PAN AMERICAN HEALTH ORGANIZATION

WORLD HEALTH ORGANIZATION

XX PAN AMERICAN SANITARY CONFERENCE

XXX REGIONAL COMMITTEE MEETING

ST. GEORGE'S, GRENADA
SEPTEMBER - OCTOBER 1978

Provisional Agenda Item 30

CSP20/9 (Eng.)
27 July 1978
ORIGINAL: SPANISH

CONTROL VS. ERADICATION IN MALARIA PROGRAMS

In the XXV Meeting of the Directing Council of the Pan American Health Organization, held in Washington, D.C., in September-October 1977, the Government of Mexico presented Document CD25/31 entitled: "Control vs. Eradication in Malaria Programs."

This document was examined by the Directing Council, which adopted Resolution XXV requesting the Director to send it to Member Governments for their comments, together with the summary records of the discussions. Subsequently, the technical staff of the Bureau prepared Document CE80/16, based on the comments forwarded by Governments. This document was examined by the Executive Committee at its 80th Meeting, at which it adopted Resolution XVIII, as follows:

THE EXECUTIVE COMMITTEE,

Bearing in mind Resolution XXV of the Directing Council at its XXV Meeting on "Control vs. Eradication in Malaria Programs";

Having examined Document CE80/16 presented by the Director and containing an analysis of the comments received from the Member Governments on this subject;

Recognizing that time-limited eradication is not equally attainable in all countries in the Americas because of differences in ecological, socioeconomic and operational conditions; and

Being aware of Resolution WHA31.45 of the World Health Assembly on "Malaria Control Strategy,"

RESOLVES:

1. To thank the Member Governments for the views they have expressed on the subject.

2. To reaffirm that malaria eradication is the ultimate goal of the malaria program in the Americas and to recognize that control activities are an intermediate stage toward that goal.

3. To urge Member Governments to make firm national commitments against malaria, assign high priority to them in national development plans, and provide adequate resources to improve malaria activities with a view to achieving eradication.

4. To request the Director to strengthen technical cooperation between the Organization and its Member Goverments and to intensify support to training and applied research.

5. To recommend to the Director that, with the support of the WHO Special Program of Research and Training in Tropical Diseases, he maintain and strengthen the work being done in the Americas to acquire more epidemiological information and to select the most efficient antimalarial methods.

6. To recommend to the Director that he take appropriate action to obtain from the international institutions and financing agencies renewed assistance to the malaria program with a view to the eradication of the disease in the Region of the Americas.

This document is being presented to the XX Pan American Sanitary Conference, also by order of the Directing Council at its XXV Meeting, and was prepared on the basis of reports received from the following 23 countries and territories:

Antigua
Argentina
Bermuda
Brazil
Colombia
Costa Rica
Cuba
Dominica
Ecuador
El Salvador
France
Guatemala
Guyana
Haiti
Jamaica
Mexico
Nicaragua
Panama
Peru
Suriname
Trinidad and Tobago
United States of America
Venezuela

A substantial number of countries have contributed observations of remarkably high quality, which in addition to presenting the official view of each country constitute an analysis of the malaria problem in the light of their individual experience. Also worthy of special mention are the uniformity of approach and similarity of views in face of the various technical and financial options available for dealing with the malaria problem.

In addition to commenting directly on the substance of Resolution XXV and on the document presented by the Delegation of Mexico, the Governments consulted discussed the problem of control vs. eradication in the light of the experience of their own countries.

One Government said that control and eradication should not be placed in opposition to each other and it should be recognized that control operations are intermediate stages on the road to the only acceptable objective, which is eradication, and that, in its view, it is important to decide once and for all on one uniform policy so that there will be no reinfections in countries where malaria has been eradicated, attributable to those that may neglect their programs for lack of resources or because they take a different view of the matter.

Another country emphasized that the old malaria control program, if it had been continued up to the present, would not have obtained the stable results registered in the political units of greatest economic and social importance. It noted that not all areas have responded in the same way to attack measures, in spite of which the Government remains an advocate of the philosophy and strategy of malaria eradication, particularly with the flexibility provided in Resolution WHA22.39 approved at the Twenty-second World Health Assembly, held at Boston in 1969.

The characteristics of the malaria problem differ with the ecological conditions in the regions where the disease is indigenous. In some areas of a country where the climate is tropical and subtropical and transmission seasonal, current technology has given good results, transmission having been interrupted in a short time. In other areas of the same country there are tropical rain forests in process of settlement where the human ecology, makeshift housing, low socioeconomic standards and intensive migration favor the establishment of a periodically exacerbating endemic that, to a considerable extent, eludes household insecticides for vector control and the effect of antimalarial drugs as reservoir sterilizers. In these areas the program has had partial results, but it is emphasized that mortality has been diminished and morbidity reduced or stabilized.

Another country said that the initial successes of the program were lost because of a lack of appropriate epidemiological surveillance. With the recent establishment of the infrastructure for the rural health program, epidemiological surveillance operations have been supplemented and made more effective in the detection of cases. In this country there is virtually no mortality from malaria whatever and morbidity has been reduced to a negligible figure, which indicates that eradication of the disease is feasible in the country.

The Government of one country advised that malaria eradication is part of its Five-Year Health Plan, and it recognizes that control activities are an intermediate stage; it appeals to the governments of countries with common borders and problems to take the necessary steps to prevent the deterioration of operations in one of them from reducing or nullifying the gains of another in the field of malaria eradication. This Government also indicated that the policy of the malaria program has been ratified at meetings of Health Ministers of the Andean Area, and it further suggests that the Final Report of the II Meeting of Directors of National Malaria Eradication Services in the Americas, held at Quito, Ecuador, in April 1975, be kept in mind as a reference document for the study of this problem.

Another country remarked that notable successes have indeed been registered in the Americas, to the extent that in 1977 an area containing 71 per cent of the inhabitants of the originally malarious area was free of the disease, but that serious problems had arisen which had hampered progress in the rest of the area and, moreover, that "every government contemplating the reinstatement of an eradication campaign must ponder its responsibility, weigh the means available to it, measure its financing facilities, once again properly train technical staff in sufficient numbers, and urge the other government agencies and private establishments to gird themselves for the joint struggle." It added that, so long as there are no technical resources effective enough to guarantee the full success of an eradication campaign, the aim of the effort must remain eventual, indefinite eradication, and the aspects of epidemiology and flexibility of attack measures must be refined even more highly than they would have to be for a short-term eradication campaign.

Another country made the point that the pessimism felt in some quarters about the eradication program is warranted and, though it grants that eradication may continue as the ultimate goal of the program, it is of the view that this goal cannot be regarded as attainable by a campaign with a definite deadline. Accordingly, the country recommends:

- the establishment of realistic intermediate goals;

- support for the training of national personnel to conduct control programs efficiently;

- the promotion of financial support for control programs through bilateral and international agencies; and

- the encouragement of research for the development of new control methods.

Another Government, in addition to recommending that eradication be upheld as the goal, with all its implications, appealed to the international institutions to give once again the aid needed for malaria eradication programs and for stepping up research to develop new insecticides, drugs and other means for the eradication of the disease. Similar comments were made by other countries, which emphasizes the need for a broad program of research on the serious problems confronting the eradication program. On this point, another country indicated that, while it is currently engaged in a program directed solely at reducing the incidence of the disease, it feels that, if eradication is to be the ultimate objective, the structures of programs will have to be improved so that measures developed by research may be carried out properly and at the right time.

In another country there are areas where the disease has been eradicated, and areas of difficult access, with scattered makeshift housing, a primarily indigenous population, and special cultural patterns, all of which hamper the application of current attack measures. In these latter areas the program is limited to keeping incidence down until new effective measures are available that can be applied at reasonable cost. The goal of the program is eventual eradication of the disease.

Several countries agreed with this view and added other ideas, such as:

- there is need of greater community participation in the program;

- vector control operations should be intensified;

- there should be coordination and information exchanges between neighboring countries; and

- the principles and procedures of eradication of the disease as the ultimate goal of the program should be upheld.

Two countries in the Caribbean area noted that they had achieved malaria eradication years ago and support the resolution to improve anti-malarial activities in other countries with a view to eradication.

Conclusions

In compliance with operative paragraph 3 of Resolution XXV, the technical staff of the Bureau analyzed the replies received and found the following to be the main points brought out:

a) The Governments reaffirm malaria eradication as the ultimate goal of the program and recognize the validity of control activities as an intermediate stage;

b) The malaria situation is not uniform in all the countries of the Americas. Some have achieved eradication in all or part of their territory, while others are far from achieving eradication in the foreseeable future;

c) Where there are difficulties in the way of the eradication of the disease within a definite period of time, realistic partial or intermediate goals should be established;

d) In a program of eradication within an indefinite period of time, flexible and epidemiologically more rigorous measures must be applied than in a short-term eradication program.

e) In the replies, an appeal is made to international institutions to resume providing the necessary assistance to malaria eradication programs and for intensifying research to obtain means that will make practical the eradication of the disease in all malarious areas in the Region of the Americas;

f) Malaria programs should proceed to:

i) improve their structures to permit the timely implementation of measures developed by research;

ii) train national personnel to conduct malaria programs efficiently in accordance with the new strategy adopted by the Governments; and

iii) carry on operational research with a view to improved utilization of methods and available resources.

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Provisional Agenda Item 30

CSP20/9, ADD (Eng.)
17 August 1978
ORIGINAL: ENGLISH-SPANISH

STATUS OF MALARIA PROGRAMS IN THE AMERICAS

XXVI REPORT

TABLE OF CONTENTS

TABLES, MAPS AND GRAPHS

Page

Tables (Cont.)

Maps

Graphs

REPORT ON THE STATUS OF THE MALARIA PROGRAMS IN THE AMERICAS

XXVI REPORT

Introduction

In its XXV Meeting, in 1977, the Directing Council of the Pan American Health Organization examined the document presented by the Government of Mexico on "Control vs. Eradication in the Malaria Programs", reaffirmed that the final goal was malaria eradication in the Americas, and recognized that control activities were an intermediate stage toward this goal.

