Tuberculosis in the Americas

PART II: CONTROL[1]

Introduction

In 1973 and 1978 PAHO evaluated[2,3] the status of the tuberculosis control programs in Latin America (which has 60 per cent of the population of the Americas, and which reports 87 per cent of new cases and 93 per cent of deaths due to the disease in the Region). A new survey was made in 1980, in which all countries and territories in the Region participated. Data from the three evaluations have been used to analyze the tuberculosis situation and the status of the control programs.

The approach to tuberculosis control has undergone significant changes in the last decade. Perhaps the most important has been a change in attitude among health professionals toward the feasibility of integrating tuberculosis control activities in the general health services and simplifying control methods.

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[1] Part I: Epidemiology, of this report was published in the last issue of the *Epidemiological Bulletin.* Vol. 2, No. 5, 1981.

[2] PAHO Document CD/TB3. 1974. Rev. 1, Survey of the Present State of Integration of Tuberculosis Control Activities in the General Health Services in Latin America, 1974.

[3] PAHO Document III SRT/11, 1979, presented at the III Regional Seminar on Tuberculosis: Chemotherapy, 1979.

In 1972, the III Special Meeting of Ministers of Health of the Americas recommended as an objective for the 1972-1981 decade the reduction by 50-65 per cent in mortality due to tuberculosis. This would be achieved by vaccinating children under 15 years of age with BCG vaccine, and simultaneously searching for and giving specialized treatment to tuberculosis patients in the general health services. The goals aimed at vaccinating 80 per cent of the 0-15 year-old group with BCG, treating all detected cases of tuberculosis, utilizing particularly outpatient medical care services, and performing bacilloscopies in 60-75 per cent of those presenting respiratory symptoms of over four weeks' duration. All these activities should be integrated in qualified general health services.

The policy of integration was postulated in 1962 at the Congress of the Latin American Union of Societies of Phthisiology (Guatemala), in 1964 by the Organization and Member Governments at the XV Meeting of the Directing Council (Mexico), and in the same year at the I Regional Seminar on Tuberculosis (Venezuela). All countries in the Region have adopted integration within their general health services as the recommended control strategy.

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Increased coverage of the population and a greater accesibility to control measures indicate that integration is proceeding well; however, activities to control quality of work through supervision and evaluation have been less satisfactory, and, except for a few countries, programming of case-finding and treatment activities with defined goals is a recent development. In some countries, when integration of program activities was implemented, the financial and professional resources released from previously existing vertical structures were not used to strengthen the central managerial teams, and in some instances these were weakened or even cancelled, thus reducing technical support for general services.

The following problems encountered in the integration of control activities within general health services were reported in 1973 and 1978: resistance to change by both specialized personnel and staff of the general health services; insufficient training or frequent turnover of personnel; irregularity in obtaining supplies; and insufficient personnel and transportation for adequate program supervision. In the 1980 survey no significant changes in the availability of training personnel were reported. The resistance to change by specialized personnel which was the major problem confronting integration, dropped from 65 per cent of the countries in 1973 to 24 per cent in 1978. Resistance to additional duties and exposure to risk by general health services personnel was reduced from 60 to 35 per cent. Participation of the countries in the Expanded Program on Immunization (EPI) and the Revolving Fund of EPI has contributed to increasing the regularity in the supply of drugs and BCG vaccine, and to reducing problems of funding, importation, and distribution.

Case-finding

Regional recommendations on case-finding assign high priority to the systematic collecting of a sputum sample from all symptomatic adults attending the general health services. While these recommendations have been accepted by most countries, implementation (including estimates of the number of persons to be examined and cases to be discovered by each health service) has progressed slowly during the decade.

Results of case-finding depend on the active questioning by health personnel regarding symptoms, definition of "symptomatic," laboratory resources, and the physicians' selection of "probable" cases for bacteriologic examinations. This is reflected in the proportion of symptomatics found among those appearing for consultation and the proportion of bacteriologically positive cases among persons examined; both proportions vary from 1 to 10 per cent in different countries.

Information on reported cases according to place where

diagnosis was made (Table 1) and where treatment started (Table 2) reflects the extent of integration and changes in attitude. However, because of variations in the composition of the sample, in the number of countries responding to a particular item, and in the total number of questionnaire respondents, only large differences in figures or proportions between the surveys may be considered significant.

Figure 1 includes data on reported cases, by method of diagnosis, in several countries of the Americas in 1973, 1978, and 1980. The number of bacteriologic diagnoses by smear examinations increased as a result of the greater number of diagnoses performed in general health services, especially in peripheral units without specialists or radiologic equipment. In that figure, "Other methods" include diagnoses made without bacteriologic or radiologic methods, as well as cases without the required information. The increase in diagnoses performed by bacteriologic and radiologic methods in the 1980 survey is due mainly to the inclusion of the United States, where resources are more readily available.

The distribution of pulmonary tuberculosis by age group (Figure 2) shows an increase in adult cases, a slight decrease in the 15 years-and-under groups (which may indicate a decrease in the incidence of the disease in younger age brackets), and a large decrease in "unknown" cases because of better case registration.

Table 1. Percentage of cases of tuberculosis reported in 1973 and 1978 in several Latin American countries, by type of health service performing the diagnosis.

Type of health service	1973[a]	1978[b]
Tuberculosis clinic	57.1	29.8
Tuberculosis or chest hospital	21.0	6.0
General health service	20.3	61.3
Other	1.6	2.9

[a]Fourteen countries and 110,346 cases reported.
[b]Twelve countries and 41,280 cases reported.

Table 2. Percentage of cases of tuberculosis reported in 1973 and 1978 in several Latin American countries, by place where treatment was started.

Place where treatment was started	1973[a]	1978[b]
Tuberculosis or chest hospital	26.1	11.0
General hospital	9.6	1.7
Home, with tuberculosis control	54.5	20.4
Home, with general health service control	9.6	63.1
Unknown	0.2	3.8

[a]Eight countries and 87,000 cases reported.
[b]Ten countries and 33,912 cases reported.

