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Mortality in Children 1-4 Years of Age in the Americas

In adopting the regional strategies for health for all and the Plan of Action for their implementation, the Member Governments of PAHO, in order to reduce health disparities both among and within each of the countries of the Region, defined six minimum regional goals.[1] One of these relates specifically to mortality in children in the 1-4 year age group, stipulating that in no country of the Region will the mortality rate for children 1-4 years of age exceed 2.4 per 1,000.

Mortality in children 1-4 years of age is being increasingly accepted as an indicator of a nation's standard of living, its degree of socioeconomic development, the influence of certain cultural and environmental factors on health, and the availability, quality, and efficiency of its health services structure. Knowledge of the mortality in this age group and of its causes contributes to the definition of policies and priorities and the formulation of health programs.

The mortality data presented here are derived mainly from the periodic reports the countries send in to PAHO on the basis of their official records. Problems in the coverage and quality of the records may limit analysis of the data and the possibility of comparison between countries. However, even in countries with underreporting, a study of the proportion of reported deaths affords a good estimate of the trend of the real behavior of mortality, which in normal situations without epidemic outbreaks or disasters tends to be regular and systematic. The underreporting of death rates in the 1-4 age group is much less than that of infant mortality rates because the latter are more influenced by the quality of the denominator, i.e., the number of live births. The denominator for the 1-4 group is less variable and can be obtained from census data or from simple and fairly reliable intercensal estimates. Consequently, ratio variations between the

[1] See *PAHO Official Documents* 173 (1980) and 179 (1982).

IN THIS ISSUE...

infant mortality rate and the mortality rate for children aged 1-4 in Latin America are due mainly to a low recording of live births and an underreporting of infant mortality.

Between 1970 and 1978 the mortality among children 1-4 years of age continued the sustained downward trend observed over the previous decade in the countries of the Region. Table 1 shows the number of deaths and the rate per 1,000 population in this age group for the countries recording them in 1970 and 1978 (or the year closest to 1978). 1978 was selected because the mortality data available for more recent years pertain to a smaller number of countries. The total population of children aged 1-4 in the 28 countries selected was 32,375,200 in 1978. The total number of deaths in this group recorded in the countries fell by 37.6 per cent between 1970 and 1978. There was a reduction in the rates for all the countries, the most marked drops being those of Costa Rica (from 4.6 to 1.1 per 1,000) and Dominica (from 4,9 to 0,6). The smallest reductions were observed in Canada (from 0.8 to 0.6) and the United States (from 0.8 to 0.7), which were also the countries with the lowest rates in both years. This is in line with the fact that the drop in mortality rates tends to be slowest where the rates are lowest.

The drop in mortality in most of the countries came mainly from reductions in deaths from respiratory and diarrheal diseases. There was no substantial change over the period in the proportion of deaths from congenital anomalies (an important cause of death in the first year of life) or from malignant neoplasms.

Of the countries with more than 200 deaths registered in 1978 in the 1-4 age group, the five with the highest and the five with the lowest mortality rates in this group were selected. Table 2 presents the mortality among children aged 1-4 as the percentage of the total annual deaths in both sets of countries. These percentages are extremely high in the countries with the highest rates—as high as 18.64 per cent in Guatemala. In three of the five countries with the lowest rates, however, the proportion stays under 1 per cent. These figures convey the potentially enormous effect a reduction in these early deaths can have on the structure of mortality, and how greatly the life expectancy of the population at large could therefore be improved.

Tables 3 and 4 show the five leading causes of death and the corresponding mortality rates in each of the five countries in the two groups. In the group with the highest rates (Table 3), communicable diseases clearly predominate and enteritis is uniformly first in all the countries. In the group with the lowest rates (Table 4),

Table 1. Number of deaths in children 1-4, and rates per 1,000 population, selected countries, 1970 and around 1978.

Country	1970		1978	
	Number of deaths	Rate per 1,000	Number of deaths	Rate per 1,000
Antigua	13	1.6	7	0.8
Argentina	6,212	3.3	4,618	2.2
Bahamas	40	1.8	22[a]	0.8
Barbados	47	2.2	26	1.3
Belize	74	4.3	35[a]	1.6
Canada	1,263	0.8	886	0.6
Chile	3,684	4.1	1,554	1.5
Colombia	19,570	6.8	13,866[b]	4.5
Costa Rica	1,155	4.6	233[a]	1.1
Cuba	1,163	1.2	847	0.9
Dominica	50	4.9	7	0.6
Dominican Republic	3,262	5.9	2,118	3.0
Ecuador	12,989	14.9	9,097	8.1
El Salvador	5,925	11.1	2,473	4.1
Grenada	58	4.4	39	2.5
Guatemala	17,116	24.0	11,933	13.1
Honduras	3,861	9.9	2,656	4.8
Panama	1,400	7.4	483	2.1
Paraguay[c]	1,196	6.7	1,110	5.0
Peru	22,781	12.5	10,915	5.2
Saint Lucia	61	4.0	25	1.4
St. Vincent	72	5.3	58	3.9
Suriname	206	4.3	66	1.4
Trinidad	197	1.8	133[b]	1.3
United States of America	11,548	0.8	8,429	0.7
Uruguay	287	1.3	229	1.1
Venezuela	7,528	5.2	4,021	2.4
Total	121,758		75,886	

[a] 1979.
[b] 1977.
[c] Information area.

Table 2. Deaths in the 1-4 year age group as percentages of general mortality.

Countries with highest mortality rates in children aged 1-4		Countries with lowest mortality rates in children aged 1-4	
Country	Percentage of total deaths	Country	Percentage of total deaths
Guatemala	18.64	United States of America	0.43
Ecuador	16.07	Canada	0.52
Honduras	14.64	Uruguay	0.81
Peru	13.34	Cuba	1.54
Paraguay	8.52	Costa Rica	2.70

on the other hand, the leading causes are non-communicable—such as neoplasms, congenital anomalies, and accidents. In all five countries in this group, accidents are the chief cause of mortality, with similar rates which range between 21.2 and 29.2 per 100,000. The mortality rates from communicable diseases such as pneumonia and enteritis are quite different in the two groups, being significantly higher in the countries

Table 3. Five leading causes of death with rates per 100,000 in children 1-4 years, in countries with highest rates in this age group, 1978.