The priorities established by the Governing Bodies in the last three years determined the policy for the Organization to direct its activities of the malaria program toward: a) the convening of groups of specialists to make recommendations to the Director; b) the promotion of changes of strategy in accordance with the actual epidemiological and financial situations of the countries; c) a technical review of malaria programs in conjunction with national technical staff with a view to the progressive adoption of more effective methods in areas with persistent transmission; d) the promotion and collaboration in research and training activities; e) the coordination of activities in all the malaria programs of the Americas and in border meetings; and f) the selection and preparation of technical information material for distribution.

This report consists of six chapters. The first contains information on the status of the program as a whole and summaries on the progress of the work in each country. The second considers the technical problems that have arisen, and the application of remedial measures to solve them. The third is on research; and the fourth on personnel training and distribution of information. The fifth deals with international coordination and cooperation; and the last, with other vector-borne parasitic diseases.

The information presented in this report was taken from the replies of the Governments to the questionnaire sent to them every year; and from monthly statistical reports, quarterly narrative reports, and special reports.

I. STATUS OF MALARIA PROGRAMS

A. General Information

The population of the Americas, on 31 December 1977, was estimated at 576,942,000 persons, of which 215,550,000 lived in originally malarious areas. Of the latter figure, 104,567,000 (48.5%) lived in areas in which malaria had been eradicated (maintenance phase), 50,610,000 (23.5%) in areas where malaria transmission had been interrupted (consolidation phase), and 60,373,000 (28%) in areas with continuing transmission (attack phase).

Progress achieved in the malaria programs in the Americas has been various from country to country and even from one area to another in the same country. In 1977, the epidemiological situation improved in some countries while making little progress or even worsening in others. Viewing the situation as a whole, however, there was a net gain in population areas free of malaria transmission; the population residing in areas of maintenance and consolidation increased from 71 per cent on 31 December 1976 to 72 per cent in 1977. In Paraguay, 271,010 Km^2 with 631,000 inhabitants were transferred from the consolidation to the maintenance phase, and 50,570 Km^2 with 500,000 inhabitants from the attack to the consolidation phase. In Brazil, 5,194 Km^2 with 150,000 inhabitants were transferred from the attack to the consolidation phase, and 46,277 Km^2 with 1.8 million inhabitants from consolidation to maintenance. Moreover, in an area containing 5.7 million inhabitants, the use of insecticides was suspended because transmission had been interrupted; the parasite incidence of this area was 0.08 per 1,000 inhabitants.

Table 1 shows the population of malarious areas in the Americas by phases and years since 1958, and Tables 2 and 3, the population and areas in square kilometers by country and phase of the program. Maps 1 and 2 convey the geographical extent of the areas in the various phases of the program in December 1976 and 1977.

During 1977, a total of 9,261,874 blood slides were examined, of which 398,598 were found positive for malaria parasites giving an annual blood examination rate (ABER) of 4.3 per cent and an annual parasite incidence (API) of 1.85 per 1,000 inhabitants. Table 4 summarizes the number of slides examined, and of those found to be positive, and the morbidity from malaria since 1958. Table 5 gives the results of blood slide examinations during 1977 by country and phase of the program. The results of the examinations, the number of positives found, the parasite species, and the classification of cases in each phase of the program are provided in Tables 6, 7, 8, and 9.

On the basis of the situation in 1977, the malaria programs in the Region may be classified in two groups:

Group I encompasses 12 countries or territories in which malaria eradication has been certified for the whole of the country: Chile, Cuba, Dominica, United States of America, including the Virgin Islands and Puerto Rico, Grenada and Carriacou, Guadeloupe, Jamaica, Martinique, Saint Lucia, and Trinidad and Tobago. This group has a population of 71,651,000 persons living in originally malarious areas, or 33.2 per cent of the total population of the originally malarious area in the Hemisphere. During 1977, 358 cases of imported malaria, which did not cause local transmission, were recorded in seven of these countries or territories.

Group II includes 21 countries or territories in which malaria control programs were in progress. On the basis of the epidemiological situation in 1977, the group has been subdivided into two areas as follows:

GROUP II

Country	AREA A			AREA B		
	Consolidation and maintenance (with imported cases or limited foci)			Attack (With and without attack measures)		
	Population (thousands)	Cases	API	Population (thousands)	Cases	API
Argentina	3 073	88	0.03	73	375	5.1
Belize	75	144	1.9	66	750	11.4
Bolivia	1 116	947	1.0	759	9 098	12.0
Brazil	26 095	2 080	0.1	19 533	99 795	5.1
Colombia	10 448	8 185	1.0	4 906	55 394	11.3
Costa Rica	419	79	0.1	174	94	0.5
Dominican Republic	4 858	349	0.1	88	396	4.5
Ecuador	1 871	781	0.4	2 541	10 466	4.1
El Salvador.....	-	-	-	3 871	31 745	8.2
French Guiana.....	50	187	3.7	5	301	60.2
Guatemala	-	-	-	2 481	34 283	14.0
Guyana	839	19	0.02	38	1 544	40.6
Haiti	-	-	-	4 126	27 679	6.7
Honduras	490	602	1.2	2 180	38 772	17.8
Mexico	17 719	453	0.03	14 474	18 295	1.3
Nicaragua.....	-	-	-	2 355	11 584	5.0
Panama	1 395	62	0.04	310	612	2.0
Canal Zone	40	4	0.10	-	-	-
Paraguay	1 870	43	0.02	476	113	0.2
Peru	4 182	9 635	2.3	1 318	22 775	17.3
Suriname	243	22	0.1	33	950	28.8
Venezuela	8 941	735 a)	0.1	566	4 024 a)	7.1
Total	83 724	24 415	0.3	60 373	369 045	6.1

a) Information up to November.

In Area A, there were 24,415 recorded cases, of which 5,397 were autochthonous. Of the autochthonous cases, 2,678 were in Peru (49.6%), 871 in Colombia (16.1%), 531 in Bolivia (9.8%), 464 in Ecuador (8.6%), and the rest (15.9% in the other 17 countries. In general, this area is subject to constant importation of cases from Area B, and transmission is observed in residual or new foci originated from imported cases. In most of the countries, the foci are effectively eliminated by emergency measures. In the last three years, however, a deterioration has been observed in the epidemiological situation of Peru, Colombia, Bolivia, and Ecuador. In Guyana there were malaria outbreaks in 1976, but the epidemiological situation improved during 1977.

Area B has a population of 60,373,000 inhabitants, or 28.0 per cent of the total in all malarious areas in the Hemisphere, but they account for 369,045 cases of malaria, which is 92.6 per cent of the 398,598 cases recorded during the year. This area, in addition to harboring foci of persistent transmission, is responsible for most of the foci reestablished in Area A.

B. Country Information

ARGENTINA - Malaria Cases: 1976 - 70 1977 - 463

Transmission had been interrupted at the beginning of the decade, and the disease has not been endemic in the country. However, there is high receptivity and vulnerability in the originally malarious areas. Cases imported from the neighboring countries often have originated foci of transmission, but they have so far been effectively eliminated by emergency measures. The preventive application of two DDT spraying cycles is continuing in the norther border area, and epidemiological surveillance is being maintained in the rest of the originally malarious area. The number of cases increased during 1977 because of small outbreaks caused by imported cases.

BELIZE - Malaria Cases: 1976 - 199 1977 - 894

The program was in an advanced stage and transmission had been confined to a number of foci frequently originated from imported cases. In 1976 and 1977, the epidemiological situation worsened with the importation of larger number of cases and a shortage of insecticides and funds for the timely application of emergency measures. Transmission was again observed in the two northern districts, and in 1977 all-out antimalaria operations were resumed.

BOLIVIA - Malaria Cases: 1976 - 6,714 1977 - 10,106

Administrative and financial problems remained the principal impediment to the normal conduct of the program. A shortage of DDT compelled the Malaria Service to apply this insecticide on a priority basis in localities of high malaria incidence. With the arrival of DDT supplies in mid-1976, the coverage of spraying was extended considerably, but proved insufficient to affect the situation during that period. During 1977 the situation worsened considerably in the departments of Pando, Beni, and Tarija.

BRAZIL - Malaria Cases: 1976 - 89,959 1977 - 104,436

In the last few years, a steady progress has been observed in the short-term eradicaiion area. In 1977, this area harbored 36 million inhabitants, of which 31.7 million (88.1%) were already free of the disease. This last figure included 26.0 million inhabitants of areas in consolidation and maintenance. In the long-term eradication area, with a population of 9.6 million, noteworthy progress was also made, and transmission was confined to isolated foci. By the end of the year, attack measures had been suspended in areas of 2.8 million inhabitants where transmission had been interrupted. However, outbreaks occurred in areas of intensive settlement where virgin jungle was being cleared for crop and livestock raising, which caused the increase in the total number of cases for the country. The Government assigned high priority to the program.

COLOMBIA - Malaria Cases: 1976 - 39,022 1977 - 63,888

The worsening trend of the last four years continued because of technical and financial problems aggravated by instability and human migration into agricultural settlement areas. In other areas, malaria control measures were not well received by the populace, which resulted in inadequate protection against infection. Intensive epidemiological studies by area and locality were in progress to identify the problems and apply specific measures suited to local conditions.

COSTA RICA - Malaria Cases: 1976 - 473 1977 - 217

Malaria transmission has been virtually interrupted in the country and epidemiological surveillance has been the principal activity since 1974. Regular DDT sprayings were continued in the border areas because of the frequent importation of cases. In 1976 and 1977, these imported cases caused small outbreaks which, however, were effectively eliminated by emergency measures that included propoxur sprayings and the distribution of antimalarial drugs.

DOMINICAN REPUBLIC - Malaria Cases: 1976 - 537 1977 - 993

Epidemiological surveillance was effectively maintained despite a steady influx of imported cases from the neighboring country. Regular DDT spraying was continued in the border areas and antilarval operations (sanitary landfill, rectification of irrigation channels, lining and cleaning of ponds, and adequate water management of irrigation systems) were intensified. During 1976 and 1977 larvivorous fish, Poecilia reticulata (guppies), were distributed in water collections of different kinds in 46 municipalities.