Figure 1. Number and percentage of reported cases of tuberculosis, by method of diagnosis in several countries of the Americas, 1973, 1978, and 1980.
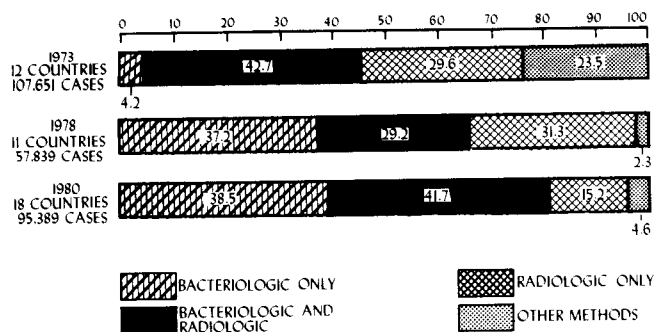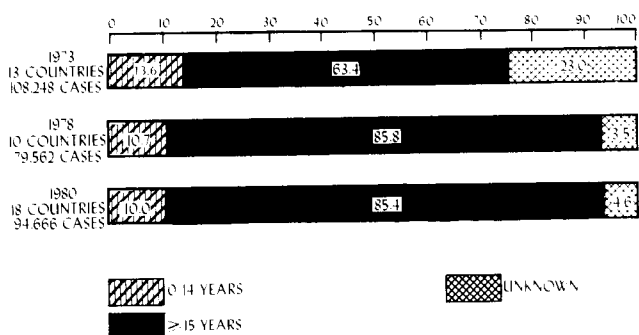

Figure 2. Number and percentage of reported cases of pulmonary tuberculosis, by age groups, in several countries of the Americas, 1973, 1978, and 1980.

Treatment

Tuberculosis treatment has undergone significant changes in the last several years. Various countries have adopted short course chemotherapy either as a partial or a general measure; fully supervised treatment is gradually being recognized as useful and feasible, and, although there are still too many beds for tuberculosis treatment in many countries, hospitalization has decreased significantly.

Data on the number of patients treated with each regimen are not available at this time. This is due to the fact that the change to short course chemotherapy has taken place only in the last two years; moreover, in many countries the disease is treated by private practitioners who do not follow standard recommendations.

The trend to reduce hospital beds for tuberculosis patients has continued in the last three years. Bolivia, Brazil, Colombia, Costa Rica, Cuba, Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, Panama, Paraguay, and Uruguay reported an overall reduction of offi-

cial beds reserved for tuberculosis patients from 26,888 in 1973 to 17,340 in 1978. Of these, 13,562 are still in specialized service hospitals, whereas only 3,778 beds are in general hospitals. Several countries reported that general service beds are used for tuberculosis patients when needed.

The data collected also reveal that in 76.4 per cent of the cases treatment begins in hospitals, that 55.7 per cent is supervised by health personnel, and that 11.8 per cent receive partial supervision. The latter two percentages are inflated since in general the countries with supervision report and register cases more efficiently. Data on the results of treatment in 15 countries indicate a loss of patients through abandonment and loss of contact by the health service as high as 50 per cent in some instances.

BCG Vaccination

Since BCG vaccination has recently been incorporated into the Expanded Program on Immunization, coverage has been increased to include the 2-6 months-of-age group.

From 1977 to 1978, 14 Latin American countries reported 9,748,687 live births and 3,017,052 BCG vaccinations of children under one year of age (30.9 per cent of the total). Vaccination coverage in this group has increased from 20.9 per cent, according to the 1973 survey, to an average of 42 per cent estimated in 1980. In all countries the standard intradermal method of vaccination is systematically used.

A study of 18 Latin American countries indicated five in 1980 with BCG coverage of 50 to 74 per cent in children under one year of age and four with over 75 per cent coverage.

Training

In the Region, annual international courses on the epidemiology and control of tuberculosis are held in Argentina, Brazil, Chile, Cuba, and Mexico, and a Regional Course on the bacteriology of tuberculosis at the Pan American Zoonoses Center in Argentina. In 1979, 235 professionals were trained in these courses, 29 of whom came from other countries.

In addition, each country has periodic courses and seminars on tuberculosis, according to the needs for personnel training and program evaluation. All these courses are supported by PAHO/WHO consultants and fellowships.

Supervision and Evaluation

A tuberculosis control program requires proper supervision to ensure the quality and efficiency of the opera-

tion. In 1978, three countries out of 17 reported that no supervision could be provided for the tuberculosis program in the general health services. Of the rest, nine countries provided supervision under a program drawn up at the beginning of the year, and in the other five, supervision was provided without prior programming in response to the needs of the moment. Supervisory personnel was specialized in tuberculosis in six countries, multipurpose health services in one, and both types in the other seven.

Health laboratories in most countries provide supervision for smear examinations either directly, where the supervisor observes the work in visits to local laboratories, or indirectly, where the local laboratory periodically sends slides to the regional or central laboratory.

In general, program evaluations are done in national or regional seminars comprised of several political units in a country, and in some countries a yearly report of data and conclusions is published. However the quality and the operational or epidemiological emphasis of the evaluations vary from country to country and there is no standard evaluation method generally accepted in the Americas.

Summary

Integration of tuberculosis control activities in the general health services of the Region of the Americas is progressing well and appears to have resulted in extended coverage, increased bacteriologic diagnosis, and reduced hospital treatment. The introduction of new and more potent drugs has decreased the duration of treatment. Supervised administration of drugs has been recognized as feasible and useful in controlling the completion of treatment and in lessening costs in short course chemotherapy through intermittent treatments schedules.

Abandonment of treatment by the patient, loss of contact by the health services, inadequate training of peripheral general services personnel, and lack of supervision appear to be the current major deficiencies of the programs. A more active management is needed to supervise and evaluate the programs, as well as to train and support the general health services personnel in order to achieve more effective tuberculosis control programs in the near future.

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

Human Plague in 1980

In 1980 a total of 505 cases of human plague were reported to the World Health Organization, resulting in 56 deaths. The corresponding figures for 1979 were 881 cases and 30 deaths (Figure 1).

Cases of human plague in *Africa* were reported in four countries: Angola (for the first time since 1975), Kenya, Madagascar, and the United Republic of Tanzania. The 1980 totals (80 cases and 20 deaths) were roughly the same as in previous years, except for 1979 when 471 cases and 12 deaths were reported.

In the *Americas,* an increase in the number of notified cases was observed, particularly in South America, where 142 cases and seven deaths were reported, compared with the 23 cases and two deaths recorded in 1979 (Table 1). This increase was due mainly to change in diagnostic criteria in Brazil where 98 cases (and no deaths)

| Country	1971 C	1971 D	1972 C	1972 D	1973 C	1973 D	1974 C	1974 D	1975 C	1975 D	1976 C	1976 D	1977 C	1977 D	1978 C	1978 D	1979 C	1979 D	1980 C	1980 D
Bolivia	19	3	0	0	0	0	14	5	2	0	24	5	29	9	68	2	10	0	26	2
Brazil	146	2	169	13	152	...	291	...	496	5	97	...	1	...	11	...	0	0	98	0
Ecuador	27	0	9	0	1	1	0	0	0	0	8	1	0	0	0	0	0	0	0	0
Peru	22	5	118	15	30	2	8	2	3	0	1	0	0	0	6	1	0	0	0	0
United States of America[a]	2	0	1	0	2	0	8	1	20	4	16	3	18	2	12	2	13	2	18	5
Total	216	10	297	28	185	3	321	8	521	9	146	9	48	11	97	5	23	2	142	7

C = Cases.
D = Deaths.
[a]Rodent plague present.
... Data not available.