Country	Order				
	1st	2nd	3rd	4th	5th
Guatemala	Enteritis	Influenza/ Pneumonia	Measles	Whooping cough	Avitaminosis
	408.6	220.5	121.2	59.1	44.1
Ecuador	Enteritis	Bronchitis	Influenza/ Pneumonia	Avitaminosis	Accidents
	227.5	91.2	89.9	38.3	37.3
Honduras	Enteritis	Measles	Influenza/ Pneumonia	Bacillary dysentery	Bronchitis
	92.8	41.6	34.8	18.7	14.6
Peru	Enteritis	Influenza/ Pneumonia	Bronchitis	Measles	Avitaminosis
	134.2	104.2	34.3	32.1	25.5
Paraguay	Enteritis	Influenza/ Pneumonia	Accidents	Avitaminosis	Bronchitis
	198.7	65.2	27.2	20.1	11.6

Table 4. Five leading causes of death with rates per 100,000 in children 1-4 years, in countries with lowest rates in this age group, 1978.

Country	Order				
	1st	2nd	3rd	4th	5th
United States of America	Accidents	Congenital anomalies	Malignant neoplasms	Influenza/ Pneumonia	Homicide
	29.2	8.3	4.8	2.9	2.5
Canada	Accidents	Congenital anomalies	Malignant neoplasms	Influenza/ Pneumonia	Homicide
	27.7	13.2	5.9	2.7	1.6
Uruguay	Accidents	Congenital anomalies	Malignant neoplasms	Influenza/ Pneumonia	Enteritis
	23.5	14.9	9.1	9.1	7.2
Cuba	Accidents	Influenza/ Pneumonia	Congenital anomalies	Malignant neoplasms	Enteritis
	22.3	14.9	8.3	6.6	4.2
Costa Rica	Accidents	Enteritis	Influenza/ Pneumonia	Congenital anomalies	Malignant neoplasms
	21.2	18.8	12.0	8.7	5.3

with the highest overall rates. In the case of enteritis, for instance, the rates in the first group range between 92.8 and 408.6 deaths per 100,000, but are below 19 in the second. There is little difference between the mortality rates from accidents in the two groups, though the proportions of the different kinds of accidents can vary from country to country. In the other 18 countries intermediate situations are observed, not only with respect to the varying combinations of communicable and noncommunicable causes among their five leading causes of deaths, but also in that the rates are between those of the two extreme groups.

The greatest advance that could be achieved in the coming decade, especially in the countries with the highest rates, would be a continuation of the reduction in mortality from respiratory infections and diarrheal diseases and, on a lesser scale, from accidents. It can be predicted that the downward trend of the first two causes will continue over the years ahead with immediate repercussions on the structure of mortality in the 1-4 age group.

Since the rates presented are national averages, they reveal nothing of the possible geographic and social variations within each country; moreover, the death certificates used do not provide socioeconomic information. Major limitations are also imposed by the difficulty of correlating mortality data with indicators of economic and social development and of the availability and accessibility of health services. These deficiencies point up the need for specific research to identify the population groups most at risk and the social, economic, and cultural variables—including access to health services—that bear on sickness and death in children 1-4 years of age. The findings of such studies could provide guidance for integrated prevention and control programs for the diseases that are the leading causes of mortality in this age group in the countries of the Region.

(*Source:* Epidemiology Unit, Health Programs Development, PAHO.)

Diseases Subject to the International Health Regulations

Cholera, yellow fever, and plague cases and deaths reported in the Region of the Americas up to 30 April 1983.

Country and administrative subdivision	Cholera cases	Yellow fever		Plague cases
		Cases	Deaths	
BOLIVIA	—	*10*	*10*	*20*
Beni	—	1	1	—
Cochabamba	—	7	7	—
La Paz	—	2	2	20
PERU	—	*4*	*4*	—
Madre de Dios	—	4	4	—

Acquired Immune Deficiency Syndrome (AIDS)

During June and July 1981, the U.S. Centers for Disease Control (CDC) reported to the medical community an unprecedented occurrence of Kaposi's sarcoma and *Pneumocystis carinii* pneumonia among apparently previously healthy homosexual men. One and a half years later, over 1,000 individuals with a similar illness characterized by unusual rare malignancies and opportunistic infections have been reported to CDC. Multiple detailed reports have appeared in the literature clearly documenting this unique pattern of disease, and the number of cases continues to increase at approximately three cases per day in the United States with increasing case reports throughout Europe, Africa, and Haiti. Since a common denominator in all of these patients appears to be the development of a profound immunosuppressed state, the disease has been referred to as the acquired immune deficiency syndrome (AIDS). CDC defines a case of AIDS as a disease, at least moderately predictive of a defect in cell-mediated immunity, occurring in a person with no known cause for diminished resistance to that disease. The disease may manifest as Kaposi's sarcoma, *P. carinii* pneumonia, and other serious opportunistic infections listed below.

As of 9 February 1983, CDC has received notification of 1,051 cases of AIDS in the United States as reported from 34 states. CDC also has information on 70 additional cases which have occurred in 15 other countries. The incidence of AIDS in the United States has roughly doubled every six months since the second half of 1979. Analysis of cases of AIDS reported to CDC shows that 50 per cent had *P. carinii* pneumonia, a rare protozoan pulmonary infection which previously was a major infection only in severely immunosuppressed patients, such as bone marrow transplant patients or patients undergoing chemotherapy (Table 1). A total of 28 per cent of AIDS patients had Kaposi's sarcoma, an extremely rare, malignant neoplasm seen previously only in elderly men or in individuals immunosuppressed due to organ transplantation or steroid therapy. Unlike the limited radiosensitive Kaposi's sarcoma seen in this latter group, Kaposi's sarcoma in AIDS patients is typically radiation and chemotherapy insensitive and frequently disseminates to a lymphadenopathic form resulting in the death of the patient within two years. Prior to the recognition of AIDS, this lymphadenopathic form of Kaposi's was occasionally seen in Equatorial Africa affecting primarily young men. An additional 8 per cent of the 1,051 cases of AIDS have had both Kaposi's sarcoma and *P. carinii* infection, a combination of diseases which had never been recognized in the past. The remaining 14 per cent of AIDS patients had other opportunistic infections which again are only seen in immunosuppressed patients. These infections include pneumonia, meningitis, or encephalitis due to one of the following: *Aspergillus, Candida, Cryptococcus,* cytomegalovirus, *Nocardia, Strongyloides, Toxoplasma, Zygomycoses,* or atypical *Mycobacteria;* esophagitis due to *Candida,* cytomegalovirus, or herpes simplex virus; progressive multifocal leukoencephalopathy; chronic enterocolitis (more than four weeks) due to *Cryptosporidia;* or unusually extensive mucocutaneous herpes simplex infection of more than five weeks duration. None of the above patients had a history of having received any immunosuppressive therapy such as corticosteroids. Patients with Hodgkins' disease and other lymphomas were excluded for epidemiological purposes.