ECUADOR - Malaria Cases: 1976 - 10,974 1977 - 11,275

A marked deterioration of the epidemiological situation has been observed in the provinces of Esmeraldas and Napo in the last few years because of operational and administrative problems that have impeded the proper application of attack measures. Transmission was confined to small, isolated communities of difficult access. The renovation of land and river transport in 1977 considerably facilitated operations and improved the coverage of DDT spraying and treatment of malaria cases. A new insecticide, fenitrothion, was tried in an area with persistent transmission and heavy population movements in the north of the country. In the city of Esmeralds, antilarval measures were applied, including the use of larvivorous fish and small engineering works.

EL SALVADOR - Malaria Cases: 1976 - 83,290 1977 - 32,243

The program has deteriorated in recent years chiefly because vector resistance to DDT and propoxur has increased in intensity and extension. Consequently, insecticide sprayings were reduced. Antimalarial drugs were widely distributed to fever cases in areas where the use of insecticide was suspended. In comparison with previous years, 1977 showed a sharp decline in the number of cases registered. This drop was credited to an extended drought--from November 1976 to May 1977--and to an improved organization of the Malaria Service, which made it possible to upgrade operations in the field. During 1977, half of the evaluators of the Malaria Service attended a 10-week training course for rural health aides.

FRENCH GUIANA - Malaria Cases: 1976 - 394 1977 - 488

The situation has remained virtually unchanged in recent years. In the coastal region, which was in the consolidation and maintenance phases, small foci of transmission had appeared every year, originated from imported cases or residual sources of transmission, but were effectively controlled by emergency insecticide spraying and the administration of antimalarial drugs. In the hinterland, which was in the attack phase, DDT spraying of houses was continued regularly in close coordination with Suriname. The most important problem was the movement of laborers, some of them infected, along the Oyapock River.

GUATEMALA - Malaria Cases: 1976 - 9,616 1977 - 34,907

In the second half of 1975, the situation took a turn for the worse as vector resistance to insecticides increased. In 1977, a lack of insecticides obliged the Malaria Service to suspend spraying operations, and a shortage of antimalarial drugs made it difficult to arrest the trend toward further deterioration; the number of cases rose sharply toward the end of the year. During 1977, epidemiological studies were carried out area by area and locality by locality, and 325 areas (containing 543 of the 9,352 localities in the country) were identified as the principal foci of transmission and the sources for 71.3 per cent of all cases occurring in the country. A field trial of copper sulphate as a larvicide was made and susceptibility tests were conducted with fenitrothion and chlorfoxim in search for substitutes for DDT and propoxur.

GUYANA - Malaria Cases: 1976 - 4,642 1977 - 1,563

Transmission had been virtually interrupted in 1974, but the suspension of antimalarial operations in 1974 and 1975 led to a resurgence of the disease in all the hinterland districts that had been in the consolidation phase. In 1976, a series of outbreaks occurred and attack measures were resumed, including residual house spraying with DDT, the distribution of medicated salt, mass blood examination of the inhabitants of affected localities, and presumptive and radical cure treatments. The incidence of malaria dropped considerably in 1977, but transmission was not interrupted.

HAITI - Malaria Cases: 1976 - 15,087 1977 - 27,679

Vector resistance to DDT compelled a considerable curtailment of spraying operations. In some localities with high malaria incidence, antilarval measures were applied (drainage, sanitary landfill, stream diversion in swamplands, and use of larvivorous fish). A total of 19 major engineering projects were launched in the last two years to eliminate or reduce permanent mosquito breeding places at some major foci of transmission in the central and southern parts of the country. Much progress was made toward reducing the incidence of malaria until the second half of 1977, when heavy rainfall created a multitude of temporary breeding places, causing a series of outbreaks, particularly in the southern peninsula. The number of cases rose sharply toward the end of the year. Efforts were made to control the situation using antimalarial drugs, space spraying, and larviciding.

HONDURAS - Malaria Cases: 1976 - 48,804 1977 - 39,414

Because of difficulties in obtaining needed funds and insecticides, spraying operations had to be suspended between April 1974 and mid-1976. The situation worsened rapidly from 1975, and the limited available resources were devoted to emergency measures to prevent further deterioration. Spraying operations were resumed in July 1976 with the arrival of insecticides donated by the European Economic Community. In 1977, a pilot project was planned for integrating the malaria program into the rural health services using the resources of the community for house spraying, antilarval measures, improvement of housing, laboratory diagnoses and the treatment of malaria cases.

MEXICO - Malaria Cases: 1976 - 18,153 1977 - 18,851

The overall epidemiological situation in the country has been stationary in recent years. In the Gulf coast region and on the Yucatan Peninsula, transmission had been virtually interrupted and effective epidemiological surveillance maintained. In 1977, there was a small outbreak (51 cases) caused by imported cases in 11 localities in the Rio Hondo area. Emergency measures eliminated the focus. In the northwestern part of the Pacific slope, the situation improved somewhat, but in the southern part, a slight deterioration was observed. The School of Public Health, in collaboration with the Organization, began a course leading to the degree of Master in Public Health, with emphasis on malaria and other parasitic diseases; the first course was given in 1976, the second in 1977, and others will continue to be given in the future.

NICARAGUA - Malaria Cases: 1976 - 26,228 1977 - 11,584

A general deterioration in the epidemiological situation, in 1975 and 1976, was caused by an increase in vector resistance to propoxur on the Pacific coast, where the chief foci of transmission were located. In 1976, antilarval operations were launched in the four most important foci: Managua, the San Antonio and Montelimar sugarcane plantations, and Tipitapa. Meanwhile, antimalarial drugs were distributed in rural areas. A marked improvement was observed in 1977, particularly in areas where antilarval operations had been undertaken. During the period from January to October 1977, the number of registered cases in the four principal foci was 1,425, down steeply from 7,745 in the same period of the previous year. In the second half of 1977, there were some outbreaks in rural areas along the Pacific coast, but a special program of mass drug administration brought the situation under control.

PANAMA - Malaria Cases: 1976 - 727 1977 - 674

Transmission has been interrupted in the country except at three foci: Bocas del Toro, Darién and San Blás. In the last few years efforts have been directed at the elimination of these foci, and considerable progress has been made. In 1977 a small outbreak was noted in the Province of Colón, but it was brought under control by the end of the year. The number of cases was very much reduced in Bocas del Toro, and the San Blás focus was almost eliminated. Also, an effective surveillance system was established to prevent a resurgence of transmission from imported cases. In Darién, however, transmission persisted, though at a low level, because of constant importation of cases from the neighboring country.

PARAGUAY - Malaria Cases: 1976 - 140 1977 - 156

Though transmission had been interrupted, the constant importation of cases necessitated continued insecticiding in the border area. In 1977 there was a small outbreak in a locality near the Brazilian border, and 35 autochthonous cases were recorded. Emergency measures taken by the Malaria Service quickly eliminated the focus. As a result of a review of the program in December 1976, eight departments, aggregating 631,000 inhabitants in 271,010 km^2, were transferred from the consolidation to the maintenance phase, and another area (with some 500, 000 inhabitants) from the attack to the consolidation phase. By the end of December only 476,000 people (20.3% of the total population of the malarious areas) remained in the attack phase.

PERU - Malaria Cases: 1976 - 18,462 1977 - 32,410

In the areas in the attack and consolidation phase the epidemiological situation has been deteriorating severely, and in every one of the last seven years there has been an increase in the number of cases. Although vectors were still susceptible to DDT, spraying coverage was insufficient because of operating problems and intimely supply of insecticides, materials, equipment and transportation.

SURINAME - Malaria Cases: 1976 - 537 1977 - 993

For the operation of the malaria program, the country was divided into 25 areas, five of them in the attack phase and the rest in the consolidation and maintenance phases. The attack phase area had a population of 31,530 persons (16.6% of the population of the originally malarious area). Transmission was observed only in the attack phase area. Residual DDT spraying and the mass distribution of antimalarial drugs succeeded, despite a limited coverage, in considerably reducing the number of cases in the last four years, except in the Tapanahony River area which, with a population of 9,700 inhabitants, accounted for 87 per cent of all the cases in the country.

VENEZUELA - Malaria Cases: 1976 - 4,740 1977 - 4,977 (up to Nov)

No major changes have been observed in the last four years. Limited transmission continued in the western part of the country, particularly in the State of Barinas. Attack measures were taken, including residual house spraying with DDT and HCH in four to six-month cycles, malathion was sprayed at ultralow volume, antilarval operations with Baytex were carried out, and antimalarial drugs were administered.

C. Field Operations

The use of insecticides has declined considerably in the last five years, from 16,971,930 sprayings in 1973 to 10,007,194 in 1977. This is chiefly because of the high cost of insecticides and the spreading of the vector resistance problem. In some areas, however --in Brazil, for example-- sprayings were suspended because transmission had been interrupted. In general, insecticiding is still the most important attack method in malaria control. DDT is the insecticide most utilized in the program, and is applied in six-month, four-month and yearlong cycles.

Where vector resistance to DDT is a problem, propoxur is applied in three-month cycles. The use of propoxur has also declined, however, from 956,056 sprayings in 1976 to 551,012 in 1977, because of increased vector resistance. Trials with fenitrothion on a limited scale were begun in Ecuador and Guatemala. Country data on houses sprayed in each cycle are given in Table 10, and the insecticides used in 1977 and estimated for 1978 in Table 11.

As more problems of resistance to insecticides arise, antimalarial drugs become more important. In addition to using drugs in presumptive and radical cure treatments, they are distributed to the population at large in selected localities either in response to epidemic outbreaks or for lack of any other effective measures, because of the problem of vector resistance to insecticides or special ecological conditions in areas of agricultural settlement or in encampments of laborers building roads, dams, etc.

In Haiti and Nicaragua, antilarval measures such as larviciding, drainage and landfill were expanded with good results. In Ecuador these techniques were also used in a city located in the area of persistent transmission. In the Dominican Republic the distribution of larvivorous fish was extended to different areas of 46 highly receptive and vulnerable municipalities. In Brazil, malathion at ultralow volume was applied experimentally in an area of settlement in the State of Pará.

Table 12 summarizes the results of active and passive case detection work by country, and Table 13 the personnel of the malaria programs by function. Table 14 shows the means of transport used in the malaria program in each country; poor transport facilities are a serious problem of field operations in some countries.