Figure 1. Number of cases and deaths of human plague in the world, 1971-1980.
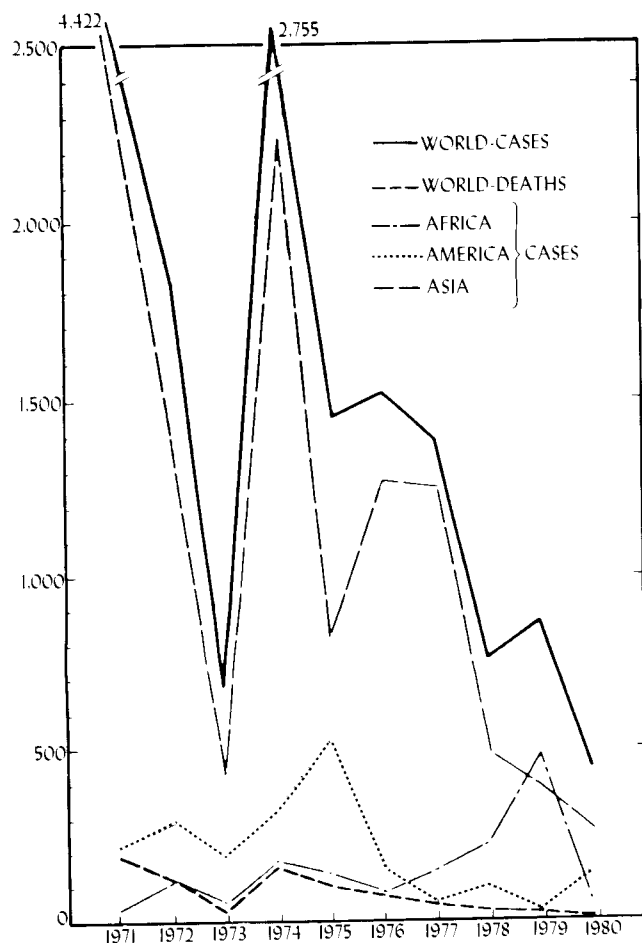
were reported in the northeastern States of Bahía, Ceará, and Pernambuco. In Bolivia, the La Paz Department reported 26 cases and two deaths between September and November in the localities of Mohima (20 cases) and Culata (six cases) in Franz Tamayo Province; a high density of *Pulex irritans* was found in these areas. In the United States, 18 cases and five deaths were reported in California, Nevada, and New Mexico. Thirteen of these cases occurred between May and September in six counties in New Mexico.

Asia recorded a reduction in morbidity in 1980, with 283 cases and 29 deaths, (compared with 387 cases and 16 deaths in 1979). Vietnam notified 180 cases and five deaths (as against 306 and eight deaths the year before).

Health administrations should be aware of the *Technical Guide for a System of Plague Surveillance* and *The Manual on Plague and Plague Surveillance and Control* (a report of an informal consultation of experts held in June 1979). These documents are available from the Bacterial and Venereal Diseases Unit, WHO.

(Source: WHO, *Weekly Epidemiological Record*, 35:273-275, 1981.)

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 December 1981.

Country and administrative subdivision	Cholera cases	Yellow fever		Plague cases
		Cases	Deaths	
BOLIVIA	—	92	21	18
Beni	—	3	2	—
Cochabamba	—	6	5	—
Chuquisaca	—	2	1	—
La Paz	—	11	7	18
Santa Cruz	—	70	6	—
BRAZIL	—	14	12	22
Amapá	—	1	—	—
Ceará	—	—	—	22
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	20[a]	—	—	9
Arizona	—	—	—	2
Colorado	—	—	—	1
Guam	1	—	—	—
Hawaii	1[b]	—	—	—
New Mexico	—	—	—	6
Texas	2	—	—	—

—None.

[a]16 cases associated with an outbreak occurred in an offshore oil rig off the coast of Texas.

[b]Imported case.

Acute Hemorrhagic Conjunctivitis in the Americas

The previous issue of the *Epidemiological Bulletin* contained a report on the epidemic of acute hemorrhagic conjunctivitis affecting a number of countries in the Americas. Since July 1981 outbreaks have been reported in Antigua and Barbuda, Bahamas, Barbados, Belize, Brazil, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, El Salvador, Guatemala, French Guiana, Guyana, Haiti, Honduras, Mexico, Nicaragua, Panama, Suriname, Trinidad and Tobago, and the United States. The reports received from several of these countries make

it possible to elucidate some of the clinical and epidemiological characteristics of the disease.

The first eteologic agent isolated at the Centers for Disease Control in Atlanta, Georgia, U.S.A. was enterovirus 70. A specimen was obtained by means of an ocular swab 12 hours following the onset of acute bilateral conjunctivitis in a 16-year-old female student associated with the outbreak. The virus was isolated by direct inoculation of the specimen into human embryo pulmonary fibroblasts and was identified by means of serologic neutralization and electronic immunoscopy.

In the United States outbreaks were reported in Dade County, Florida, and spread to Monroe County in the same state and to North Carolina. In the eastern region of North Carolina there was an outbreak among Haitians living in a migrant workers camp. In two of these workers, conjunctivitis appeared on 25 September, the day after they arrived in Miami; both confirmed that they had been in contact with residents in that city who suffered from the disease. Between 25 and 30 September, 18 cases of hemorrhagic conjunctivitis were diagnosed in 25 Haitian workers in the same camp where the first two cases were living. No cases were reported among persons living in other camps.

In Honduras the route by which the disease was introduced into the country is also known. The first reports of the outbreak came from schools on 3 July. During interviews with sick students, it was discovered that one student's uncle was a sailor who had arrived from India with the disease. This individual stated that he and 24 other sailors had left the ship in Jamnagar, India, and had remained there for eight days. The sailors confirmed that during their stay they had been in contact with many persons suffering from the disease and that one of them had even developed it. On 24 June the sailors returned from Bombay by air, with stopovers in London and Miami, and reached San Pedro Sula on 25 June. On reaching Honduras, five of the sailors showed symptoms of the disease and were the first cases identified and investigated.

According to information provided by the countries, the clinical symptoms associated with the epidemic have a short incubation period (24 hours) and are characterized by conjunctive congestion, lacrimation and secretion, ardor, itching, sensation of a foreign body, edema of the eyelids, ocular pain, photophobia and, in hypersensitive patients, subconjunctival hemorrhages and preauricular adenopathy. In general, permanent ocular or neurologic complications have not been reported. The disease lasts for two to three days with treatment and up to two weeks without treatment.

Usually the outbreaks last for four to five weeks and peak in the third week. For example, in Honduras 1,918 cases were reported between 5 July and 26 August with the following distribution:

Epidemiological week	Cases reported
5-11 July (27)	17
12-18 July (28)	83
19-25 July (29)	587
26 July-1 August (30)	660
2-8 August (31)	462
9-15 August (32)	101
16-22 August (33)	8

The highest risk groups are in the poorest urban sectors, where overcrowding and lack of hygiene are influential factors. The disease presents milder symptoms and has a shorter course in children than in adults. The highest frequency of cases occurs in persons over 15 years of age. With respect to the distribution by sex, the incidence of cases in females is frequently higher than in males.

