Epidemiological Bulletin

PAN AMERICAN HEALTH ORGANIZATION

ISSN 0256-1859 Vol. 7, No. 1, 1986

Status of the Malaria Programs in the Americas[1]

Background

Despite the fact that the countries of the Region of the Americas have adopted malaria-control strategies, the epidemiological situation continues to grow worse. The number of registered cases increased from 830,700 in 1983 to 984,171 in 1984, even though the data from three countries were incomplete. This increase was higher than in any previous year.

The originally malarious countries of the Region have been ranged in four groups on the basis of the status of the problem and the progress and results of the program, as follows:

Group 1 includes 12 countries or territories where there is no evidence of transmission: Cuba, Chile, Dominica, Grenada, Guadeloupe, Jamaica, Martinique, Puerto Rico, Saint Lucia, Trinidad and Tobago, the United States of America, and the Virgin Islands (USA).

Group 2 covers four countries—Argentina, Costa Rica, Panama, and Paraguay—where malaria transmission has been considerably reduced and this favorable situation is being maintained.

Group 3 includes four countries—Brazil, French Guiana, Guyana, and Suriname—with endemic areas where malaria has increased and which produced 42.2% of all cases in the Region in 1984.

Group 4 is made up of 13 countries comprising three geographic subregions which generated 56.5% of all cases reported in the Americas in 1984: *Subregion A:* Haiti and the Dominican Republic; *Subregion B:* Belize, El Salvador, Guatemala, Honduras, Mexico and Nicaragua; *Subregion C:* Andean countries, Bolivia, Colombia, Ecuador, Peru, and Venezuela.

Epidemiological Situation of Malaria

Table 1 shows the totals for malaria cases reported annually by each group of countries between 1981 and 1984. Although Group 1 registered a total of 1,206 cases in 1984, most of them were imported cases.

Haiti and the Dominican Republic are the only Caribbean countries in which transmission is active. In 1984 the situation in Haiti worsened, but the Dominican Republic registered 1,431 fewer cases than in 1983. The autochthonous cases detected in these two countries were all caused by the species *Plasmodium falciparum*.

In Mexico the situation deteriorated in 1984 (10,472 more cases than in the preceding year), while in Central America and Panama, only the latter country and Honduras showed any appreciable improvement. Panama was the only country that was able to sustain the downward trend of incidence, and most of the 125 cases discovered during the year were imported from neighboring countries. In Honduras, 10,204 fewer cases

[1]This article includes material covered in Report XXXIII on the Status of Malaria Programs in the Americas (Document CD31/INF/2) presented at the XXXI Meeting of the Directing Council of PAHO (September-October 1984). Copies of this document may be obtained from the Tropical Diseases Program, PAHO.

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Table 1. Cases of malaria reported annually, by groups of endemic countries, 1981-1984.

Country groups		Population of the malarious areas in 1984[a]	Number of cases registered			
			1981	1982	1983	1984
Group 1	Countries in which malaria eradication has been certified[b]	77,953	1,599	972	914	1,206
Group 2	Argentina	3,752	323	567	535	437
	Costa Rica	718	168	110	245	569
	Panama	2,037	340	334	341	125
	Paraguay	2,701	73	66	49	554
Subtotal		9,208	904	1,077	1,170	1,685
Group 3	Brazil	55,927	197,149	221,939	297,687	378,257
	French Guiana	73	769	1,143	1,051	1,021
	Guyana	836	2,065	1,700	2,102	3,017
	Suriname	281	2,479	2,805	1,943	3,849
Subtotal		57,117	202,462	227,587	302,783	386,144
Group 4	*Subregion A:*					
	Dominican Republic	6,060	3,596	4,654	3,801	2,370
	Haiti	4,818	46,703	65,354	53,954	54,896[c]
	Subregion B:					
	Belize	160	2,041	3,868	4,595	4,117
	El Salvador	4,132	93,187	86,202	65,377	66,874
	Guatemala	3,104	67,994	77,375	64,024	74,132
	Honduras	3,867	49,377	57,482	37,536	27,332
	Mexico	41,639	42,104	49,993	75,029	85,501
	Nicaragua	3,165	17,434	15,601	12,907	15,702
	Subregion C:					
	Bolivia	2,469	9,774	6,699	14,441	16,338
	Colombia	18,600	60,972	78,601	105,360	55,268
	Ecuador	5,276	12,745	14,633	51,606	78,599
	Peru	6,361	14,812	20,483	28,563	32,621[d]
	Venezuela	13,156	3,377	4,269	8,400	11,127[e]
Subtotal		112,807	424,116	485,214	525,593	524,877
Total		257,085	629,081	714,850	830,460	913,912

[a]In thousands.
[b]See page 1.
[c]Up to September.
[d]Up to October.
[e]Up to November.

were registered than in 1983. While the situation remained stationary in Belize, it deteriorated in other countries of that area, including Nicaragua where, after a downward trend in recent years, there were 2,795 more cases than in 1983. In Costa Rica the number of cases rose by 132% from 1983 to 1984, although the absolute figure remained low (569 cases).