D. Budget

Table 15 summarizes the expenditures made by the Governments in 1976, the budgets approved for 1977, and the estimated budgets for malaria programs in 1978. Of the 21 countries and territories that had malaria programs, the budget was increased in 15, remained unchanged in one, and was reduced slightly in four, and no information is available on one. As can be seen, the national funds assigned to malaria programs increased from US$81,655,965 in 1976 to US$97,968,065 in 1977 (a 20 per cent increase).

Table 16 illustrates the expenses incurred by PAHO/WHO in 1977 and its budget for technical cooperation with the countries in 1978-1980. The PAHO/WHO and USA/AID contributions assigned to each country in 1977, and the amounts estimated for 1978, are presented in Table 17.

A total of US$1,084,908,666 was invested in malaria programs in the Americas between 1957 and 1977, of which 82.1 per cent was put up by national governments and 17.9 per cent by cooperating international agencies. Graphs 1 and 2 present the funds invested by governments in malaria programs and the contributions of international agencies during those years. In addition, between 1971 and 1973 the Government of the Federal Republic of Germany contributed US$2,546,000 in grants to the malaria program in the Americas.

II. TECHNICAL PROBLEMS

Table 18 and Map 3 show the geographical distribution of the areas with technical problems. In most countries there was no significant change from the situation in 1976, except in Guatemala, where fewer areas are reported on and Honduras, which made no report on problem areas. These areas where malaria transmission persists because of technical problems harbor 8.9 million inhabitants, or 13.6 per cent of the total population of the areas still in the attack phase (60 million). In addition to the areas shown in Table 18, the Amazon Basin, which embraces parts of Bolivia, Colombia, Ecuador and Peru, and an extensive area of Brazil, has special problems associated with low population density and socioeconomic development projects like agricultural settlement and highway construction.

In these areas, inaccessibility and the high cost of operations pose a great problem in efforts to achieve adequate coverage.

Map 4 shows the distribution of A. (N) albimanus and its resistance to DDT and propuxur, and Map 5 the distribution of A. (A) pseudopunctipennis and its resistance to DDT.

A. albimanus, the principal vector, has developed resistance to DDT in areas of the Pacific Coast from Southern Mexico to Panama. This problem has diminished and even nullified the effectiveness of DDT in malaria control. In El Salvador, Guatemala, Honduras and Nicaragua, DDT has been replaced by propoxur since 1970 and 1971. The epidemiological situation improved in the first four or five years, but the vector developed resistance to the new insecticide and, as a result, transmission increased. The area of insecticiding has been progressively curtailed in recent years as resistance has spread and grown stronger. The population of the areas in which vectors are resistant to insecticides is 20 per cent of the total population of the malarious area in these countries.

P. falciparum resistance to chloroquine is widespread in Brazil, Colombia, Ecuador, French Guiana, Guyana, Panama, Suriname and Venezuela. The problem has not yet been detected, in Mexico or in Central America and the Caribbean. To learn more about the geographical distribution of the resistant strains, a survey has been scheduled to cover 100 areas in 20 countries in 1978 where national personnel have been trained in the techniques of in vitro testing for P. falciparum susceptibility to antimalarial drugs.

Most areas of persistent transmission have difficult access and poor socioeconomic development. In these areas the problems are associated with human ecology and ethology, and include makeshift housing, habits and customs that expose humans to increase contacts with the vector, and different kinds of human migrations. No single attack standards and measures can be established as equally effective in all areas, because the epidemiological conditions differ from one to another. In 1976 and 1977 epidemiological studies were begun in most of the countries facing these problems, and an effort was made to find a measure or combination of measures to arrest or diminish transmission. On the whole, more resources are needed for the antimalarial measures in these areas to be effective.

III. RESEARCH

The technical problems detected during execution of the malaria program have made it necessary to intensify epidemiological and applied research studies for developing new and more efficient measures to interrupt or reduce transmission. The principal lines of research pursued in 1977 are summarized as follows:

A. Field Insecticide Trials

In the last four years, Stage III to V trials of several new insecticides have been conducted in El Salvador (AMRO-0901). Of the insecticides tested, only chlorfoxim and permethrin gave encouraging results against DDT and Propoxur-resistant strains of A. albimanus. On the basis of this observation, a field test of chlorfoxim (Stages VI and VII) was arranged for 1978. The Government of Nicaragua, with the technical cooperation of PAHO (AMRO-0901), drew up a protocol and began the preparatory steps, including the selection of localities aggregating 5,000 houses, where this insecticide could be applied in early 1978.

In Brazil, a trial of diclorvos was carried out in 1976 and 1977 in the State of Santa Catarina, to observe its effectiveness against Kerteszia-transmitted malaria. The insecticide appeared to have interrupted transmission, but the result was not conclusive because of other impoundering factors. Malathion was also tested at ultralow volume (ULV) in an agricultural settlement area in the State of Pará. No definite conclusions have been obtained because of operational difficulties. Another trial has been scheduled to be carried out in 1978 with the active participation of project Brazil-0200.

In September 1977 the Government of Ecuador, with the cooperation of project Ecuador-0100, began an experiment with fenitrothion in an area of

3,000 houses in the Province of Esmeraldas. Preliminary results indicate that the insecticide was well received by the population, no toxicological effects were observed among either spraymen or dwellers because of the precautions taken; in addition, autochthonous cases stopped turning up in the localities sprayed with this insecticide, though they increased in the control localities.

B. Larvivorous Fish Trials

A total of 16 potentially larvivorous fish species have been identified in El Salvador since 1974. Only three of these species are considered as potentially usable biological control agents, and of these Poecilia sphenops exhibits the most useful traits. A field trial for the breeding and distribution of Poecilia sphenops was begun in Nicaragua in the course of this year.

A test of the larva control potential of Poecilia reticulata was conducted in the Dominican Republic in 1976. The results were highly satisfactory, and in 1977 were put into extended practical application with the distribution of fish to mosquito breeding places in 46 municipalities.

In Haiti and Ecuador, on the basis of the good results of the studies in 1977, plans were made for large-scale distribution of Poecilia reticulata in 1978.

C. Immunological studies

A research project on malaria immunology was established by the Organization, the Ministry of Health of Colombia and the University of New Mexico in 1976 with US/AID financial assistance. A laboratory was set up in the National Institute of Health of Bogotá in 1977. The laboratory was outfitted in the course of the year and the national technical staff was trained. Studies on the susceptibility of different Aotus species to the plasmodium, to evaluate the immune mechanism and the in vitro cultivation of P. falciparum were begun in 1978.

D. Malaria chemotherapy

Studies of the geographical distribution of the chloroquine-resistant strain of P. falciparum were continued. In 1977 a plan was drawn up for the training of national personnel to expand studies on the in vitro with a view to susceptibility-testing in 20 countries. In addition, a protocol was drawn up to conduct clinical trials of mefloquine in Brazil. These two projects will be carried out with the support of the WHO Special Program for Research and Training in Tropical Diseases.

E. Serological studies

The Governments of Mexico, Panama, Brazil and Costa Rica continued their seroepidemiological studies during the year with the technical cooperation of the Organization.

F. Entomological studies

Collaborative and entomological studies were continued with the University of California (Riverside) on the cross-resistance of the principal vector in Central America to organochlorine, organophosphorous, carbamate and pyrethroid insecticides. These studies contributed to the choice of chlorfoxim for field trials because it gave no evidence of any appreciable cross-resistance with DDT and propoxur, and also because of its low toxicity for mammals. These results were borne out by field observations in project AMRO-0901 in El Salvador.

Behavioral and cytogenetic studies of anophelines continued in Colombia, Venezuela and Brazil in collaboration with the Florida Medical Entomological Laboratory to determine the geographical distribution of the different Karyotypes of A. albitarsis and A. nuñeztovari and study the association of karyotypes with epidemiologically important traits like behavior or vectorial capacity.

IV. PERSONNEL TRAINING AND INFORMATION DISTRIBUTION

The School of Malariology and Environmental Sanitarion of Maracay, Venezuela, completed its XXXIII International Course in Malaria and Environmental Sanitarion. In addition to local participants, two professionals from Haiti and Panama attended under Venezuelan Government fellowship with the support of the Organization. The course began on 17 January and ended on 28 October 1977.

The School of Public Health of the Ministry of Public Health and Welfare of Mexico conducted its second Master's Course in Public Health with Emphasis on Malaria and Other Parasitic Diseases from 14 February to 15 December 1977. The course was attended by 12 physicians: four from Mexico, two from Brazil and the other six from Argentina, Costa Rica, Haiti, Nicaragua, Paraguay and Venezuela.

The School of Public Health of Sao Paulo University, Brazil, conducted its second course on entomology and epidemiology from 1 August to 8 November 1977. The course was attended by five professionals from Brazil, Colombia, Ecuador, Guatemala, Mexico and Paraguay under PAHO fellowships.

The following technical publications were translated, prepared or distributed during the year:

1. Manual on Larval Control Operations in Malaria Programmes - MPD/WHO
2. Manual on Personal and Community Protection against Malaria - MPD/WHO
3. Mosquito Prevention on Irrigated Farms - U.S Department of Agriculture
4. Guide to Malaria in Primary Health Care Services - PAHO
5. Guide for Engineers in Antimalaria Work - PAHO
6. The Use of Larvivorous Fish in Mosquito Control - PAHO (in preparation)
7. Guidelines on the Chemotherapy of Human Malaria - PAHO (in preparation).

V. INTERNATIONAL COORDINATION AND COOPERATION

PAHO/WHO continued its support to malaria programs by providing personnel and some equipment, antimalarial drugs, and materials. It also collaborated in the organization of training courses for national technicians and provided fellowships. Table 19 shows the distribution of the PAHO/WHO technical staff assigned to malaria programs in the Americas from 1975 to 1978 by category (medical officers, sanitary engineers, sanitary inspectors, entomologists and others). Table 20 summarizes the quantities of antimalarial drugs supplied to the countries.

The Government of Venezuela continued its policy of providing six fellowships or candidates selected by the Organization to participate in the training courses at the School of Malariology and Environmental Sanitation at Maracay.