(*Source:* Epidemiological Surveillance, Division of Disease Prevention and Control, PAHO.)

Review of the Malaria Eradication Program in Panama

In cooperation with PAHO/WHO, the authorities of the Ministry of Health of Panama carried out a joint review of the National Malaria Eradication Program of Panama from 18 to 22 May 1981. The conclusion reached was that the program had succeeded in bringing about a continuous and gradual reduction in the incidence of malaria and that the transmission of the disease had been focalized in a small number of places.

The favorable developments achieved in some districts of the Provinces of Colón and Coclé made it possible to

shift an area of 4,403 km^2 into the consolidation phase; that area contained 620 localities with 23,273 dwellings and 179,013 persons. Consequently, 49 per cent of the territory of the country in which 92 per cent of the population resides is at present in the consolidation phase. The priority and the continuing financial support assigned by the Government to this program have been the determining factors in the progress achieved.

Because of the high risk that exists in receptive areas with substantial economic potential, it is essential to maintain a proper surveillance system. At the same time operating mechanisms for achieving more active participation in the program of the general health services and of voluntary collaborators should be studied.

In this regard, the following recommendations were made:

1. Step up efforts to interrupt the transmission of malaria in the districts of the Province of Bocas del Toro, where the situation has been developing favorably in the past two years and give special attention to the Province of Darien and the District of San Blas in order to avert outbreaks which could lead to the importation of cases or operational shortcomings in that area.

2. Study mechanisms for the coordination with national socio-economic and livestock development programs in order to improve the malaria situation, especially as it concerns the aspect of local transmission.

3. Study mechanisms for technical cooperation with the malaria programs of other countries and with international agencies in order to promptly identify the importation and distribution of malaria cases.

In view of the excellent experience in coordinating activities with the Costa Rican Malaria Eradication Program, it was recommended in addition that efforts continue to be made to find alternative ways of maintaining or establishing mechanisms for the operational coordination of the National Malaria Eradication Services of Panama and of Colombia.

Yellow Fever in Bolivia, 1980

According to the data available, there are at present three endemic areas of jungle yellow fever in Bolivia: El Chapare, in the Department of Cochabamba; Los Yungas, in that of La Paz; and the Province of Ichilo in that of Santa Cruz.

In 1979 a pilot epidemiological surveillance program was begun in El Chapare and in 1980 it was extended to the Provinces of Ichilo and Andrés Ibañez (Department of Santa Cruz). In addition, in 1980, a course was held in Cochabamba for the purpose of standardizing criteria for the histopathologic diagnosis of yellow fever and was attended by 80 per cent of the anatomopathologists in the country. Educational activities were supplemented by the use of posters and the broadcasting of educational material aimed at the community and health personnel.

In 1980 vaccination efforts in endemic areas were increased and 555,014 persons were vaccinated by brigades that visited the communities and by fixed posts on the access routes to land settlement areas in the jungle.

In the 1981–1982 period surveillance activities are expected to be conducted throughout the country, yellow fever vaccination activities intensified, and vaccination posts established at strategic points of entry to the jungle areas. In the second half of 1982 it is estimated that approximately 1,500,000 persons will have been vaccinated.

With respect to incidence, a total of 45 cases of jungle yellow fever were reported in the country in 1980, 19 of which were confirmed by histopathologic and serologic examinations. There was a marked predominance of cases in males of working age (84.5 per cent). Of the cases, 86.7 per cent were over 20 years of age and had not been vaccinated.

The most frequent clinical symptoms were: fever (97.7 per cent), severe headaches and prostration (95.5 per cent), rash (84.4 per cent), digestive hemorrhage (80.0 per cent), lumbalgia (73.3 per cent), and shock (66.7 per cent).

All the cases occurred between January and August, with the highest incidence between March and May.

Epidemiology of Leprosy in Rio Grande do Sul, Brazil, 1975–1980

General Data

The State of Rio Grande do Sul has a population of 7,776,000 inhabitants and covers a surface area of 282,000 km². Since 1938, when the first patient registers were established, the State-Government agencies have been responsible for leprosy control. Up to 1954 control was based on a law requiring the compulsory hospitalization of all leprosy patients throughout the country. When the law was repealed in that year, greater emphasis was given to outpatient treatment under the responsibility of the federal government. In 1964 control was delegated to the Ministry of Health and the Environment of Rio Grande do Sul.

Today leprosy patients are treated through a network of health units of the above-mentioned Ministry (about 400), which covers 16 regions and 232 municipalities in the State. For every two regions there is a medical officer who supervises the health dermatology programs and provides the physicians of the local units with technical support, and in 22 of the health units there is a dermatologist. The Health Dermatology Team prepares the technical standards and centralizes the information provided by the local units. Since 1975 the register of patients and contacts has been maintained by means of a computerized system, which makes it possible to administer the program much more quickly and at the same time provides access to data for epidemiological studies.

As of 31 December 1980, there were 3,265 registered cases of leprosy in Rio Grande do Sul, which represents a prevalence rate of 0.42 per 1,000 population.

The epidemiological behavior of the disease from 1975 to 1980 is analyzed below.

Incidence

In the period 1975–1980, a total of 1,435 new cases of leprosy were diagnosed, that is, an annual rate of 3.19 cases per 100,000 population (Table 1). In 1976 and 1977 there was an increase in the number of new cases because of the delayed notification of cases diagnosed in earlier years by private practitioners. The active register also included 140 cases from other states, 31 cases were relapses of the disease, and another three were cases included for a second time, which made a total of 1,609 new cases registered in the period (Table 2).

The predominant clinical forms were lepromatous (702 cases) and tuberculoid (462), followed by indeterminate (224) and dimorphous (221).

The distribution by sex showed a similar incidence in

Table 1. Leprosy incidence in Rio Grande do Sul, Brazil, 1975–1980.

Year	New cases diagnosed	Rate per 100,000 population
1975	235	3.25
1976	253	3.45
1977	268	3.60
1978	233	3.08
1979	222	2.90
1980	224	2.88
1975–1980 (average)	239.17	3.19

Table 2. Leprosy cases in the active register by clinical type and method of detection, Rio Grande Do Sul, Brazil, 1975–1980.

| Method of detection	Clinical type				
	Lepromatous	Dimorphous	Tuberculoid	Indeterminate	Total
Reported	126	51	89	28	294
Examination of contacts	76	28	70	63	237
Consultations	312	96	210	92	710
Other means	28	5	14	8	55
Not specified	69	22	32	16	139
Subtotal (new cases)	611	202	415	207	1,435
Transfers	63	16	44	17	140
Relapses	26	3	2	—	31
Other re-registrations	2	—	1	—	3
Total	702	221	462	224	1,609

the two groups, 725 cases in males and 710 cases in females. The data appear to indicate that, although the risk of contracting leprosy is similar in the two sexes, the proportion of individuals with natural resistance is higher among males.