Table 1. Distribution of AIDS cases, according to clinical reports, notified in the United States of America, up to 9 February 1983.*

Disease	Number	Total cases	Fatality percentage
Kaposi's sarcoma	295	28	21
Pneumocystis carinii pneumonia	527	50	44
Both	86	8	51
Other opportunistic infections	143	14	46
Total	1,051	100	39

*Information provided by U.S. Centers for Disease Control (CDC), Atlanta, Georgia.

Approximately 80 per cent of the cases reported in the U.S. have been concentrated in six metropolitan areas: New York City (46 per cent), San Francisco (11 per cent), Los Angeles (6 per cent), Newark (5 per cent), Miami and Houston (4 per cent) (Table 2). Of the total cases, 73 per cent occurred among homosexually or bisexually active men, 16 per cent among heterosexual intravenous drug abusers, 5 per cent among Haitian immigrants residing in the U.S., and 1 per cent among hemophiliacs receiving lyophilized concentrates of Factor 8 (Table 3). Over the past year other categories of patients have developed AIDS which include patients who have received routine blood transfusions, children of AIDS patients, heterosexual partners of AIDS

Table 2. Percentage distribution of AIDS cases by area of residence, United States of America, up to 9 February 1983.*

Residence	Percentage of total
New York State	50
New York City	46
California	21
San Francisco	11
Los Angeles	6
Florida	6
Miami	4
New Jersey	6
Newark	5
Other States (30)	17

*Information provided by CDC.

Table 3. Percentage distribution of AIDS cases, by risk categories, United States of America, up to 9 February 1983.*

Category	Per cent
Homosexual/bisexual men	73
Heterosexual IV drug abusers	16
Haitian immigrants	5
Hemophiliacs	1
Others:	5
Patients receiving blood transfusions	
Children of AIDS patients	
Heterosexual partners of AIDS patients	
Prison inmates	

*Information provided by CDC.

Table 4. Percentage distribution of AIDS cases by race, United States of America, up to 9 February 1983.*

Race	Percentage of total
White	59.9
Black	21.0
Hispanic	12.7
Haitian	5.4
Native American	0.2
Asian	0.2
Unknown	0.6
Total	100.0

*Information provided by CDC.

Table 5. Percentage distribution of AIDS cases according to age, United States of America, up to 9 February 1983.*

Age	Percentage of total
Under 20	0.4
20-24	4.3
25-29	17.4
30-34	27.5
35-39	20.3
40-49	22.6
Over 50	7.2
Unknown	0.3
Total	100.0

*Information provided by CDC.

patients, and prison inmates who state that they do not belong in the above risk categories. The racial and age distribution of AIDS cases in the U.S. are shown in Tables 4 and 5.

Occurrence of AIDS among hemophiliacs, those receiving blood transfusions, and heterosexual intravenous drug abusers has suggested that the syndrome, or the etiologic agent of the syndrome may be transmitted through blood products, analogous to hepatitis B virus or non-A or non-B hepatitis. In addition, the frequent occurrence among homosexually active men and among the heterosexual partners of AIDS patients also suggests the sexual transmissibility of this syndrome. Clustering of cases and analysis of contacts of patients with AIDS have also shown that many patients may be asymptomatic carriers of this syndrome.

The overall case fatality rate for the 1,051 cases has been 38.6 per cent. However, for cases that were diagnosed two years ago the mortality rate exceeds 70 per cent. It is estimated that the five year mortality rate will exceed 90-95 per cent. The fatality rate for cases of *P. carinii* pneumonia without Kaposi's sarcoma was 44 per cent and for Kaposi's sarcoma without *P. carinii*, 21 per cent. Cases with both *P. carinii* pneumonia and Kaposi's sarcoma had a fatality rate of 51 per cent. Those with other opportunistic infections had a mortality rate of 46 per cent.

The common denominator in these patients appears to be a profound immunosuppressed state, particularly among the patients with severe opportunistic infections. Typically, patients present lymphopenia (total lymphocyte count less than 1,500 cells per mm) and anergy to all skin tests. There is an absolute depression of helper T lymphocytes resulting in a decreased ratio of helper T-cells to suppressor T-lymphocytes (usually less than 1.0; normal is greater than 1.0). In addition,

diminished proliferative responses to most mitogens are observed in vitro. In addition to defective natural killer cell activity, B cell function appears to be slightly abnormal with polyclonal hypergammaglobulin and increased immune complexes. The latter have been associated with autoimmune thrombocytopenic purpura and autoimmune hemolytic anemia in patients. As a consequence of the immunosuppressed cell-mediated response, patients with AIDS will typically develop infections with fungal, viral, and parasitic infections. Since neutrophil function remains intact, bacterial infections other than mycobacteria are not a major problem in these patients.

Although immunologic dysfunction is the common factor among all AIDS patients, the clinical spectrum of disease has been quite variable. From epidemiological studies the incubation period appears to be between 6-12 months. There is usually a 3-6 month symptomatic period commonly referred to as the prodromal period of AIDS, characterized by unexplained fever, night sweats, chills, diarrhea, fatigue, diminished libido and impotency, depression, apathy, and generalized lymphadenopathy. The syndrome is then typically diagnosed with the appearance of either Kaposi's sarcoma or disseminated opportunistic infections.

Treatment of patients with AIDS has been challenging because they often have multiple opportunistic infections which tend to present themselves. Whether treatment is initially successful for an opportunistic infection or for improvement in Kaposi's sarcoma, the immunologic defect is persistent and the patient frequently has occurrence of malignancy or opportunistic infection. Treatment modalities in addition to specific treatment for the identified infections have included interferon, interleukin, thymosin, and bone marrow transplantation. In all instances there is an attempt to avoid treatment with immunosuppressive drugs. Infections with *Mycobacterium avium-intracellulare* or with cryptosporidiosis have proven to be highly resistant to treatment and the efficacy of new investigative drugs is being studied.

From the studies on the epidemiology of AIDS, the data highly support the hypothesis that this syndrome is caused by an infective agent transmissible through blood, blood products, or sexual activities. The appearance of AIDS in children born to mothers with AIDS also suggests either transplacental transmission or transmission through maternal-fetal blood transfer at time of birth. Thus far, all investigative efforts have failed to identify a cause of this disease. Until an etiologic factor is identified or successful treatment is developed, it is likely that the number of cases of AIDS will continue to increase in epidemic numbers within the United States and in other countries, and if the fatality rate continues unabated, the lethal effects of this disease will eventually be felt throughout the world.