The United States of America, through the Agency for International Development, continued its financial support to the program in Haiti, and in 1977 approved a five-year plan for continuing this aid. This agency also continued its national assistance to the Malaria Immunology Research Project in Colombia.

The following meetings were held in connection with malaria programs during 1977:

a. Meeting of the Study Group on Malaria Control, held at Washington, D.C., from 12 to 15 April 1977.

b. The meeting on The Use of Non-human Primates in Human Malaria Research, held at Washington, D.C., on 7 and 8 July 1977.

c. The following intercountry meetings of the heads of the NEMSs and PAHO staff:

Bolivia-Brazil, at Brasilia, Brazil, 21 October.

Costa Rica-Panama, at Puerto Armuelles, Panama, 6 July.

Guatemala-El Salvador-Nicaragua, at Guatemala City, Guatemala, 28 October.

Haiti-Dominican Republic, at Pedernales, Dominican Republic, in June.

Haiti-Dominican Republic, at Malpasses, Haiti, in August.

VI. OTHER PARASITIC DISEASES

In recent years the Organization has expanded its program for the control of parasitic diseases, particularly American Trypanosomiasis or Chagas' disease, schistosomiasis and the filariasis, including onchocercosis, pursuant to resolutions of the Directing Council, which in its XXIV Meeting recognized the importance of these diseases as causes of morbidity and mortality in the Americas.

Research and training for the purpose of intensifying epidemiological studies and activities for the control of these diseases have been given priority and enjoy the support of national institutions, specific PAHO projects and the WHO Special Program for Research and Training in Tropical Diseases.

A. Chagas' Disease

Chagas' disease, which afflicts millions of persons in this Hemisphere, is one of the most serious public health problems because of its prevalence and the gravity of its manifestations and because of the difficulties of controlling it.

The World Health Organization and the Pan American Health Organization have recognized the gravity of the problem posed by this disease, and the need to promote research and exchanges of information in order to make headway toward its control. In the last four years PAHO has sponsored a series of meetings, including the one on the Immunology of Chagas' disease in December 1974, the International Symposium on New Orientations in American Trypanosomiasis Research in March 1975, the Symposium on Chagas' Disease in New York on 27 June 1977 on the occasion of the International Congresses on Parasitology, Protozoology and Tropical Medicine, and the meeting of a Scientific Working Group convened by the WHO Special Program for Research and Training in Tropical Diseases (TDR) in Buenos Aires, Argentina, in November 1977.

National institutions with adequate installed capacity that are interested in doing research with the support of the Organization have been identified, and priority has been given to the awarding of fellowships for training national staff in this field. The WHO Special Program (TDR) is collaborating in these activities.

With PAHO support, the Member Governments have carried out control operations with the means at hand. Short-term consultants have been assigned, at the request of two countries, to collaborate with their national authorities in the preparation of projects for control of the disease.

Epidemiological studies and methods for the control of Chagas' disease have been emphasized in the International Master's Course in Public Health of the Ministry of Health and Welfare of Mexico. The Organization collaborated in this course with short-term consultants. The Research and Reference Center on Vector Biology and Control, a PAHO project in Maracay, Venezuela, is engaged in research and training with emphasis on vectors of Chagas' disease.

During the period PAHO edited an distributed the following publications on Chagas' disease:

1. Scientific Publication No. 318, American Trypanosomiasis Research (1975) in English, generated by an International Symposium held at Belo Horizonte, Brazil.

2. Scientific Publication No. 319, Quantitatively Standardized Complement-Fixation Methods for Critical Evaluation of Antigens prepared from Trypanosoma cruzi (1976), in English and Spanish, based on the efforts of a Collaborative Working Group on the Serological Diagnosis of Chagas' disease sponsored by the Pan American Health Organization.

3. Scientific Publication No. 347, Chagas' Disease, generated by an International Symposium held in New York in June 1977 of the occasion of the 5th International Congress of Protozoology.

B. Schistosomiasis

In the Americas the problem of schistosomiasis (S. mansoni) is confined to areas of South America (chiefly the Brazilian northeast, the north central part of Venezuela and part of the Suriname coastal belt) and to small foci on some Caribbean Islands (the Dominican Republic, Puerto Rico, Vieques, Saint Martin, Guadeloupe, Martinique and Saint Lucia).

It is difficult to estimate the number of new cases each year because patients easily develop the chronic forms of the disease. The number of persons infected with S. mansoni in the Region of the Americas is estimated to exceed 7 - 8 million. The areas subject to the risk of transmission harbor more than 36 million inhabitants.

The intermediate host regarded as the most important one epidemiologically because of its widespread distribution in the Hemisphere, its vectorial capacity and its resistance to desiccation is the snail Biomphalaria glabrata. The snail B. straminea occurs from Costa Rica to Northern Argentina and is epidemiologically significant, but its record of infection is not as great as that of B. glabrata in endemic areas. Another intermediate host, B. tenagophila has a more limited area of distribution than the other two species. The countries in which the disease is endemic have instituted control programs: a) Brazil, Suriname and Venezuela are using chemotherapy, molluscicides and sanitation works, b) Saint Lucia is using chemotherapy and environmental sanitation, and c) Puerto Rico and the Dominican Republic are using molluscicides and sanitation works.

The Planorbid Identification Center for the Americas (CIPA) is the reference center for snail taxonomy and is currently operating in the Oswaldo Cruz Institute at Rio de Janeiro, Brazil. This Center has done research on possible intermediate hosts of Schistosoma spp; and to identify other snails that could compete with B. glabrata or serve as a bait for parasites impeding the completion of the life cycle.

The program includes epidemiological surveillance activity in areas free of the disease but subject to importation of cases and harboring potential intermediate hosts.

C. Filariases

The nocturnally periodic form of filariasis caused by Wuchereria bancrofti occurs in Central and South American coastal areas, particularly on the Atlantic and some Caribbean Islands. Foci have lately been observed in Trinidad and Haiti. On the whole, prevalence has declined in recent years thanks to mosquito control measures, urban and environmental sanitation, and chemotherapy.

There have also been in the Region infections of D. perstans and M. ozzardi though apparently of slight epidemiological significance, and infections of Onchocerca volvulus, which present a serious public health problem in areas of Guatemala and Mexico, and in limited foci in Brazil, Colombia and Venezuela.

In October 1977 the Organization sponsored an International Meeting on Onchocercosis in Guatemala City as a forum for the exchange of information on the state of the problem in the affected countries, the unification of working techniques and the selection of research priorities.

Table 1

POPULATION IN THE MALARIOUS AREAS
IN THE AMERICAS, 1958-1977

(Population in thousands)

Year	Originally malarious areas					Total population
	Maint. phase	Consolid. phase	Attack phase	Prep. phase or program not yet started	Total	
1958	52 866	1 996	46 196	34 351	135 409	387 276
1959	52 856	9 349	56 292	27 423	145 920	394 606
1960	54 363	10 101	53 400	25 722	143 586	400 500
1961	56 979	17 879	39 021	33 413	147 292	416 008
1962	59 299	30 424	49 276	14 743	153 742	427 919
1963	56 546	33 901	31 910	29 664	152 021	434 950
1964	57 414	32 277	34 426	34 525	158 642	447 666
1965	60 975	34 731	38 575	12 108	146 389	455 527
1966	69 760	36 128	43 369	17 212	166 469	463 649
1967	70 720	41 581	44 766	12 834	169 901	474 868
1968	72 441	45 812	56 234	217	174 704	484 664
1969	72 757	46 987	56 375	206	176 325	491 483
1970	80 770	40 518	59 807	162	181 257	505 819
1971	81 306	43 644	60 396	146	185 492	513 544
1972	86 634	42 016	61 645	153	190 448	524 774
1973	87 969	45 535	61 915	109	195 528	535 109
1974	91 527	46 042	63 130	56	200 755	544 865
1975	99 405	44 633	61 834	-	205 872	555 676
1976	101 068	48 813	61 205	-	211 086	565 249
1977	104 567	50 610	60 373	-	215 550	576 942

Table 2

STATUS OF THE MALARIA PROGRAM IN THE AMERICAS, BY POPULATION, 1977

(Population in thousands)