There was a marked predominance of incidence in the higher age groups, which shows that the risk of contracting the disease increases with age (Figure 1). Only 3.55 per cent of the cases diagnosed occurred in children under 15 years of age, which appears to confirm that Rio Grande do Sul is not a highly endemic area.

Prevalence

Between 31 December 1974 and 31 December 1976, the prevalence rate fell from 0.47 to 0.42 cases per 1,000 population because of the elimination of a large number of cases by death.

Figure 1. Leprosy incidence rate, by age groups, Rio Grande do Sul, Brazil, 1975-1980.

New cases under 15 years of age: 51 (3.55%)
Total of new cases: 1,435
Incidence rate: 5.22/100.000 population
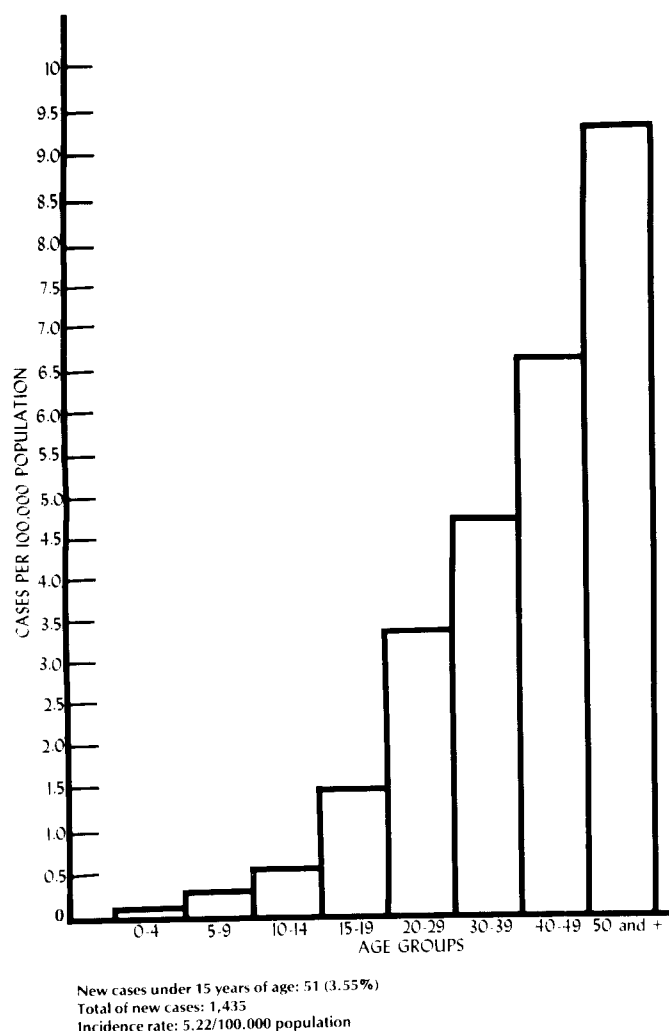
Since 1976 the prevalence rate has stood at 0.42 per 1,000, which shows that the number of cases registered increases in proportion to the population of the State (Table 3).

Control of Patients

In accordance with the criteria adopted by the National Health Dermatology Division of Brazil, leprosy patients meeting the following conditions are considered to be cases under control:

1. Those with the indeterminate clinical form, with negative Mitsuda, and those with the lepromatous or dimorphous form that have been examined at least once in the previous six months.

Table 3. Leprosy prevalence in Rio Grande do Sul, Brazil, 1974-1980.

Year	Cases in the active register by 31 December	Rate of prevalence per 1,000 population
1974	3,311	0.47
1975	3,115	0.43
1976	3,056	0.42
1977	3,096	0.42
1978	3,143	0.42
1979	3,195	0.42
1980	3,265	0.42

2. Those with the indeterminate clinical form, with positive Mitsuda, and those with the tuberculoid form that have been examined at least once in the previous twelve months.

Since 1975 there has been a gradual improvement in the general control percentages which by 31 December 1980 reached an index of 85.7 per cent for the lepromatous and dimorphous forms, 77.1 per cent for tuberculoid forms, and 76.6 per cent for indeterminate forms (Table 4).

Discharges. Between 1975 and 1980 a total of 1,655 leprosy patients (a slightly higher number than that of admissions to the register in the same period) were removed from the active register for the following reasons: cure, 644; death, 340; movement to other states or countries, 220; and statistical adjustments, 361.

Hospitalization. In 1975 a campaign was begun with the general hospitals to have them hospitalize leprosy patients with clinical and surgical problems that required ongoing attention. As a result, the number of general hospitals that agreed to admit leprosy patients rose from two to 43, and the annual average number of hospitalized cases, which was 50 up until 1974, fell to 10 a year in the period 1975-1980. The average number of hospital discharges either for death or for transfer of the patient to outpatient treatment remained at around 30 cases annually during the period. The number of hospitalized patients fell from 343 on 31 December 1974 (10.4 per cent of the total number of patients registered) to 210 by 31 December 1980 (6.4 per cent).

Table 4. Percentages of leprosy cases under control, classified by clinical type, Rio Grande do Sul, Brazil, 1975-1980.

Clinical form	Control year					
	1975	1976	1977	1978	1979	1980
Lepromatous and dimorphous	77.6	81.9	80.9	84.5	85.6	85.7
Tuberculoid	68.0	74.2	76.1	75.7	75.7	77.1
Inderminate	66.9	68.3	70.3	74.3	76.0	76.6
Total	74.0	78.7	78.8	81.8	82.9	83.5

Control of contacts

On 1 July 1977 the general register of household contacts of leprosy patients was put into the computer. By 31 December 1981, of the 3,265 patients on the active register, 2,454 had their contacts registered. The total number of contacts registered was 6,636, or an average of 2.7 contacts per patient; that figure is less than that of the average family size in Rio Grande do Sul (an average of 4.9 persons per household, according to the 1970 census), which would give 3.9 contacts per patient, since there are frequently two or more cases of leprosy in the same family.

By 31 December 1980 the number of contacts of patients with the lepromatous or dimorphous form of the disease was 4,881; of these, 1,337 (27.4 per cent) were under control. Since only 77.7 per cent of the patients with these forms of the disease had registered contacts, the actual control percentage may be estimated at 21.3 per cent (27.4 per cent $\times$ 77.7 per cent). Likewise, the effective general control percentage of contacts is estimated at 18.7 per cent.

(Source: Ministry of Health and the Environment, Rio Grande do Sul, Brazil.)