In South America the epidemiological situation developed as follows in 1984: Of the five malarious countries in the Andean subregion—Bolivia, Colombia, Ecuador, Peru, and Venezuela—only in Colombia did the number of cases go down; in the others (although data for Peru and Venezuela are incomplete) there was an increase in the number of cases, which was especially noticeable in Ecuador.

The figure was also higher for Brazil, up from 297,687 cases in 1983 to 378,257 in 1984. In the other Group 3 countries, only in French Guiana did the situation remain stationary during the year. The other two countries (Guyana and Suriname) reported increases in malaria transmission of 915 and 1,906 cases, respectively, although the absolute number of cases was low in both countries.

The number of cases in Argentina was down slightly, from 535 in 1983 to 437 in 1984, but the increase in the course of the year in Paraguay was alarmingly steep, from 49 to 554 cases.

Field Operations

During 1984, the countries of the Region continued the effort begun in previous years to strengthen their epidemiological surveillance systems and to find the means for making antimalaria activities an integral part of the operations of all health sector institutions. The

malaria program was further developed through vector control by intradomiciliary spraying with residual insecticides; larvicidal measures (using chemicals and larvivorous fish, and reduction of breeding places), and personal protection (use of repellents and mosquito nets, and case treatment).

The use of insecticides, the chief vector-control measure, was kept at a low level in 1984. DDT use was practically the same as in 1983, while that of propoxur increased slightly, and the use of fenitrothion diminished. DDT continued to lead among the insecticides applied, even though it was not utilized at all in El Salvador, Guatemala, or Haiti.

During the 1981-1984 period it might have been expected that decreased reliance on intradomiciliary spraying with residual insecticides as the main attack measure would have been accompanied by a diversification of control measures, but this did not happen. In most areas where spraying was discontinued, no other vector surveillance and control measures were implemented.

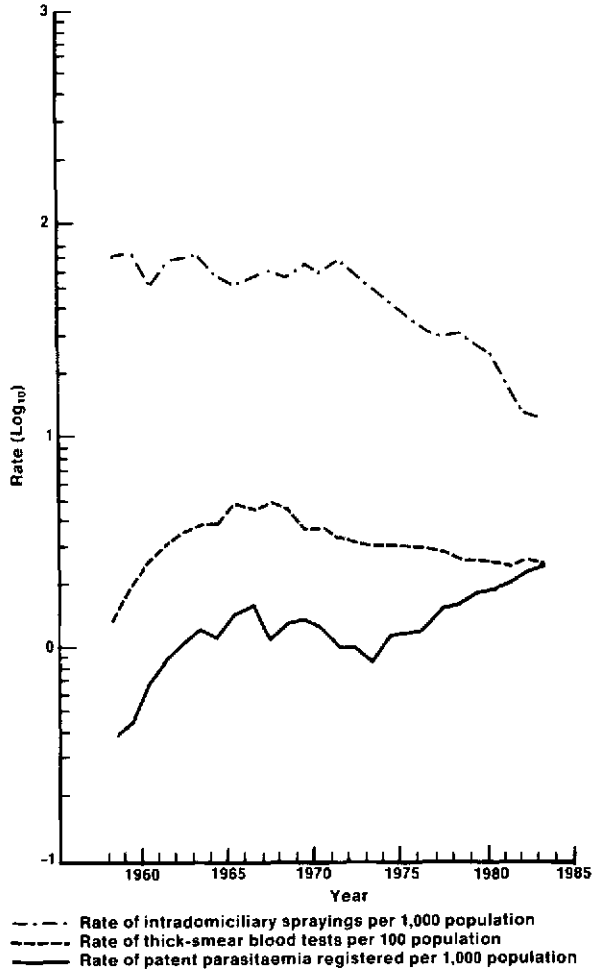
Eight countries used larvicides as a malaria-control measure for the protection of 2,242,000 inhabitants. In Haiti, larvivorous fish were used on the same scale as in 1983 in an area with 42,614 inhabitants. El Salvador and Mexico also opted for small-scale sanitary engineering works to reduce breeding places, thus providing protection for 392,000 persons.