Note:

Although the cause of AIDS remains unknown, the Public Health Service recommends the following actions:

1. Sexual contact should be avoided with persons known or suspected to have AIDS. Members of high risk groups should be aware that multiple sexual partners increase the probability of developing AIDS.
2. As a temporary measure, members of groups at increased risk for AIDS should refrain from donating plasma and/or blood. This recommendation includes all individuals belonging to such groups, even though many individuals are at little risk of AIDS. Centers collecting plasma and/or blood should inform potential donors of this recommendation. The Food and Drug Administration (FDA) is preparing new recommendations for manufacturers of plasma derivatives and for establishments collecting plasma or blood. This is an interim measure to protect recipients of blood products and blood until specific laboratory tests are available.
3. Studies should be conducted to evaluate screening procedures for their effectiveness in identifying and excluding plasma and blood with a high probability of transmitting AIDS. These procedures should include specific laboratory tests as well as careful histories and physical examinations.
4. Physicians should adhere strictly to medical indications for transfusions, and autologous blood transfusions are encouraged.
5. Work should continue toward development of safer blood products for use by hemophilia patients.

The National Hemophilia Foundation has made specific recommendations for management of patients with hemophilia.[1]

The interim recommendation requesting that high-risk persons refrain from donating plasma and/or blood is especially important for donors whose plasma is recovered from plasmapheresis centers or other sources and pooled to make products that are not inactivated and may transmit infections, such as hepatitis B. The clear intent of this recommendation is to eliminate plasma and blood potentially containing the AIDS agent from the supply. Since no specific test is known to detect AIDS at an early stage in a potential donor, the recommendation to discourage donation must encom-

[1] Medical and Scientific Advisory Council Recommendations to prevent AIDS in patients with hemophilia. New York: National Hemophilia Foundation, January 14, 1983.

pass all members of groups at increased risk for AIDS, even though it includes many individuals who may be at little risk of transmitting AIDS.

As long as the cause remains unknown, the ability to understand the natural history of AIDS and to undertake preventive measures is somewhat compromised. However, the above recommendations are prudent measures that should reduce the risk of acquiring and transmitting AIDS.

(*Source:* Thomas C. Quinn, M.D., Senior Investigator, National Institutes of Allergy and Infectious Diseases, National Institutes of Health (USA), and MMWR32 (8): 102-103, March 1983.)

The Cuban *Aedes aegypti* Campaign: a Year Later

The *Epidemiological Bulletin* Vol. 3, No. 1 (1982) reported on the program for dengue elimination and *Aedes aegypti* eradication following the 1981 epidemic of dengue when 344,203 cases and 158 deaths were reported in Cuba. Dengue was declared eliminated from Cuba on 16 November 1981 and, at that time, the premises index had been reduced from 35 and greater before the epidemic to 0.09.

On 5 October 1981 the consolidation phase of the eradication program began. The initial strategy was to do treatment cycles at two month intervals and verification cycles every one or two months depending on the area. During November 1982, a team from PAHO accompanied staff from the National *Aedes aegypti* Eradication Program to several areas in Cuba where statistical information of the first year of the consolidation phase was analyzed.

The technical information obtained from the intensive control measures that are being directed against *A. aegypti* in Cuba and the flexibility to combat technical difficulties inherent in many programs have prompted a follow-up of the original report. The information presented may guide other member countries in seeking solutions for some of their control problems.

The program completed seven cycles on 11 December 1982. Table 1 gives the cycle schedule, number of positive premises, and the premises index. As anticipated, the index did not vary greatly between cycles due to the fact that it is fairly easy to bring about a rapid reduction when the index is high but as the index of infestation approaches zero, the expenditure of effort greatly increases. Consequently, without increases in staff and supplies, any campaign may expect a static period before eradication is completed. Considering that the Cuban campaign is only 16 months old and covers approximately 2.5 million houses, the progress is remarkable.

Several factors account for the continued presence of positive premises despite the intensity of the campaign. By the third cycle, it was evident that the problem of control had shifted from an urban to a rural environment (Table 2). At the same time it became necessary to place a greater priority on treatment of schools, factories, and other nonresidential structures. Rural and industrial areas were identified as a cause for continued positivity at the beginning of the rainy season. Rains caused an increase of natural containers (tree holes, bamboo, coconut shells, etc.) serving as *A. aegypti* breeding sites and aggravated logistical problems because of dispersed premises in treatment and evaluation. Despite the logistical problem, the cycle schedule was maintained and in some risk areas, the number of evaluations actually increased.

Closed houses, a problem in many programs, has not caused concern in Cuba. The goal of 100 per cent coverage was almost met in every cycle. For example, only 0.9 per cent of the houses were closed in the second cycle, 0.2 per cent in the third, 0.3 per cent in the fourth, and

Table 1. Premises found positive for *Aedes aegypti* and premises index, by treatment cycle, Cuba, 1982.

Cycle	Dates	Number of positive premises	Premises index
1	5 Oct. -12 Dec. 1981	504	0.020
2	14 Dec. -23 Jan. 1982	294	0.013
3	25 Jan. -20 Mar. 1982	501	0.019
4	22 Mar.-22 May 1982	497	0.020
5	24 May - 6 Aug. 1982	470	0.018
6	16 Aug.-16 Oct. 1982	298	0.012
7*	18 Oct. -11 Dec. 1982	117	0.005

*Data incomplete.

Table 2. Urban/rural distribution of premises found positive for *Aedes aegypti* in cycles 3 and 4, Cuba, 1982.

Positive premises	Cycle 3	Cycle 4
Total premises positive	501	497
Rural premises positive	344	299
Percentage of total positive premises that are rural	68.7	60.2
Urban premises positive	93	90
Percentage of total positive premises that are urban	18.6	18.1
Nonresidential premises positive*	64	108
Percentage of total positive premises that are nonresidential	12.7	21.7

*Factories, schools, etc.

Table 3. Distribution of breeding sites, by container, cycles 1-4, Cuba, 1982.

Type of container	Number positive	Percentage
Low level water tanks	743	30
Tires	488	20
55 gallon metal tanks	300	12
Tin cans	181	7
Animal watering tanks	73	3
Wide mouth earthen jars	44	2
Elevated tanks	22	1
Cisterns and walls	26	1
Flower vases	18	1
Miscellaneous	576	23

0.4 per cent in the fifth. This success was achieved by having staff follow a work schedule that fits the seasonal activity (in agriculture) and employment schedule (in industry) of the resident population. In addition, staff rotated shifts to be available for follow-up work on Saturdays.