Editorial Comments

Leprosy is an endemic disease in almost all the countries of the Americas. According to reports received by PAHO, there are about 257,000 registered cases but the actual total is estimated to be around 450,000.

The geographical distribution of the cases is not uniform; there is a tendency for them to be concentrated in well-defined foci where the morbidity rate may be as high as 10-30 cases per 1,000 population.

The areas most affected are in the Amazon subregion (including parts of Bolivia, Brazil, Colombia, and Peru); the Caribbean (French Guiana, Guyana, Suriname, and several of the islands); and some areas in the Southern Cone countries. The following outstanding epidemiological characteristics are to be noted:

1. With few exceptions, half the cases diagnosed are infectious.
2. Prevalence in the age group 0-14 years is less than 15 per cent.
3. Up to the 1950s, about 70 per cent of the cases reported were from rural areas (scattered communities with fewer than 2,500 inhabitants). At present the situation is the reverse, owing to the immigration of patients to the large cities.

If only the absolute number of cases and the morbidity rates are taken into account, leprosy would not be a priority public health problem. However, the extent of the problems is increasing because of the following factors inherent in the disease:

• Its chronic course: cases of the disease with the most favorable course (incipient cases) are only discharged as cured after a minimum of five years and the more advanced cases need treatment and epidemiological surveillance for many more years.
• In addition to being communicable, leprosy is a disabling disease since it involves the peripheral nervous system, and neuritic lesions may be aggravated even in "cured" cases, if they are not carefully treated. About 30 per cent of the patients have some kind of incapacitating lesion.
• Culturally or socially leprosy has been associated with a stigma that prevents the patients from being accepted in their community and causes them to be rejected even by the healthy members of their own family. This attitude is irrational, yet compulsive, and exists in all strata of the population, even among physicians, and is the most serious limiting factor or obstacle in the application of control measures.

In the past, control of the disease was based on the isolation of patients in leprosaria, that is to say, on segregating the sources of infection. Later it was found that this measure was counterproductive since it encouraged the concealment and dispersion of patients, even to communities free of the disease; it accentuated the existing stigma, and when the cases were diagnosed and isolated, most of them had already infected other persons.

In the 1940s treatment with Dapsone (D.D.S.), a drug that proved effective, was begun, and the emphasis of control policy was directed towards outpatient treatment.

Subsequently it was found that monotherapy with D.D.S. favored the development of resistant strains and, consequently, the treatment of patients with more than one drug at the same time, preferably a bactercidal drug, was recommended.

At present, the policy recommended by the International Congresses on Leprology and by the WHO Expert Committee on Leprosy is based on the secondary prevention of the disease, that is to say, detection and locating of cases, treatment with a combination of drugs, and epidemiological surveillance for ensuring regular medication. Follow-up of the cases includes prevention and treatment of incapacitating lesions.

The implementation of this simple and rational policy depends on certain strategies that are summarized below:

• Use of the general health services, primarily at the primary care level, for the detection and treatment of cases. Activities for the prevention of disabilities, which are simple techniques that can be carried out at any level.
• Allocation of the necessary resources (staff time and logistic elements) in accordance with the importance of the problem in well-defined foci.
• Appropriate training of personnel and development of their decision-making capacity to establish priorities in health problems.
• Strengthening of the supervision and operational and epidemiological information mechanisms.

• Supervised treatment of patients with more than one drug (preferably a bactericidal drug).

• Adoption of new schedules for the administration of intermittent treatment in order to make the costs of the treatment more acceptable.

The leprosy control program in Rio Grande do Sul is a good example of sound policies and strategies and of the priority assigned to the problem by the health authorities of the country.

Reports of Meetings and Seminars

Meeting of the Advisory Study Group on Chronic Rheumatic Diseases

Chronic rheumatic diseases are a public health problem because they frequently require outpatient treatment and prolonged hospitalization and produce a lasting and progressive disability which affects important core groups in the active population.

To discover certain epidemiological features of these diseases which may serve as the basis for subsequently programming control measures, PAHO is coordinating a collaborative study designed to investigate aspects of the patients treated by rheumatology services in Latin American countries.

Centers in Argentina, Brazil, Chile, Mexico, Uruguay, and Venezuela participate in the study which was begun in 1977 with a view to keeping track of the patients for five years. The elements being investigated include the extent of disability and dependence produced by these diseases, their impact on work both on the job and at home, and the demand for medical services.

The IV Meeting of the Advisory Group on Chronic Rheumatic Diseases was held at PAHO Headquarters in Washington, D.C., from 21-23 October 1981. It reviewed the progress of the study and planned future activities, including the preparation of practical recommendations for an improved treatment of certain musculoskeletal conditions that are a frequent reason for consultation in the general health services. These recommendations, directed to physicians who are not specialists in this field and to nurses, will make a useful contribution to the extension of coverage by facilitating better treatment of rheumatic patients in the general health services.

Seminar on Immunodiagnosis in Malariology

The Seminar, sponsored by the Mérieux Foundation and WHO, was held in Lyon, France, from 9-12 September 1981. Its purpose was to review recent progress in the field of malaria immunology and the use of immuno-diagnostic serologic tests in the epidemiological study of malaria.

Some of the most important aspects discussed are dealt with below.

Immunological diagnostic tests in malaria

Several serologic tests have been used in the study of malaria, including the following:

• Indirect immunofluorescence (IIF).
• Immunoelectrophoretic analysis (IFA).
• Passive hemagglutination (IHA).
• Enzyme-linked immunoassay (ELISA).
• Radioimmunoassay (RIA).

The *indirect immunofluorescence* test (IIF) has been the most widely used in field work. Its sensitivity is acceptable and it is at present the preferred method. The use of homologous antigens makes it possible to recognize specific antibodies. Good quality reagents are available, although the equipment for carrying out the test is expensive and well-trained technical personnel are necessary.

Immunoelectrophoretic analysis techniques including the agar-gel diffusion test (*Ouchterlony technique*) and *counterimmunoelectrophoresis* are sensitive for analyzing malaria antibodies and antigens, but are of limited use in field work. The tests require large amounts of homologous antigen which is generally in short supply and also of limited stability. However, the *Ouchterlony technique* has proved to be much more useful in the laboratory for the antigenic analysis of immune sera of adults infected with *Plasmodium falciparum* in hyperendemic areas. The recognized antigens are categorized according to their thermal stability as labile (L), resistant (R), and heat stabile (S) antigens. The S antigen may in future be used to identify serotypes of *P. falciparum* but additional studies are required in this field.

The *passive hemagglutination* test (IHA) which employs sheep or preferably human red blood cells type O sensitized with plasmodium antigen is a practical test but not very sensitive in detecting antibodies in the primary and early infections.