Another measure for prevention and control of the disease was mass drug distributions, which were carried out in five countries with a coverage of 1,273,540 persons. Selective treatment was used for 651,257 persons in four countries.

It should be noted that large proportions of the populations at risk in the malarious zones did not receive any protection at all. Eight countries reported that around 13 million persons had been left without care for lack of funds, and it is estimated that a further 680,000 are without proper protection owing to social problems that are disrupting public order and to the difficulty of access to some places.

Figure 1 shows that the number of intradomiciliary sprayings per 1,000 inhabitants has declined greatly since the beginning of the 1970s. On the other hand, the rate of detected parasitaemia remained stable between 1960 and 1973 but has risen steadily since 1974. The annual rate of blood examinations (per 100 persons) declined slightly in the closing years of the 1960s and remained stable up to 1984.

Figure 1. Malariometric rates of 21 countries of the Americas, 1960-1985.



Problems Impeding the Progress of the Programs

The problem of vector resistance to insecticides in Central America and Haiti has caused serious operational and financial difficulties in those areas, owing to the high cost of alternative products. For example, 1 kg of DDT-75 costs US$1.40, the same quantity of fenitrothion-40 costs $4.50, and of propoxur $10.50. Amounts needed for one spraying, however, are 533 g of wettable DDT powder, 1,000 g of fenitrothion, and 800 g of propoxur.

Levels of resistance are highest in the Central American isthmus, from southern Mexico to Panama. *Anopheles albimanus*, the leading vector of malaria in those countries, has become resistant to chlorinated insecticides, many organophosphates, and some carbamates. It is known that an important factor in the emergence of this phenomenon is the presence of cotton plantations and rice fields, which are subjected to massive airborne applications for several months that are also the months of heaviest anopheline density. The use of insecticides in agriculture is an important factor in the natural selection of multiresistant anopheline strains that are difficult to control. The countries concerned have been obliged to solve this problem by

using new insecticides, whose initial efficacy soon fades. It is also known that, when a country decides to use a new product in its health campaigns, it often turns out that the product has already been in agricultural use for months and even years in advance.

In Central America good results have already been obtained by replacing DDT with other insecticides, such as propoxur, which was applied on a large scale in the early 1970s. Unfortunately, the cost of this carbamate has prevented its widespread use. The same can be said of chlorphoxim, resmethrin, fenitrothion and bendiocarb. The latter two appear to be the most promising and are starting to be used in Guatemala, Haiti, Honduras, and Mexico.

It is regrettable that some countries have started spraying with new insecticides donated by the governments of producer countries on occasions when there has been no justification for abandoning the use of DDT. It commonly happens that the quantity donated is used up without any advance arrangements having been made for a continued supply. In such cases, the spraying program has come to a standstill and the epidemiological situation has worsened all over again. This is a problem for which a permanent solution has to be found, because it is one of the causes of the ups and downs in the indices of malaria transmission noted by the programs.

Although *A. darlingi* and *A. nuñeztovari* are susceptible to insecticides, including chlorinated hydrocarbons, obtaining foreign exchange for purchases of DDT abroad is at times a formidable obstacle difficult to overcome. This causes delays in purchasing and therefore also in the schedules for sprayings, which are not applied at the requisite times and intervals.

The problems created by parasite resistance to drugs are very serious in South America, especially in Brazil and Colombia. In these coutries it has been necessary to establish treatment regimes to replace those using chloroquine in order to treat resistant *P. falciparum* infections in areas of the Amazon region, the Magdalena valley, Catatumbo, and the Turbo region. The use of other drugs more expensive than chloroquine has aggravated the problem of financial imbalance.

Human migrations, which are very heavy in the Brazilian Amazonian region and in some land-settlement areas of Colombia, are another factor that prevents or impedes the implementation of prevention and control programs. Movements of people in border areas are inevitable and difficult to control. These movements affect countries that have achieved a satisfactory control of malaria, as they are compelled to maintain strict and expensive surveillance to prevent reintroduction of the disease in transmission-free areas.

Other problems impeding the progress of the programs were:

- The difficulty of obtaining foreign exchange for public health activities, which are very often given lower priority than other development activities;
- Reluctance of the population to accept spraying;
- Pressure from local and international environmental protection groups opposed to the use of pesticides;
- Makeshift housing in many rural localities, which makes it doubtful whether intradomiciliary spraying has any effect at all; and
- Risks of environmental pollution in areas growing crops or raising livestock for export.