Because of the potential threat of insecticide resistance to organophosphate compounds (temephos was used as a larvicide and malathion as an adulticide), the campaign kept records of the principal breeding sites (Table 3). Less than 50 per cent of the containers were associated with potable water. Many of these could be closed in such a way that mosquitoes could not enter. The other potable water containers were treated with temephos and the remaining containers were eliminated. For example, 1,257,792 containers were treated with insecticide during cycle 5, while 2,215,825 containers were destroyed. For cycle 6 a total of 1,979,259 containers were treated and 4,670,786 were destroyed. Some programs have questioned the economic efficiency of destroying breeding sites as a method of source reduction. However, the average number of premises treated per individual (18.9 from cycles 2 to 5) is competitive with programs in other countries and the conservation of insecticide is considerable. Because the evaluators are responsible only for premises inspection and health education, their output per day is greater.

Tires were identified as an important *A. aegypti* breeding site. One industrial area in Habana was recognized as a principal source for tires throughout the country. To minimize the influence of transporting *A. aegypti* eggs from the area, a special team was stationed there. One of its duties was to treat all tires with a residual insecticide.

The number of premises positive and the premises index per cycle is only a partial indication of the control picture. During cycles 5 through 7, the number of positive containers varied from 869 to 556 to 143 per cycle, and 1.85, 1.86, and 1.22 positive containers, respectively, per positive house. It is believed that this is an indication that the time interval between cycles is sufficiently short to curtail the spread of infestation.

Each positive premises is thoroughly studied to locate the primary breeding site. The history of the positive container is taken and if it originated from a site other than its present location, the earlier location is also inspected. Staff members of the Central Office visit more than 60 per cent of the premises found positive per cycle. They have noted that only rarely is the same container or premises positive for two consecutive cycles. For the most part, new breeding sources originate with the transportation of containers from sheltered areas to places where they are exposed to water where dormant fertile eggs hatch. This phenomenon of chance exposure of fertile eggs to water is another reason the final stages of eradication are a drawn out process.

The campaign continues to effect intensive control within a radius of 200 to 500 meters to each positive premises. Larviciding, adulticiding, and source reduction are used along with increased inspection for missed containers. Septic tanks, hidden cisterns, depressions beneath warehouses, road ditches, and natural containers have been identified as the missing primary breeding sites. When there is a problem of identification of a primary site, the number of ovitraps within the area is increased and space spraying is done daily for at least 10 days after all indication of adults or positive ovitraps stops.

Table 4 provides the status of the campaign within each province by cycle. Isla de la Juventud became negative during the intensive attack phase and has remained so for a year. The Province of Guantánamo became negative at cycle 6. A total of 16 municipalities in various provinces have been negative for a year and

Table 4. Status of eradication by cycle and province, Cuba, 1982.

Province	Total premises	Number of premises positive per cycle					
		1	*2*	*3*	*4*	*5*	*6*
Pinar del Río	173,914	20	43	38	42	28	2
Habana	160,452	2	13	36	39	33	28
Habana City	532,418	9	7	31	45	80	73
Matanzas	157,901	2	23	32	30	11	26
Villa Clara	209,482	6	3	8	17	10	13
Cienfuegos	86,904	45	36	13	16	12	4
Sancti Spíritus	101,943	1	27	36	17	67	19
Ciego de Avila	86,553	155	5	15	16	17	11
Camagüey	184, 382	2	12	10	54	49	11
Las Tunas	110,252	15	10	3	11	10	9
Holguín	216,534	8	10	3	11	10	9
Granma	166,355	26	24	42	18	8	2
Santiago de Cuba	197,763	57	81	200	154	114	79
Guantánamo	12,879	0	0	0	0	0	0

*Cycles 4, 5, and 6 were during rainy season.

four more were negative during the last five cycles (10 months). Whenever a municipality becomes negative a 1 km barrier is designated around it. In this area additional ovitraps are set out and more intensive inspections are made. In addition, previously identified risk areas within the municipality received more ovitraps and inspections.

Beginning in January 1982, 6,000 larvitraps or ovitraps were placed throughout the country. This number has been increased to 11,500. These are placed in air and sea port areas, cemeteries, known risk areas, and homes of staff members. Positivity is about 0.1 per cent.

Control activities are managed at the municipal and provincial level with a large component of community involvement. However, this horizontal-type program utilizes a technically strong central core to provide evaluation and technical guidance. The central core has a chief, assistant chief, epidemiologist, entomologist, two statisticians, and two technical officers which average about 60 to 80 per cent of the time in the field. Weekly statistical reports are received by telephone and cable from all provinces. A special report is made on each positive premises. By doing this, all information received is current. Extensive use of maps and statistical analysis makes it possible to study progress and adapt new strategies when required. An example of this is the fact that tropical storm David, which caused considerable damage in the area of Habana, did not produce a threat to the campaign due to this flexibility and ability to mobilize intensive control activities immediately.

As was mentioned in the 1982 report, an important factor in the campaign is the "esprit de corps" of the entire country toward the goal of *A. aegypti* eradication. The impact an informed and cooperative community has on a solution to the problem cannot be overestimated.

(Source: Tropical Diseases Program, Health Programs Development, PAHO, with assistance from staff of the *Aedes aegypti* Campaign, Ministry of Public Health, Cuba.)

Special Program on Research and Training in Tropical Diseases (TDR)

This program was planned and initiated by the World Health Organization with the assistance and joint sponsorship of the United Nations Development Program (UNDP) and the World Bank to stimulate and coordinate research for the acquisition and application of new methods for the control of tropical diseases and for refining those already available.

The Program concentrates on research into and the development of better means of controlling tropical diseases, and on the personnel training and institutional strengthening needed to augment research capabilities in tropical countries. These goals take into consideration the repercussions of a disease as a public health problem, the unavailability of satisfactory methods for combating it in the typical conditions of tropical countries, and the existence of avenues of research for improving the methods for its control. The Program has been targeted at research on malaria, schistosomiasis, filariasis, African and American trypanosomiasis, leishmaniasis, and leprosy.

The Special Program also has epidemiology, operations, vector control, and socioeconomic and biomedical research components. Each activity is carried out by multidisciplinary groups of specialists organized in different scientific working groups, each of which is responsible for the guidance of research in specific areas.