The *enzyme-linked immunoassay* (ELISA) and *radio-immunoassay* (RIA) tests are highly sensitive methods for detecting antibodies in malaria infection. Their specificity and sensitivity depend on the quality (standardization) of the antigen and of the conjugates used. Both tests call for very well trained technical personnel and appropriate laboratories; however, ELISA, which is more practical than RIA, may be carried out with less expensive equipment. Its use and application in field work calls for subsequent evaluation, especially in connection with the preparation and storage of antigen-coated plates, supply of standardized material, etc.

The Seminar emphasized the need for the highest possible uniformity in the use of serologic diagnosis in epidemiological evaluation of malaria and control measures. In its recommendations it gave priority to studies aimed at standardizing certain serologic methods, including IFA and ELISA, with respect to test procedures, reagents, equipment, sampling methods, and storage of specimens. It was suggested that WHO coordinate these studies. The International Association for Biological Standardization will study the standardization of the biological products employed and will prepare appropriate recommendations for their use.

Also discussed were other immunological diagnostic techniques still being studied or evaluated, including *thin layer immunoassay* (TIA), *latex agglutination, fluoroimmunoassay* (FIAXr) and the use of monoclonal antibodies as a diagnostic method.

Use of serologic diagnosis in the epidemiology of malaria

Serologic diagnosis is useful for epidemiological evaluation in malaria although it has certain technical limitations. Its use is justified when it yields information that other methods cannot supply, especially in malarious areas with low levels of transmission.

Indications for seroepidemiological studies may be classified as follows:

Areas with endemic malaria

- Evaluation of the epidemiological situation (delimitation and stratification of malarious areas, determination of transmission periodicity).
- Monitoring and evaluation of the impact of specific or general malaria control measures on the transmission of the disease.
- Epidemiological research on acquired immunity in children receiving chemotherapy; relationship between immune status of the population and drug response.

Areas in which malaria has been eradicated, but with high malariogenic potential

- Screening of groups constituting risks (migrants, workers, and tourists from countries in which malaria is endemic).
- Detection of secondary cases and delimitation of new foci.

Areas free from malaria with low malariogenic potential

- Detection of asymptomatic imported cases and prevention of induced (post transfusional) malaria.

With respect to the prior requirements for the conduct of these studies, the following aspects were emphasized:

Collection of blood specimens. For an epidemiological survey, fingerpricks should be used for collecting microspecimens of blood. Blood specimens obtained by venepuncture should be reserved for special investigations.

Serologic tests. The serologic tests selected depend on the epidemiological objectives defined. At present the test most used is IFA. The IHA has given disputable results and can produce false negatives in young children and in cases of relatively recent infection. Other tests such as ELISA are promising, but their use in epidemiological surveys has not been evaluated.

Statistical interpretation. The type of survey—simple cross-sectional, repeated cross-sectional, or longitudinal—should be selected at the beginning according to the epidemiological objectives and practical considerations. Statistical interpretation of the results which is essential for the evaluation of serologic data is possible only if the sampling frame and the type of survey have been carefully selected. Mathematical models may be useful in the seroepidemiology of malaria but require further evaluation.

The Seminar recommended that additional studies be made in order to improve serologic diagnostic methods, evaluate mathematical models for the epidemiological study of malaria, identify reference laboratories at the regional and/or national level, organize personnel training programs, and prepare a manual on seroepidemiology in malaria.

Immunological aspects of malaria

Experimental animals, in particular rodents, have been immunized with plasmodium sporozoite antigens, which so far is the only valid assay of protective immunity. A satisfactory model in primates is not yet available.

The availability of an in vitro culture system for the exoerythrocytic forms of rodent plasmodia provide other experimental models for immunological studies of malaria. In addition, work is being done on the cultivation of exoerythrocyte forms of human plasmodia.

Considerable progress has been made in characterizing *Plasmodium knowlesi* erythrocytic antigens detected at the surface of parasitized red blood cells. There is also evidence of the presence of *P. falciparum* antigens in parasitized red blood cells, and it is suspected that these antigens may be responsible for the attachment of the parasitized red blood cells to the endothelial walls of the blood vessels. These antigens, in the *P. knowlesi* system,

are apparently responsible for a mechanism that confers protection.

The characterization of merozoite surface antigens has been difficult although it has been possible to identify merozoite antigens of *Plasmodium yoeli* by means of monoclonal antibodies. It has been demonstrated that these monoclonal antigens induce some protective activity against lethal infections caused by blood parasitized by the *P. yoeli* plasmodium.

In laboratory animals it has been found that it is possible to produce antibodies against gametes in order to block the initiation of sporogony in the mosquito. However, additional studies are required to identify the specific antigens responsible.

Furthermore, it has been demonstrated that both cellular and humoral immunity play an important part in the control of the malaria infection, although they vary according to the host-parasite model used.

The epidemiological and environmental evidence indicates that the protective immunity acquired by man in the course of natural infection is directed against the asexual erythrocytic forms of the parasite, most likely in the late developmental phases (schizonts and merozoites). It is not yet known whether these antibodies require the cooperation of sensitized effector cells to destroy the parasite in the host. Nor have the antigens involved in the protective immunological system been identified.

Immunopathology

The immune mechanisms not only play a role in the protection of the host but also contribute to the pathogenesis of the disease. Nephropathies in malaria are a pertinent example. Other lesions require further study.

The possible destruction of erythrocytes that have not been parasitized by an immune mechanism still remains unclear. The most probable explanation is the attachment of immune complexes to the erythrocytes.

Some aspects observed in the acute phase of the disease are not easy to attribute to the presence of parasites in circulating erythrocytes. For example, there may be signs of hypoglycemia, liver damage, and coagulopathy, but these manifestations may be due to the formation and liberation of mediators such as thromboplastin, the glucocorticoid-activating factor and the tumoral necrosis factor by activated macrophages in the presence of endotoxins or endotoxin-like factors released during schizogony.

The Seminar emphasized the need for close cooperation between WHO, the national health authorities, the scientific community, and industry in continuing immunological laboratory and field studies on malaria. The financial implications need to be carefully studied and solved in order to make the technological breakthroughs derived from them available to all the countries concerned.

Seminar on the Transmission and Control of Tropical Diseases in the Process of Human Migrations

This Seminar was held at PAHO's Area V headquarters in Brasilia from 2-5 June 1981. It was organized by the Public Health Campaigns Authority (SUCAM) of the Ministry of Health of Brazil with the assistance of PAHO/WHO and the financial support of the Special Tropical Diseases Research and Teaching Program (UNDP/World Bank/WHO).

It was attended by professional personnel from several institutions in Brazil and other Latin American countries, international officials, and specialists with experience in different contexts who could contribute to a better understanding of the topic.

The migration of human populations has serious consequences for the health sector. On the one hand, it has to address the problem of the spread of diseases from endemic to disease-free areas through pathogenic agents associated with the migrant population and, on the other, it must take into account man's penetration into ecological environments where he comes into contact with natural foci of diseases unknown in his place of origin.