Country or other political or administrative unit	Total population	Population of originally malarious areas							
		Total		Malaria eradication claimed (maintenance phase)		Consolidation phase		Attack phase	
		Total	%	Total	%	Total	%	Total	%
Antigua	71a)	-	-	-	-	-	-	-	-
Argentina	26 100	3 146	12.1	3 009	95.7	64	2.0	73	2.3
Bahamas	211a)	-	-	-	-	-	-	-	-
Barbados	247a)	-	-	-	-	-	-	-	-
Belize	141	141	100.0	-	-	75	53.2	66	46.8
Bermuda	57	-	-	-	-	-	-	-	-
Bolivia	5 914	1 875	31.7	-	-	1 116	59.5	759	40.5
Brazil	113 209	45 628	40.3	13 129	28.8	12 966	28.4	19 533	42.8
British Virgen Isl.	12a)	-	-	-	-	-	-	-	-
Canada	23 143a)	-	-	-	-	-	-	-	-
Cayman Islands	14a)	-	-	-	-	-	-	-	-
Chile	10 967	237b)	2.2	237	100.0	-	-	-	-
Colombia	25 987	15 354	59.1	-	-	10 448	68.8	4 906	32.0
Costa Rica	2 061	593	28.8	-	-	419	70.7	174	29.3
Cuba	9 657	3 225	33.4	3 225c)	100.0	-	-	-	-
Dominica	80	16d)	20.0	16c)	100.0	-	-	-	-
Dominican Republic	4 978	4 946	99.4	4 813	97.3	45	1.0	88	1.7
Ecuador	7 193	4 412	61.3	-	-	1 871	42.4	2 541	57.6
El Salvador	4 496	3 871	86.1	-	-	-	-	3 871	100.0
Falkland Islands	2	-	-	-	-	-	-	-	-
French Guiana	55	55	100.0	34	61.8	16	29.1	5	9.1
Grenada	110	41	37.3	41c)	100.0	-	-	-	-
Guadeloupe	360a)	315d)	87.4	315c)	100.0	-	-	-	-
Guatemala	6 651	2 481	37.3	-	-	-	-	2 481	100.0
Guyana	877	877	100.0	823	93.9	16	1.8	38	4.3
Haiti	4 698	4 126	87.8	-	-	-	-	4 126	100.0
Honduras	2 939	2 670	90.8	-	-	490	18.3	2 180	81.7
Jamaica	2 072a)	1 618d)	78.1	1 618c)	100.0	-	-	-	-
Martinique	369a)	230d)	62.4	230	100.0	-	-	-	-
Mexico	64 594	32 193	49.8	-	-	17 719	55.0	14 474	45.0
Montserrat	13	-	-	-	-	-	-	-	-
Netherland Antilles	241	-	-	-	-	-	-	-	-
Nicaragua	2 355	2 355	100.0	-	-	-	-	2 355	100.0
Panama	1 771	1 705	96.3	-	-	1 395	81.8	310	18.2
Canal Zone	40a)	40	100.0	-	-	40	100.0	-	-
Paraguay	2 805	2 346	83.6	631	26.9	1 239	52.8	476	20.3
Peru	16 580	5 500	33.2	1 538	28.0	2 644	48.1	1 318	23.9
Puerto Rico	3 214b)	3 214b)	100.0	3 214c)	100.0	-	-	-	-
St. Kitts, Nevis, Anguilla	66	-	-	-	-	-	-	-	-
St. Lucia	118	99	84.0	99c)	100.0	-	-	-	-
St. Pierre & Miquelon	5	-	-	-	-	-	-	-	-
St. Vincent	110	-	-	-	-	-	-	-	-
Surinam	435	276d)	63.5	196d)	71.0	47d)	17.0	33d)	12.0
Trinidad & Tobago	1 170b)	1 054b)	90.1	1 054c)	100.0	-	-	-	-
Turks & Caicos Islands	6	-	-	-	-	-	-	-	-
United States of America	215 118a)	61 309d)	28.5	61 309c)	100.0	-	-	-	-
Uruguay	2 798a)	-	-	-	-	-	-	-	-
Venezuela	12 737	9 507	74.6	8 941e)	94.1	-	-	566	5.9
Virgen Islands (USA)	95	95	100.0	95c)	100.0	-	-	-	-
Total	576 942	215 550	37.4	104 567	48.5	50 610	23.5	60 373	28.0

a)1976 population. Latest available figure. (Population and Vital Statistics Report, United Nations,Jan.1978.b)1976 population figure provided by country. c) Population in areas where eradication of malaria has been certified by PAHO/WHO. d) Estimated. e) Includes an area with 6,862,282 inhabitants, where eradication of malaria has been certified by PAHO/WHO.

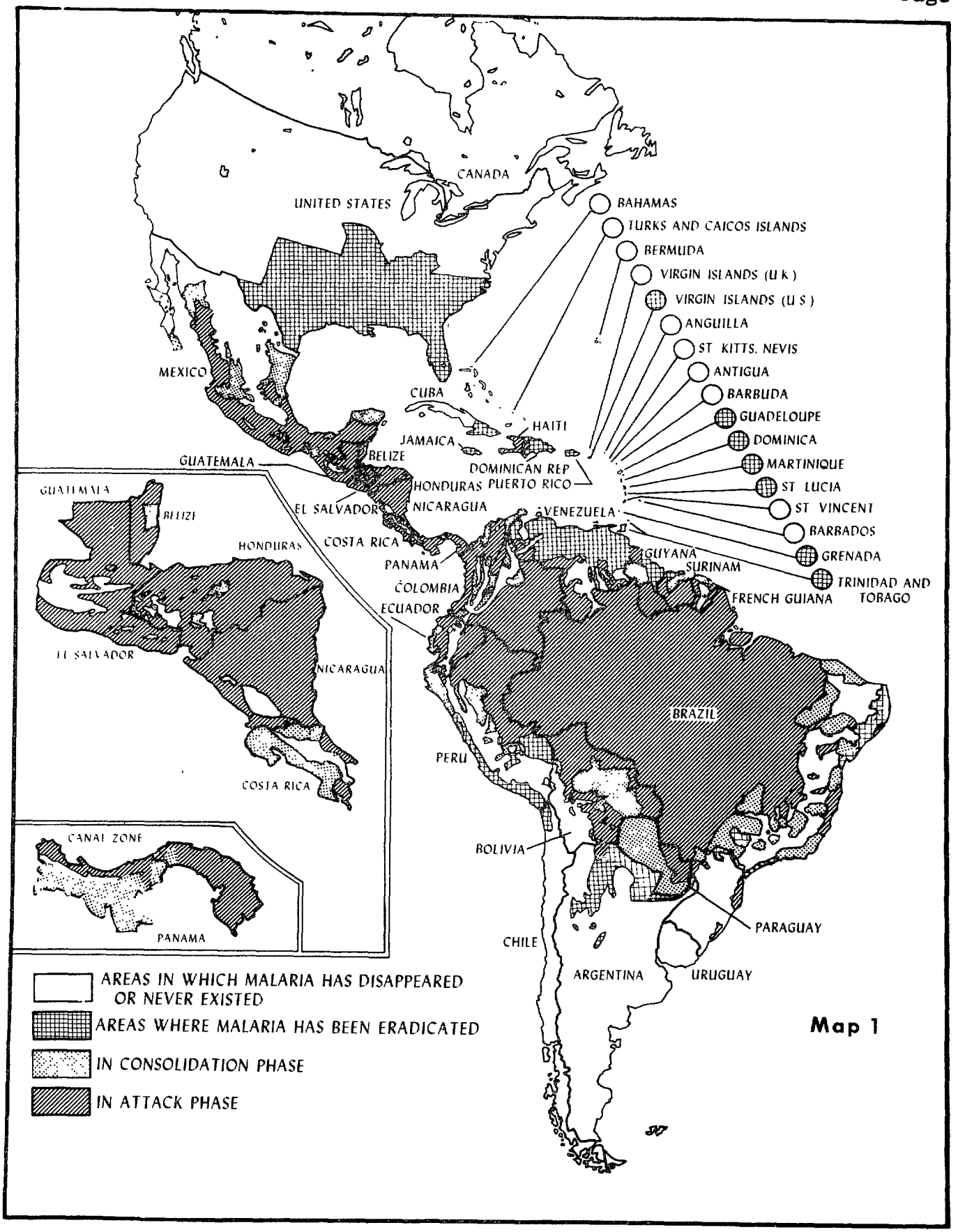
Table 3

STATUS OF THE MALARIA PROGRAM IN THE AMERICAS, BY AREA, 1977

(Area in Km^2)