The program can provide financial assistance to researchers who undertake to study different aspects of the diseases mentioned, provided the topic has priority and the project scientific merit. The scientific working groups, made up of members of the world scientific community with experience in this field, have approved the Program's financing.

The search for new control methods relates to the training of personnel and the strengthening of the institutions performing research in countries where tropical diseases are endemic. The institutional strengthening activities revolve around the creation of a network of collaborating centers in the tropical countries. These centers will coordinate the upgrading of the research potential of the countries concerned, and will house the researcher training activities.

In the area of training, the purpose of the Program is to train both researchers and auxiliary personnel for laboratory work, ambulatory care, and field activities, in keeping with the decisions and needs of the countries concerned. Financing is provided for institutions that direct their research efforts toward finding means of controlling any of the six diseases.

Between 1975 and January 1982 the Program provided financial support totalling US$22,932,231 for 474 projects in the Region of the Americas.

For more information about this Program, contact: Director TDR, World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland, or: Coordinator, Special Program on Tropical Diseases (TDR), Pan American Health Organization, 525 Twenty-third Street, N.W., Washington, D.C. 20037, USA.

(*Source:* WHO Special Program on Research and Training in Tropical Diseases (TDR), and Tropical Diseases, Health Programs Development, PAHO.)

Influenza in Latin America and the Caribbean, 1981-1982

In general, the 1981-1982 influenza season in Latin America and the Caribbean was moderate. The Trinidad outbreak due to H3N2 viruses observed in the second half of 1981 was associated with strains related to A/Texas/1/77 and with the A/Shangai/31/80-like variant of A/Bangkok/1/79, but one strain was similar to A/Oregon/4/80. Ten additional H3N2 viruses were isolated in Trinidad during January/February 1982. Influenza B activity began to be detected in April and lasted until November; a total of 20 influenza B viruses

was isolated during this period. One case of seroconversion to influenza A in January and another to influenza B in September, were seen in patients from Barbados.

Most influenza A (H3N2) strains isolated in Rio de Janeiro, São Paulo, and Bogotá in 1982 were similar to A/Oregon/4/80 virus, but strains related to A/Arizona/2/80 and A/Texas/1/77 were also found in São Paulo. One sporadic H3N2 virus recovered in Rio de Janeiro in September was found to be similar to A/Bangkok/2/79. One H1N1 strain similar to A/England/333/80 was isolated in Rio de Janeiro and another (A/India/6263/80-like) was recovered in Belém. A single H1N1 virus identified as A/England/333/80-like was recovered in Peru in October 1981. Several B viruses related to B/Illinois/1/79 or to B/Singapore/222/79 were obtained in Rio de Janeiro and São Paulo during the first half of 1982. Influenza A(H1N1) viruses recovered in Ecuador in 1981-1982 appeared very similar to A/Brazil/11/78 or else exhibited drift away from A/Brazil/11/78. Several of these isolates (e.g., A/Ecuador/8128/82), were determined to be a low-avid A/England/333/80-like strain. A 1981 H3N2 Ecuadorian isolate proved to be intermediate between A/Texas/77 and A/Bangkok/1/79.

The only influenza activity detected in Chile up to November was one seroconversion to A(H1N1) virus, observed late in September. No activity was reported from Argentina.

In Jamaica influenza A (H1N1) virus circulation among young persons was confirmed at the end of 1982 by serologic diagnosis and virus isolation. The strains were related to A/England/333/80.

Note:

The above findings illustrate the role played by the network of National Influenza Centers in disease surveillance in the Americas. The function of this network is to monitor outbreaks, report them directly to WHO, and isolate and identify influenza strains for which antigenic relationships to other known strains are subsequently investigated in more detail at the WHO Collaborating Centers for Reference and Research on Influenza. This approach allows the detection of new variants like the A/Brazil/11/78 (H1N1) isolate from Belém, Brazil, recovered in 1978. This strain was incorporated in the influenza vaccines formulated since 1979-1980. Moreover, the network periodically surveys the status of immunity to influenza in populations of different age groups and assesses the serologic response to vaccination.

(*Source:* Epidemiology Unit, Health Programs Development, PAHO.)

The Caribbean Epidemiology Center (CAREC)

During 1971 and 1972, Trinidad experienced major poliomyelitis and typhoid fever epidemics at the same time that cholera continued its spread westward reaching Portugal. Because of these developments, English-speaking countries and territories of the Caribbean were especially conscious of communicable diseases—not only the direct threat posed to their inhabitants but also the potential threat to tourism, their major industry. It became evident, however, that little accurate information existed on communicable disease patterns in the Caribbean.

The consequent need for good epidemiological surveillance and back-up laboratories was first stated by Dr. Eric Williams, Prime Minister of Trinidad and Tobago; his call for action was endorsed by the V Caribbean Health Ministers Conference (Dominica 1973). In this same vein, Dr. Williams had approached PAHO in 1972 to see if the Organization would be interested in establishing a disease surveillance center based in Trinidad that would incorporate the activities of the existing Trinidad Regional Virus Laboratory. This laboratory, situated near the center of Port-of-Spain, was used by the Rockefeller Foundation for arbovirus studies from 1952 to 1968, during which time it was affiliated with the Department of Microbiology of the University of the West Indies. In 1968 the Rockefeller Foundation withdrew its funding, but the University kept the laboratory in operation with contributions from the Governments of Barbados, Guyana, Jamaica, Trinidad and Tobago, United Kingdom, and

serial grants from the Medical Research Council (United Kingdom) and the National Institutes of Health (United States).

In response to Dr. Williams' request, PAHO sent a team of scientists to examine surveillance requirements in the area. This team presented a report in 1973 confirming the need for a disease surveillance center. Subsequently, a pan-Caribbean conference (Jamaica, 1974) endorsed plans for performing disease surveillance work based at the Trinidad Regional Virus Laboratory. As a result, PAHO and the Government of Trinidad and Tobago signed a bilateral agreement which granted the lands and facilities of the Trinidad Regional Virus Laboratory to PAHO for 10 years; in October 1974 PAHO signed an additional multilateral agreement with the governments of the Commonwealth Caribbean. Together, these agreements provided the structure of what was to become the Caribbean Epidemiology Center (CAREC), established for a 10-year period beginning 1 January 1975.