Research

During 1984, research was carried out in the Region in the areas of epidemiology, entomology, vector biology and control, immunology, chemotherapy and applied social sciences. These studies were supported by the national malaria programs and research institutes of Brazil, Colombia, the Dominican Republic, Guatemala, Honduras, and Mexico; universities of those countries and the United States; and specialized agencies such as the Brazilian Research Council, the Agency for International Development (AID), the National Institutes of Health and Department of Defense of the USA, the Special UNDP/World Bank/WHO Program for Research and Training in Tropical Diseases, and PAHO.

The need to define the socioeconomic factors that influence the transmission and control of malaria has prompted various research projects through which it is hoped to gain a better understanding of the social epidemiology of malaria in the Americas. In Brazil, efforts are being made to identify the risk factors (biological, environmental, behavioral, economic, social, and of access to services) that affect the prevention and treatment of malaria infection.

In Colombia a multidisciplinary team has continued studies to relate housing conditions and other socioeconomic variables to malaria transmission. Its findings are expected to provide baseline data for a revision of the National Malaria Service's control strategies.

Also in Colombia, an analysis of the influence of socioeconomic and epidemiological factors on the incidence of malaria and its prevalence in the household and community was completed in 1984. The object of this study was to determine the impact of the disease on labor production, family income, and domestic and production activities. Attempts were also made to design methodologies for evaluation of the cost-benefit ratio, cost-effectiveness, and social benefits of the antimalaria campaign. The results of these studies show that the rate of exposure to mosquito bites of persons working outdoors and the activities of the control program are the variables that influence malaria incidence the most.

To sum up, the greatest difficulty encountered by the countries in regard to malaria prevention and control was the lack of more specific data on the situation with which to make better use of resources on existing epidemiological problems. The financial crisis affected all the countries to the extent that most of the steps taken were emergency measures. It is worth stressing that eight countries reported endemic zones, with a total population of about 13 million, in which no control activities were being carried out for lack of funds. Some countries also announced that current social and political unrest made it impossible for them to apply control measures in the localities involved. In other countries no work could be done in certain areas that are extremely difficult to reach.

Teaching and Practice of Epidemiology in Venezuela[1]

Introduction

The first National Meeting on the Teaching and Practice of Epidemiology in Venezuela was an outcome of interest on the part of the Venezuelan Ministry of Health and Social Welfare in the integral development of epidemiology and the health services system as a response to needs implicit in the changing health-sickness profile of the population. It was hence part of a wider effort prompted by growing local and international awareness of the enormous potential of epidemiology for understanding, analyzing, and modifying the population's health problems and for more harmonious, efficient, and effective articulation of the services. It also arose from a conviction that a strong effort to revise and improve both the teaching and practice of epidemiology is needed for the discipline to be able to perform its important function.

The significance traditionally attached in Venezuela to the development of epidemiology, especially as regards certain communicable diseases, is part of the reason for the progress made in the control of many of them. At the present time the changes occurring in the epidemiological profiles of the general population and of certain specific groups are characterized by an increase in chronic degenerative pathologies, accidents, work-related problems, pollution and degradation of the environment, and other factors determined by processes requiring adjustment and updating of epidemiological knowledge and techniques. The differences in the health-disease conditions of specific population groups have become more clearly defined in terms of their exposure to biological, physicochemical, and social risks which entail a fresh, more responsive approach for proper diagnosis, interpretation, and management. Moreover, growing economic and administrative difficulties in the health services demand a more accurate assessment of the priority needs of the population and an evaluation of the real impact of services and programs on its health.

Internationally, the spread of the theory, methods, and practices of epidemiology and the explosive advances made in the physical, chemical, biological, and social sciences from which it draws its sustenance have created a climate favorable to these endeavors. Special mention must be made of the stimulus provided by international health agencies through activities such as the meeting on "Epidemiology: Current Uses and Future Prospects" organized by PAHO at the end of 1983. All of these developments have helped give momentum to the sizable effort undertaken by Venezuela for the advancement of epidemiology.

Evaluation Activities

In 1984 the Ministry of Health and Social Welfare formed a committee to evaluate the current status of the teaching and practice of epidemiology in order to establish the groundwork for an integral development program. The committee was made up of representatives from the Ministry, the Central University of Venezuela, and PAHO. Consequently, in November and December of the same year, two workshops were held to define the areas of epidemiological work in Venezuela. The resulting document, once approved by the Ministry, became the basis for a national evaluation made in 1985 by the original committee plus representatives of the Venezuelan Social Security Institute and the Lisandro Alvarado West-Central University.

This evaluation covered the epidemiology services (ambulatory and inpatient) of various health institutions at all levels of the system, as well as schools of

[1]Based on the General Report of the First National Meeting on the Teaching and Practice of Epidemiology in Venezuela, held in Caracas, Venezuela, on 1-3 December 1985.