Of fundamental importance in Latin America is the rural exodus phenomenon which has completely changed the demographic picture in less than 20 years and reversed the urban/rural distribution of the population in a number of countries to such a point that at present there is a marked predominance of urban population. At the same time there has been a radical change in the nosological picture, and there appear to have been shifts in the epidemiological patterns of a number of diseases in recent years which could be seen as a result of changes in their structure. The fact that these changes coincide with the acceleration of migratory processes points to a relationship between the two phenomena; however, this hypothesis can be duly explored only by means of the collective effort of professional personnel from various areas and institutions.

During the Seminar it was emphasized that the migratory phenomenon is an extremely complex problem, since it has political, social, and economic repercussions, and, in addition, influences the health/disease process and therefore should be analyzed in a broad perspective in order to be understood.

The importance of synchronizing population and economic policies was also underscored, in particular the aspects relating to the mobility of the population and the need to formulate guidelines for the solution of the problems that affect the pattern of their living conditions. It was emphasized that measures should be taken which influence factors determining migrations, such as the creation of employment opportunities, and an increase in the income of the poorest groups in conjunction with the

strengthening of activities for the support and guidance of migrants.

To obtain information that could be used as the basis for establishing disease control strategies, it was recommended that the information available in the countries on migratory processes be organized and distributed, that the gaps in our knowledge of migrations be identified, and that specific studies on the following aspects be undertaken:

- Measures to prevent and control diseases in the areas of origin and of destination.
- Influence of migrations associated with development projects in modifying the natural environment, including the destruction of ecological reserves.
- Characteristics of the migrant population and the influence they exercise on the environment in the reception area.
- Changes in immigrants due to types of work in the reception area.
- Economic impact of diseases and cost/benefit ratio of the proposed activities.
- Influence of migratory flows on the epidemiological pattern of diseases.
- Epidemiology of natural foci of diseases in the migrant reception areas.

Other recommendations dealt with studies on nutrition and food patterns, coordination of intercountry activities, financing of research and disease control projects, and establishment of priorities for the conduct of specific activities in the health sector designed to minimize the unfavorable effects of the migratory process on the population.

The participants stressed that the problem must be approached from a multisectoral standpoint in order to reach its structural base and it's eventual solution, and they unanimously adopted the following declaration:

"The principal objective of the interventions, that is to say, that which they are designed to control, should be the *disease* and not the *migrant*. When migrants are found to spread or cause health problems, the planner may be tempted to control migration. However, it should be borne in mind, first, that, as an end, disease control is consistent with all human values and is generally acknowledged to be a human right, whereas the control of migrations would be contrary to the ethical and political principles of freedom of movement and human rights. This applies to all human beings, including the sick."

Calendar of Meetings

Congress on Medical Informatics in Developing Countries

The Congress will be held in Mexico City from 7-12 February 1982 under the auspices of the Mexican Academy of Informatics, the Mexican Society of Public Health, and the Mexican Society of Health Statistics. The purpose of the meeting is to analyze the application of informatics in health care.

Specialists in medical computer science as well as physicians, statisticians, nurses, nutritionists, administrators and, in general, persons interested in health information systems, with particular emphasis on developing countries, are expected to attend the Congress.

The program includes plenary sessions, discussion sessions, workshops, free working sessions, and other activities.

The specific objectives of the Congress are:

1. To analyze the experiences, problems, and prospects in the various areas of medical informatics that are of interest to developing countries.

2. To present the recent advances in the application of informatics in health services.

3. To prepare conclusions and suggestions for expanding the support provided by informatics to the practice of medicine and to the development of health care processes.

The principal topics of the Congress will be presented in the plenary sessions: experiments in health informatics, national and regional policies for health informatics, and problems and needs for the development of health informatics.

The discussion sessions will deal with the impact, strategies, and prospects of health informatics: impact of information technology on the health system, strategies and criteria for the acquisition of informatics resources for health systems, prospects for health informatics in the provision of health services, prospects for health informatics in administration, and support of health systems.

The workshops will discuss such aspects as the components and statistical requirements of health information systems, training of human resources in health in-

formatics, support of health informatics in clinical decision-making, concept of health for the population: role of health informatics, role of medical informatics in the processing of non-numerical information, application of actuarial methods in health informatics. Exhibitions of posters and systems of programming, laboratory systems, hospital outpatient systems, and uses of microprocessors are also planned.

WHO, PAHO, and the International Medical Informatics Association will jointly sponsor the Congress.

Persons interested in obtaining further information should contact: World Congress on Medical Informatics in Developing Countries, Plaza de la Republica No. 6, 3rd floor, Mexico 1, D.F., Mexico.

XXV Congress on Tuberculosis and Diseases of the Respiratory System

The Conference will be held in Buenos Aires, Argentina, from 21–24 April 1982 and will coincide with the centennial of the discovery of the tuberculosis bacillus by Robert Koch.

The session devoted to evaluating the present status of the tuberculosis problem will be of special interest, since strategies for tuberculosis control in the next 20 years as well as the role to be played by WHO and the International Union against Tuberculosis will be discussed.

Other sessions will be devoted to the immunology of respiratory diseases and tuberculosis; problems connected with the diagnosis, treatment, and prevention of the disease in children; advances in the knowledge of these diseases and of leprosy; problems in the provision of services and application of control programs at the community level, and methods of evaluation and surveillance.

Further information may be obtained from the Conference Secretariat: Sante Fe 4292, 1425 Buenos Aires, Argentina.

Publications

Control of Communicable Diseases in Man, 13th ed.—A. J. Benenson, editor. Washington, D.C., American Public Health Association, 1981. (ISBN 0-87553-077-X). 443 pages. Price: US$7.50.

This edition (first published in 1917) presents the essential facts for the control of communicable diseases in man. This volume was compiled with the active participation of WHO, PAHO, and the health authorities of the major English-speaking countries. The manual is addressed to public health workers of official and voluntary health agencies, and, in particular to physicians, dentists, veterinarians, sanitary engineers, nurses, social workers, health educators, and sanitarians.

The manual provides immediate information on how to recognize a specific disease and manage the patients so that the disease does not spread.

The handy, pocket-sized format is tailored to the needs of the health worker in the field. The presentation is standardized: each disease is briefly identified as to its clinical nature, differentiation from related conditions, and laboratory diagnostic procedures. Infectious agent, occurrence, reservoir, mode of transmission, incubation period, period of communicability, and susceptibility and resistance follow. Methods of control are then described under the headings: preventive measures; control of patient, contacts, and the immediate environment; epidemic measures, disaster implications, and international measures. In addition, the manual contains definitions of approximately 50 terms and a complete index.

As with previous editions, the Pan American Health Organization will publish the Spanish and Portuguese versions of the 13th English edition which will be available in 1983 and will be included in the PAHO Scientific Publications Series and Textbook Program of the Organization.