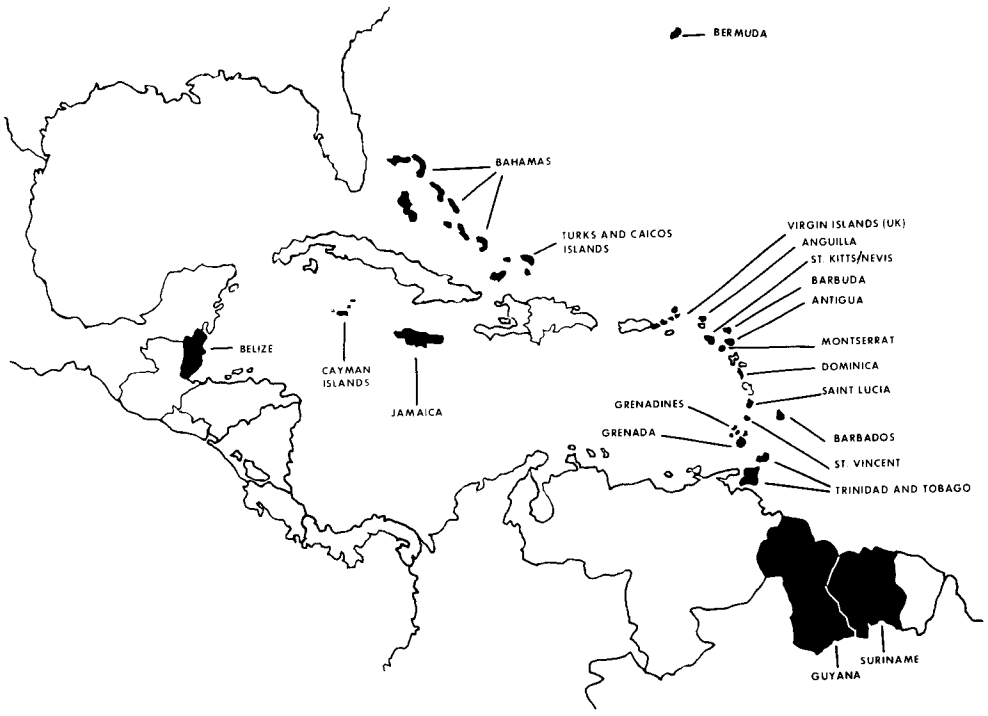
CAREC currently has 19 members: Anguilla, Antigua and Barbuda, Bahamas, Barbados, Belize, Bermuda, British Virgin Islands, Cayman Islands, Dominica, Grenada, Guyana, Jamaica, Montserrat, St. Kitts/Nevis, Saint Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago, and the Turks and Caicos Islands (Figure 1).

The basic objectives of CAREC set down clearly in the multilateral agreement, may be summarized as follows:

- Establish and consolidate disease surveillance in the Caribbean area, first for communicable diseases and later for noncommunicable diseases.
- Provide diagnostic laboratory facilities for virology and supportive and referral laboratory facilities for bacteriology and parasitology.
- Provide laboratory and epidemiological surveillance training for Caribbean area personnel.
- Conduct research relevant to the core programs of communicable disease surveillance and laboratory work.

The CAREC service and research program is reviewed in depth annually by a Scientific Advisory Committee (SAC) and the CAREC Council. SAC is composed of five scientists nominated by the Director of the PASB, three medical faculty members and one agricultural faculty member from the University of the West Indies, and three representatives nominated by the Conference of Ministers Responsible for Health in the Caribbean. The committee advises the CAREC Council which in turn advises PASB's Director, and through him the Caribbean Health Ministers, about the Center's program and budget needs. The Council consists of three

Figure 1. Members of CAREC.



representatives nominated by the Conference of Ministers Responsible for Health in the Caribbean: one representative each from the University of the West Indies, the Caribbean Community (CARICOM), the Commonwealth Caribbean Medical Resarch Council, the Overseas Development Ministry of the United Kingdom, PAHO, and the chairman of the Scientific Advisory Committee.

A grant to support surveillance activities and train health workers to carry them out was initially awarded by the U.S. Centers for Disease Control (CDC) and after three years continued by the U.S. Agency for International Development (USAID). The principal part of the USAID-funded program consists of training activities conducted by the CAREC staff.

By coincidence, the Trinidad Public Health Laboratory was situated in the same building as CAREC, facilitating the arrangement whereby the Director of that laboratory also became the Assistant Director of CAREC. Very strong and essential ties were thus created between the Trinidad Public Health Laboratory and CAREC—ties which have continued to develop. The close relationship established between CAREC and the governments of the Commonwealth Caribbean (through their health ministries and the Caribbean Health Ministers Conference) is particularly important to the structure of CAREC, as defined by the aforementioned multilateral agreement.

A novel feature of the original recommendation was that each country should appoint one physician to work closely with the Center as the designated epidemiologist. Although the link provided by these designees has proved invaluable, it also became clear early on that travelling and the multiple duties of these persons (particularly in the smaller countries), did not allow them enough time for epidemiology. As a result, the Center has responded to a request by the health ministers to develop a cadre of deputy-designated epidemiologists who are public health inspectors and public health nurses. The Center has also sought commitments from the larger countries to organize surveillance units; full-time medical officers have been assigned to such surveillance units in Barbados, Guyana, Jamaica, Suriname, and Trinidad and Tobago.

A major problem in controlling communicable diseases in the Caribbean has been the difficulty small island governments face in attracting and retaining highly trained pathologists, microbiologists, and senior laboratory staff. Special care is taken to design CAREC's training program in such a way as to encourage its graduating technicians to remain in the Caribbean and not contribute to the already severe brain drain.

The Center also publishes the *CAREC Surveillance Report* monthly which is distributed to 2,500 health workers throughout the Region. The report presents information on communicable disease activity in the Caribbean and includes epidemiological analyses by CAREC personnel.

(Source: Epidemiology Unit,
Health Programs Development, PAHO.)

Reports on Meetings and Seminars

Workshop on Epidemiology and Control of *P. falciparum* Malaria in the Americas

The workshop was held in Albuquerque, New Mexico from 26-29 October 1982, under the auspices of the University of New Mexico with the financial support of the Special Program for Research and Training in Tropical Diseases (WHO/UNDP/World Bank), the U.S. Agency for International Development (USAID), and the technical cooperation of PAHO/WHO.

The meeting consisted of three major segments:

- a review by a representative of each of 12 American countries of the current situation relative to *Plasmodium falciparum* malaria, especially drug-resistant *P. falciparum;*
- a review of the current situation as it relates to therapy and prophylaxis of drug-resistant *P. falciparum* malaria, and to the current technology for detecting and monitoring drug resistance; and
- a discussion of the management of *P. falciparum* malaria in three types of situations: (1) where resistance has not yet emerged; (2) where isolated foci of resistance occur; and (3) where there is already widespread resistance.