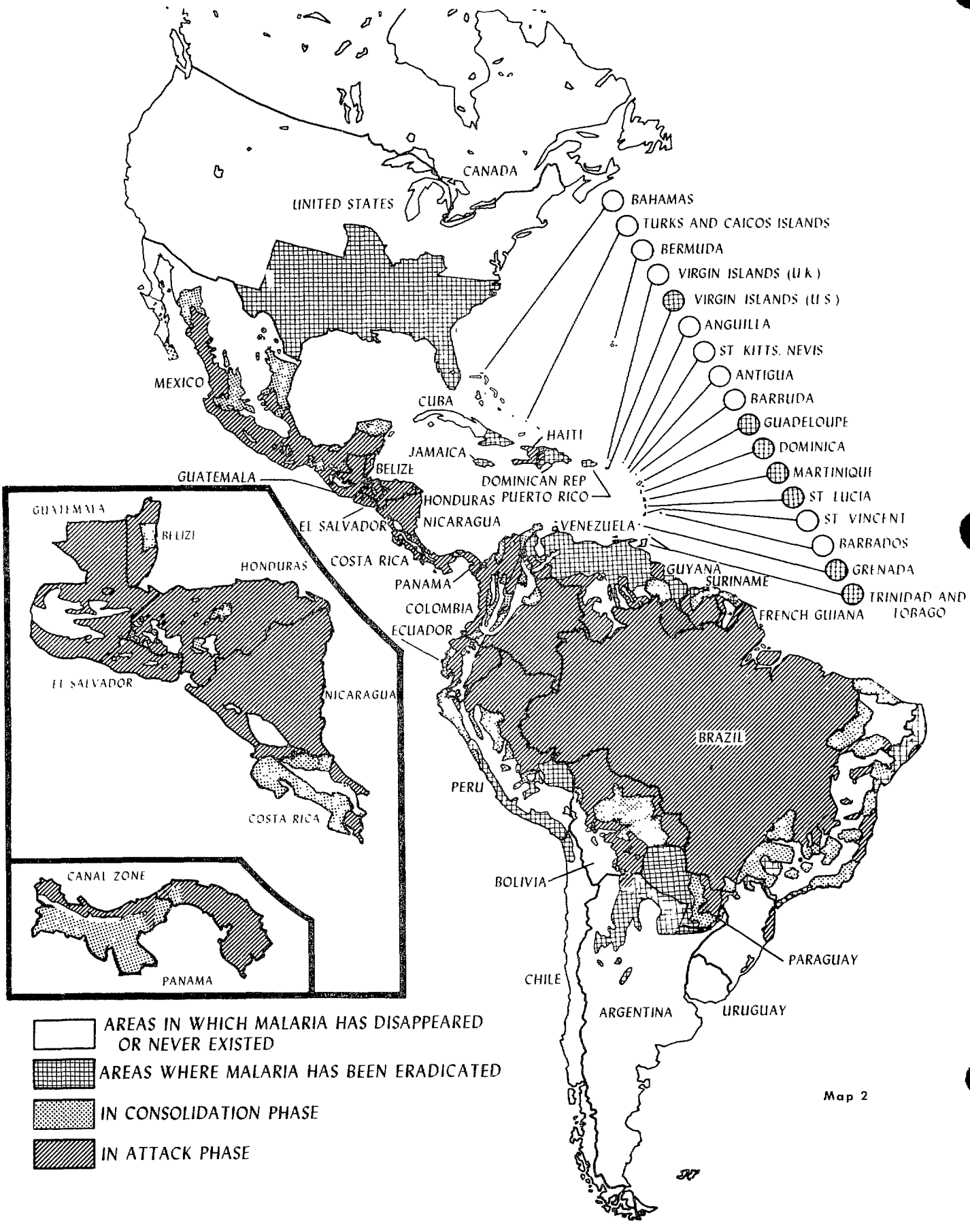
Country or other political or administrative unit	Total area	Originally malarious areas							
		Total		Malaria eradication claimed (maintenance phase)		Consolidation phase		Attack phase	
		Total	%	Total	%	Total	%	Total	%
Antigua	280	-	-	-	-	-	-	-	-
Argentina	4 024 458	349 051	-	334 527	-	3 249	-	11 275	-
Bahamas	11 396	-	-	-	-	-	-	-	-
Barbados	430	-	-	-	-	-	-	-	-
Belize	22 965	22 965	100.0	-	-	7 943	34.6	15 022	-
Bermuda	53	-	-	-	-	-	-	-	-
Bolivia	1 098 581	821 346	74.8	-	-	367 940	44.8	453 406	55.2
Brazil	8 511 965	6 897 891	81.0	179 189	2.6	484 746	7.0	6 233 956	90.4
British Virgin Islands	174	-	-	-	-	-	-	-	-
Canada	9 221 016	-	-	-	-	-	-	-	-
Cayman Islands	183	-	-	-	-	-	-	-	-
Chile	797 054	55 287	6.9	55 287a)	100.0	-	-	-	-
Colombia	1 138 914	970 849	85.2	-	-	113 176	11.7	857 673	88.3
Costa Rica	50 900	35 446	69.6	-	-	22 653	63.9	12 793	36.1
Cuba	114 524	37 502	32.7	37 502a)	100.0	-	-	-	-
Dominica	751	152	20.2	152a)	100.0	-	-	-	-
Dominican Republic	48 442	47 562	98.2	44 281	93.1	1 096	2.3	2 185	4.6
Ecuador	291 906	175 462	60.1	-	-	27 797	15.8	147 665	84.2
El Salvador	21 149	18 655	88.2	-	-	-	-	18 655	100.0
Falklan Islands	11 961	-	-	-	-	-	-	-	-
French Guiana	90 000	90 000	100.0	200	0.2	82 300	91.5	7 500	8.3
Grenada	344	103	29.9	103	100.0	-	-	-	-
Guadeloupe	1 779	1 136	63.9	1 136	100.0	-	-	-	-
Guatemala	108 889	80 350	73.8	-	-	-	-	80 350	-
Guyana	215 025	215 025	100.0	39 437	18.3	84 114	39.1	91 474	42.6
Haiti	27 750	19 100	68.8	-	-	-	-	19 100	-
Honduras	112 088	101 351	90.4	-	-	7 023	6.9	94 328	93.1
Jamaica	11 310	10 028	88.7	10 028	100.0	-	-	-	-
Martinique	1 080	300	27.8	300	100.0	-	-	-	-
Mexico	1 967 183	1 150 000	58.5	-	-	483 724	42.1	666 276	57.9
Montserrat	84	-	-	-	-	-	-	-	-
Netherland Antilles	961	-	-	-	-	-	-	-	-
Nicaragua	127 358	118 358	92.9	-	-	-	-	118 358	100.0
Panama	75 650	69 840	92.3	-	-	29 705	42.5	40 135	57.5
Canal Zone	1 432	1 432	100.0	-	-	1 432	100.0	-	-
Paraguay	406 752	406 552	100.0	271 010	66.6	80 749	19.9	54 793	13.5
Peru	1 285 215	961 171	74.8	195 418	20.3	222 330	23.1	543 423	56.6
Puerto Rico	8 899	8 899	100.0	8 899	100.0	-	-	-	-
St. Kitts, Nevis, Anguilla	396	-	-	-	-	-	-	-	-
St. Lucia	603	510	84.6	510a)	100.0	-	-	-	-
St. Pierre y Miquelon	240	-	-	-	-	-	-	-	-
St. Vincent	389	-	-	-	-	-	-	-	-
Suriname	163 820	163 750	100.0	8 955	5.5	55 345	33.8	99 450	60.7
Trinidad & Tobago	5 605	5 444	97.1	5 444a)	100.0	-	-	-	-
Turks & Caicos Islands	522	-	-	-	-	-	-	-	-
United States of America	9 365 604	2 309 876	24.7	2 309 876a)	100.0	-	-	-	-
Uruguay	186 926	-	-	-	-	-	-	-	-
Venezuela	915 741	600 000	65.5	460 054	76.7	-	-	139 946	23.3
Virgen Islands (USA)	345	345	100.0	345a)	100.0	-	-	-	-
Total	40 449 092	15 745 738	38.9	3 962 653	25.2	2 075 322	13.2	9 707 763	61.6

a) Area where eradication of malaria has been certified by PAHO/WHO. b) Includes an area of 407,945 Km^2 where eradication of malaria has been certified by PAHO/WHO.



STATUS OF THE MALARIA PROGRAM IN THE AMERICAS, 31 DECEMBER 1976

STATUS OF THE MALARIA PROGRAM IN THE AMERICAS, 31 DECEMBER 1977



Map 2

Table 4

MALARIA MORBIDITY IN THE AMERICAS
1958-1977

Year	Population		Blood Slides			Morbidity per 100,000 inhabitants	
	Total Country	Total malarious area	examined	Positive	%	Total Country	Malarious area
1958	387 276	135 409	1 716 103	56 705	3.3	14.64	41.88
1959	394 606	145 920	2 749 117	75 612	2.8	19.16	51.82
1960	400 500	143 586	3 955 149	79 998	2.0	19.88	55.71
1961	416 008	147 292	5 341 004	99 539	1.9	23.93	67.58
1962	427 919	153 742	7 221 367	177 089	2.5	41.38	115.19
1963	434 950	152 021	7 903 156	227 026	2.9	52.20	149.34
1964	447 666	158 642	8 156 290	254 572	3.1	56.87	160.47
1965	455 527	146 389	9 069 950	241 462	2.7	53.01	164.95
1966	463 649	166 469	11 731 451	333 245	2.8	71.87	200.18
1967	474 868	169 901	11 609 226	369 341	3.2	77.78	217.39
1968	484 664	174 704	12 522 696	282 773	2.3	58.34	161.86
1969	491 483	176 325	12 179 190	323 782	2.7	65.88	183.63
1970	505 819	181 257	9 925 162	344 170	3.5	68.04	189.88
1971	513 544	185 492	10 134 212	338 416	3.3	65.90	182.44
1972	524 774	190 448	9 695 953	284 813	2.9	54.23	149.55
1973	535 109	195 528	9 400 682	280 276	3.0	52.38	143.34
1974	544 865	200 755	8 997 318	269 003	3.0	49.37	134 00
1975	555 676	205 872	9 276 878	356 692	3.8	64.19	173.26
1976	565 249	211 086	9 351 875	379 364	4.1	67.11	179.72
1977	576 942	215 550	9 261 874	398 598	4.3	69.09	184.92

Table 5

CASE DETECTION BY COUNTRY AND PHASE OF PROGRAM, 1977

Country or other political or administrative unit	Total		Maintenance phase		Consolidation phase		Attack phase		Non-malarious areas	
	Slides examined	Positive	Slides examined	Positive	Slides examined	Positive	Slides examined	Positive	Slides examined	Positive
Argentina	46 841	463	31 422	77	5 708	11	9 711	375	-	-
Belize	39 151	894	-	-	18 023	144	21 128	750	-	-
Bolivia	118 002	10 106	-	-	26 574	947	90 759	9 098	669	61
Brazil	2 638 763	104 436	186 659	977	595 139	1 103	1 796 112	99 795	60 853	2 561
Canada	...	100	-	-	-	-	-	-	-	100
Colombia	401 621	63 888	-	-	154 808	8 185	245 031	55 394	1 782	309
Chile	0	0	-	-	-	-	-	-	-	-
Costa Rica	176 111	217	-	-	74 214	79	100 296	94	1 601	44
Cuba	321 019	168	-	-	-	-	-	-	321 019	168
Dominica	0	0	-	-	-	-	-	-	-	-
Dominican Republic	364 800	745	312 251	341	6 141	8	46 202	396	206	-
Ecuador	307 540	11 275	-	-	121 063	781	184 312	10 466	2 165	28
El Salvador	471 109	32 243	-	-	-	-	451 154	31 745	19 955	498
French Guiana	16 908	488	4 329	97	4 400	90	8 179	301	-	-
Grenada and Carriacou	0	0	-	-	-	-	-	-	-	-
Guadeloupe	0	0	-	-	-	-	-	-	-	-
Guatemala	472 297	34 907	-	-	-	-	462 100	34 283	10 197	624
Guyana	121 075	1 563	7 872	19	-	-	113 203	1 544	-	-
Haiti	400 024	27 679	-	-	-	-	400 024	27 679	-	-
Honduras	264 233	39 414	-	-	23 390	602	239 304	38 772	1 539	40
Jamaica	15 386	4	15 386	4	-	-	-	-	-	-
Mexico	1 804 367	18 851	-	-	514 491	453	1 270 376	18 295	19 500	103
Nicaragua	215 093	11 584	-	-	-	-	215 093	11 584	-	-
Panama	377 059	674	-	-	190 648	62	186 411	612	-	-
Canal Zone	1 077	4	-	-	1 077	4	-	-	-	-
Paraguay	85 613	156	4 343	2	50 231	41	30 937	113	102	-
Peru	275 827	32 410	48 494	768	121 318	8 867	106 015	22 775	-	-
Puerto Rico	3	3	3	3	-	-	-	-	-	-
St. Lucia	5	0	5	0	-	-	-	-	-	-
Surinam	67 501	993	2 324	6	16 059	16	47 821	950	1 297	21
Trinidad and Tobago	6 649	2	6 649	2	-	-	-	-	-	-
United States	354	354	354	354	-	-	-	-	-	-
Venezuela a)	253 446	4 977	150 736	735	-	-	101 500	4 024	1 210	218
Total	9 261 874	398 598	770 827	3 385	1 923 284	21 393	6 125 668	369 045	442 095	4 775

