, and complications of earlier deliveries are associated with an unfavorable course of pregnancy.

While some of these characteristics are probably of universal importance, other risk factors may be present in different countries or regions and need to be identified through epidemiological studies.

Although maternal and child health indicators show that there has been a substantial improvement in the situation in the past decade, there are still many communities in the Region in which conditions are below the minimum acceptable and for which special efforts are required, including the application of the risk approach.

To develop this approach, each community or area needs first to define its own priority problems, to analyze them from an epidemiological point of view, and to reach an understanding of their "etiological chain." The next step is to decide, in the light of such criteria as feasibility and viability, where to intervene in that chain to change the undesirable results. For that purpose, existing resources will have to be reassigned and frequently others that are not traditionally considered health resources will have to be mobilized.

An essential part of this process consists in defining the characteristics of the individuals or groups "at risk" so that they can be promptly identified and appropriate measures taken.

The assignment of risk figures to individuals, families, and communities makes it possible to develop appropriate strategies and to reassign resources for averting or reducing undesirable results. The risk approach is therefore a management strategy that can improve the design of health services and the mobilization of community resources for promoting its health and preventing disease.

Since the beginning of the past decade it was understood how valuable the risk approach could be, especially if it were possible to develop a methodology enabling it to be systematically applied to the rationalization of the use of health resources. In 1977 WHO convened an expert group whose discussions laid the conceptual groundwork for the use of this method. Since 1978 experimental studies based on the approach advocated by WHO and PAHO have been initiated in a number of the countries. These studies have resulted in operational guidelines that will make it possible to systematize the method of study and application of the risk approach. In April 1980, an interregional workshop held in Nottingham, England, spelled out the methodological basis of the approach and wrote a manual that is being published. In March 1981 PAHO organized in Bogotá, Colombia, the First Regional Meeting on the Risk Approach in the Extension of Health Service Coverage. It was attended by representatives of 15 countries in the Americas who reported on the various experiments underway in the countries.

The studies on this subject made in the Americas have been of two types:

• Those that have followed all the stages of the methodology

advocated by WHO, beginning with an epidemiological study at the local level designed to identify the risk factors and subsequently strictly following the methodological steps (such as the investigation carried out in Cuba and that being undertaken by the Latin American Center for Perinatology and Human Development).

• Those that have been initiated with the preparation of a predictive model in which the risk indicators are selected on the basis of other experiments and the initial weighting is established by appraisal. The periodic evaluations of the predictive value of the model and of the weight of each of the indicators are used to adjust it in successive approximations (such as the studies made by the Javeriana University in Colombia).

In addition to the above, other studies of interest have been made in Latin America and there is a wide literature on the subject. Those interested in obtaining further information may contact the Maternal and Child Health Program, Division of Comprehensive Health Services, PAHO.

Reports of Meetings and Courses

International Course in Epidemiology

This course, which was held from 21 September to 9 October 1981 in Guatemala City, was sponsored by PAHO and the U.S. Centers for Disease Control (CDC). It was attended by professional health workers working as epidemiologists at the central or regional level in Costa Rica, Dominican Republic, El Salvador, Guatemala, and Honduras.

The course included group discussions, theoretical presentations and exercises on diseases in the population, quantification of health problems, arrangement and presentation of data, statistical methods, epidemiological surveillance, epidemiological investigation, epidemiology and nutrition, epidemiology of chronic diseases, disease control, epidemiology, and evaluation of health programs.

A field study carried out during the final week consisted of an epidemiological survey in a district of Guatemala City.

The course was based on "Principles of Epidemiology for Disease Control" prepared by PAHO, supplemented by discussions of exercises prepared by CDC. Technical personnel from the PAHO Area III Office in Guatemala and from the CDC served as course instructors.

XXVIII Meeting of the Directing Council of PAHO

In its XXVIII Meeting, held in Washington, D.C., from 21 September to 2 October 1981, the Directing Council of PAHO was informed of the dengue situation, which led to the approval of the following resolution:

THE DIRECTING COUNCIL,

Aware that the presence of *Aedes aegypti* in many American countries, the endemicity of dengue in some of them, the emergence of hemorrhagic forms of the disease, the persistence of sylvatic yellow fever, and intensified movements of people and goods within and between countries pose a real risk of an outbreak of dengue epidemics that could spread into hitherto untouched areas, and of a recrudescence of urban yellow fever,

RESOLVES:

1. To request the Director to organize a technical group that would include among its members representatives of the most severely affected countries to study the problem and propose possible alternative courses of regional action for the eradication of *Aedes aegypti* and other approaches to controlling dengue and for dispelling the threat of urban yellow fever in the Hemisphere.

2. To request the Director to present the proposals of the technical group to the XXI Pan American Sanitary Conference.

Editorial Note:

At this printing the situation in the Caribbean as to dengue hemorrhagic fever is as follows:

The epidemic in Cuba is practically under control. Cases in the country since the outbreak of the epidemic number 343,924, of which 156 ended in death. No case of hemorrhagic dengue has been reported from any other country in the region.

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