Three working groups developed general recommendations for management of the resistance problem which included: standardization and optimization of

antimalaria drug use; establishment of longitudinal monitoring systems for the detection and definition of resistance; enhancement of malaria surveillance systems; need for further knowledge of the epidemiology of *P. falciparum* malaria as a prerequisite to effective control; need for rapid detection and treatment of all cases of *P. falciparum* (including an effective gametocytocide) in threatened areas as well as in existing foci of resistance; and enhancement of communication channels among the countries and international organizations for rapid dissemination of significant information.

Drug resistance of *P. falciparum* is a major technical and health problem in those areas of the Americas where the phenomenon is firmly established and is a major threat in those areas where it is not yet established. It required a national commitment toward the effective control of *falciparum* malaria in both affected and nonaffected areas.

A lasting solution to this problem can only be sought through the control and eventual elimination of malaria transmission in all areas affected by drug-resistant *P. falciparum*. This strategy would also lead to a reduction or elimination of *Plasmodium vivax* which, in some areas, is of equal if not higher socioeconomic importance than *P. falciparum*.

Short-term issues which require immediate action are associated with the direct manifestations of drug resistance and with its control; long-term issues aim at the overall control/elimination of malaria. Among the basic decisions to be taken are those pertaining to the degree to which governments are ready to tolerate malaria in their territories, i.e., the national commitment toward effective control which needs to be expressed in action rather than hypotheses. These decisions should be based on a realistic appraisal of the feasibility of the strategy to meet the goal.

Methods and tools available for the epidemiological assessment and the control of malaria may be improved or even augmented in number as a result of laboratory and field research; future approaches and strategies should make use of these developments. For short-term planning, however, it is wise to rely on the best use of what is at hand.

For the medium-term it will be important to investigate the mechanisms of the occurrence and spread of drug resistance, and to identify the major responsible factors with a view to developing a rational strategy for the prevention of drug resistance. This will involve the investigation of a variety of epidemiological parameters (related to man, vector, parasite, and environment) and may also contribute to the long-term study of dynamics of malaria and its transmission which is ultimately expected to provide the key to the effective overall control/elimination of malaria.

Members of the workshop made the following general conclusions and suggested that action at the national and international levels be taken accordingly:

- The problem of drug-resistant *falciparum* malaria in the Region is of major importance especially in two countries, Brazil and Colombia, where intense processes of new settlements, socioeconomic development projects, and human migrations are taking place.
- Other countries in South America have shown drug-resistant malaria to a lesser extent. Apparently, in countries of Central America, Dominican Republic, Haiti, and Mexico no significant changes have been demonstrated in the sensitivity of *falciparum* malaria to drugs. Nevertheless, an alarming increase of *falciparum* malaria cases has been observed during the last two decades.
- The epidemiological surveillance system of malaria infections should be strengthened and the monitoring of the sensitivity/resistance of *P. falciparum* to drugs should include all countries of the Region and should be organized at the country level by national malaria services. PAHO/WHO will coordinate the activities at a regional level and linkage with the global monitoring program is envisaged.
- Adequate provisions will be disseminated at the regional level to collect and analyze information, and intercountry exchange of information will be promoted.
- The needs for training national and international personnel will be identified and research activities will be promoted and coordinated in conjunction with reference, research, and educational centers.

Meeting of Arbovirologists in Latin America and the Caribbean

During 24-26 January 1983 PAHO and the Caribbean Epidemiology Center (CAREC), with support from the International Development Research Center (IDRC) of Canada, held a Meeting of Arbovirologists in Latin America and the Caribbean in Port-of-Spain, Trinidad.

The meeting was attended by about 30 participants from the United States [Yale University, Centers for Disease Control (CDC), Walter Reed Army Institute of Research (WRAIR)], Governmental Institutions of Mexico, Panama, Jamaica, Puerto Rico, Colombia, French Guiana, Cuba, Canada, Trinidad and Tobago, and PAHO, CAREC, and IDRC. The participants presented a total of 25 working papers.

The purpose of the seminar was to discuss:

- findings related to the 1978-1980 yellow fever (YF) epidemic in Trinidad;
- results of the YF ecological investigations funded by IDRC, the Medical Research Council (UK), the Government of Trinidad and Tobago, and CAREC/PAHO and undertaken in Trinidad following the outbreak in order to determine if YF virus could persist on the island; and

• epidemiology of YF and dengue viruses in the Americas and laboratory aspects of these two agents in the region.

The meeting debated the priority of future research on YF and dengue in the Americas.

The group suggested that a report be published on the results of the studies on the above mentioned YF epidemic and post-outbreak investigations, abstracts of other YF and dengue papers, and recommendations on YF and dengue in the Region.

Calendar of Courses and Meetings

Epidemiology Summer Program

The University of Massachusetts at Amherst and the New England Epidemiology Institute are sponsoring this program from 31 July-20 August 1983.

Courses will include theory and practice of epidemiology, biostatistics, multivariate methods in epidemiological analysis, as well as cancer, reproductive, clinical, environmental, occupational, infectious, and cardiovascular disease epidemiology. Proficiency in the English language is essential.

For more information, contact: the New England Epidemiology Institute, P.O. Box 56, Chestnut Hill, Massachusetts 02167.

International Conference on Health for All

Sponsored by the Ministry of Public Health of Cuba, PAHO, UNICEF, WHO, and the Network for Medical Sciences Institutions, this international conference will take place in Habana from 3-9 July 1983.

The main purpose of the Conference will be to promote a multidisciplinary approach for achieving the goal of health for all by the year 2000, and at the same time to exchange experiences and information on the organization of primary health care activities within the framework of health systems, ideas, and national health services.

For more information, contact: Dr. José Jordán, Secretary, Edificio del Consejo Científico, Calle 4, No. 407 e/ 16 y 19, Vedado, Habana 4, Cuba.

Fifth World Conference on Smoking and Health

The Conference will be held in Winnipeg, Canada, 10-15 July 1983. The program includes presentations by experts in the field covering such topics as smoking and insurance, smoking among minority groups, the effects of changing cigarettes, legislation and taxation, mathematical models, pharmacology and toxicology, passive smoking, and long-term trends.

For more information, contact: Registration Secretariat, Fifth World Conference on Smoking and Health, 275 Bay, Ottawa, Canada, K1R 5Z5.

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