a) Information through November

Table 6

SLIDES EXAMINED AND POSITIVES, BY SPECIES AND CLASSIFICATION, MAINTENANCE AREAS, 1977

Country or other political or administrative unit	Blood slides examined	Total positive	Specie of parasite				Classification of cases							
			P. falciparum	P. vivax	P. malariae	Mixed infections	Autochthonous	Relapsing	Imported		Induced	Introduced	Criptic and Unclassified	No investigated
									from abroad	from areas within country				
Argentina	31 422	77	-	77	-	-	37	1	11	5	-	22	1	-
Brazil	186 659	977	246	715	-	16	129	4	1	662a)	6	3	1	171
Chile	0	0	-	-	-	-	-	-	-	-	-	-	-	-
Cuba	0	0	0	-	-	-	-	-	-	-	-	-	-	-
Dominica	0	0	-	-	-	-	-	-	-	-	-	-	-	-
Dominica Republic	312 251	341	341	-	-	-	10	-	170	-	-	126	-	35
French Guiana	4 329	97	71	26	-	-	5	-	15	34b)	-	6	30	7
Grenada	0	0	-	-	-	-	-	-	-	-	-	-	-	-
Guadeloupe	0	0	-	-	-	-	-	-	-	-	-	-	-	-
Guyana	7 872	19	3	16	-	-	-	1	1	-	-	-	-	17
Jamaica	15 386	4	2	2	-	-	-	-	4	-	-	-	-	-
Paraguay	4 343	2	-	2	-	-	-	-	2	-	-	-	-	-
Peru	48 494	768	-	767	1	-	665	5	2	92c)	1	-	-	3
Puerto Rico	3	3	-	2	-	1d)	-	-	3	-	-	-	-	-
St. Lucia	5	0	-	-	-	-	-	-	-	-	-	-	-	-
Suriname	2 324	6	6	-	-	-	-	-	-	6	-	-	-	-
Trinidad and Tobago	6 649	2	1	1	-	-	-	-	2	-	-	-	-	-
United States of America	354	354e)	71	229	14	3	-	3	349	-	2	-	-	-
Venezuela[f]	150 736	735	86	643	1	5	56	2	181	326	2	168	-	-
Total	770 827	3 385	827	2 480	16	25	902	16	741	1 125	11	325	32	233

a) One case imported from consolidation areas b) Ten cases imported from Attack and 24 from Consolidation phase areas
c) 79 cases imported from Attack and 13 from Consolidation phase areas. d) One case undetermined specie
e) Includes 8 P. ovale and 29 undetermined infection f) Information up to November.

Table 7

SLIDES EXAMINED AND POSITIVES, BY SPECIES AND CLASSIFICATION, CONSOLIDATION AREAS, 1977

Country or other political or administrative unit	Population (thousands)	Blood slides examined	Total cases	Specie of parasite					Origin of infections							
				API*	P. falciparum	P. vivax	P. malariae	Mixed infection	autochthonous	Relapsing	Imported		Induced	Introduced	Cryptic	Unclassified or not investigated
											from abroad	from areas within country				
Argentina	64	5 708	11	0.2	-	11	-	-	-	-	3	5	-	1	2	-
Belice	75	18 023	144	2.0	-	144	-	-	67	-	5	14	-	13	-	45
Bolivia	1 116	26 574	947	1.0	4	940	-	3	531	-	-	300	-	-	-	116
Brazil	12 966	595 139	1 103	0.1	282	814	1	6	177	7	8	625a)	1	33	6	246
Colombia	10 448	154 808	8 185	0.8	3 145	4 976	1	63	871	3	53	4 644	9	14	181	2 410
Costa Rica	419	74 214	79	0.2	9	70	-	-	47	1	21	4	-	5	1	-
Dominican Republic	45	6 141	8	0.2	8	-	-	-	3	-	5	-	-	-	-	-
Ecuador	1 871	121 063	781	0.4	257	523	-	1	464	4	-	164	-	4	5	140
French Guiana	16	4 400	90	6.0	51	37	-	2	51	-	18	8	-	9	3	1
Guyana	16	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-
Honduras	490	23 390	602	1.2	11	590	-	1	12	4	-	13	-	-	-	573
Mexico	17 719	514 491	453	0.03	-	451	2	-	189	28	14	175	4	-	19	24
Panama	1 395	190 648	62	0.04	28	33	1	-	32	3	8	16	-	3	-	-
Zona del Canal	40	1 077	4	0.1	1	3	-	-	-	-	3	-	-	-	1	-
Paraguay	1 239	50 231	41	0.03	-	41	-	-	38	-	3	-	-	-	-	-
Peru	2 644	121 318	8 867	3.4	-	8 867	-	-	2 013	20	-	330 b)	1	-	-	6 503
Suriname.....	47	16 059	16	0.3	16	-	-	-	-	-			-	-	1	-
Total	50 610	1 923 284	21 393	0.4	3 812	17 500	5	76	4 495	70	141	6 314	15	82	218	10 058

a) One case imported from non-malarious areas. b) Three cases imported from maintenance phase areas.

Table 8

SLIDES EXAMINED AND POSITIVES BY SPECIES
ATTACK AREAS, 1977

Country or other political or administrative unit	Slides examined			Species found			
	Total	Positive		P. vivax parum	P. vivax	P. malariae	Mixed infections
		Number	Percentage				
Argentina	9 711	375	3.9	-	375	-	-
Belize	21 128	750	3.6	-	750	-	-
Bolivia	90 759	9 098	10.0	1 196	7 894	-	8
Brazil	1 796 112	99 795	5.6	39 945	59 158	27	665
Colombia	245 031	55 394	22.6	26 608	28 318	47	421
Costa Rica	100 296	94	0.1	30	63	-	1
Dominican Republic	46 202	396	1.0	396	-	-	-
Ecuador	184 312	10 466	5.7	2 313	8 112	1	40
El Salvador	451 154	31 745	7.0	2 826	28 828	-	91
French Guiana	8 179	301	3.7	211	83	-	7
Guatemala	462 100	34 283	7.4	2 051	32 127	-	105
Guyana	113 203	1 544	1.4	629	907	-	8
Haiti	400 024	27 679	7.0	27 672	6	1	-
Honduras	239 304	38 772	16.2	1 227	37 431	-	114
Mexico	1 270 376	18 295	1.4	1	18 292	2	-
Nicaragua	215 093	11 584	5.4	1 619	9 913	-	52
Panama	186 411	612	0.3	277	332	-	3
Paraguay	30 937	113	3.5	7	102	-	4
Peru	106 015	22 775	21.5	3	22 750	22	-
Suriname	47 821	950	2.0	911	39	-	-
Venezuela a).....	101 500	4 024	4.0	1 043	2 915	7	59
Total	6 125 668	369 045	6.0	108 965	258 395	107	1 578

a) Information up to November.

Table 9

SLIDES EXAMINED AND POSITIVES BY SPECIES,

NON-MALARIOUS AREAS, 1977

Country or other political or administrative unit	Slides examined			Species found			
	Total	Positive		P. falciparum	P. vivax	P. malariae	Mixed infections
		Number	Percentage				
Bolivia	669	61	9.1	-	61	-	-
Brazil	60 853	2 561	4.2	851	1 694	-	16
Canada	...	100	-	...	...	...	...
Colombia	1 782	309	17.3	103	202	-	4
Costa Rica	1 601	44	3.0	7	37	-	-
Cuba	321 019	168	0.05	99	58	9	2b)
Dominican Republic	206	0	-	-	-	-	-
Ecuador	2 165	28	1.3	1	27	-	-
El Salvador	19 955	498	2.5	25	472	-	1
Guatemala	10 197	624	6.1	3	621	-	-
Honduras	1 539	40	2.6	1	38	-	1
Mexico	19 500	103	0.5	-	99	4	-
Paraguay	102	0	-	-	-	-	-
Suriname	1 297	21	1.6	12	9	-	-
Venezuela a)	1 210	218	18.0	19	194	3	2
Total	442 095	4 775	1.1	1 121	3 512	16	26

a) Information up to november.

b) Two cases P. ovale.

Table 10

HOUSES SPRAYED WITH RESIDUAL INSECTICIDES,[a] BY COUNTRY AND BY CYCLE, 1977

Country or other political or administrative unit	1st Cycle			2nd Cycle			3rd Cycle			4th Cycle			Total sprayings
	Houses planned	Houses sprayed	% sprayed	Houses planned	Houses sprayed	% sprayed	Houses planned	Houses sprayed	% sprayed	Houses planned	Houses sprayed	% sprayed	
Argentina	14 109	7 841	55.6	15 891	10 489	66.0	-	-	-	-	-	-	18 330
Belice	6 716	5 603	83.4	11 716	7 697	66.0	-	-	-	-	-	-	13 300
Bolivia	38 320	34 720	91.0	37 506	33 406[b]	89.1	-	-	-	-	-	-	68 126
Brazil	2 745 711	2 438 905	89.0	2 383 036	2 073 990	87.0	-	-	-	-	-	-	4 512 895[c]
Colombia (Semestrial)	329 330	240 689	73.1	346 911	283 076	69.0	-	-	-	-	-	-	523 765
(Annual cycle)	42 497	42 016	99.0	-	-	-	-	-	-	-	-	-	42 016
(Quarterly cycles)	2 016	1 977	98.1	2 048	1 973	96.3	2 063	2 005	97.2	2 103	2 029	96.5	7 984
Costa Rica (Semestrial)	12 351	12 559	102.0	12 651	6 331	50.0	-	-	-	-	-	-	18 890[d]
(Quarterly Propoxur)	...	1 041	-	...	127	-	...	358	-	...	490	-	2 016[d]
Dominican Republic	6 357	5 755	90.5	3 570	3 206	90.0	-	-	-	-	-	-	8 961
Ecuador (Semestrial)	164 100	144 982	88.3	174 183	168 070	96.5	-	-	-	-	-	-	313 052
(Annual cycle)[e]	84 366	58 995	70.0	-	-	-	-	-	-	-	-	-	58 995
(Quarterly cycles)	5 167	4 849	94.0	7 000	6 673	95.0	6 666	5 155	77.3	7 193	6 458	90.0	23 135
El Salvador (Annual DDT)	43 184	26 626	62.0	-	-	-	-	-	-	-	-	-	26 626[f]
(Quarterly, propoxur)	-	-	-	63 627	57 381	90.2	63 626	58 182	91.4	63 627	58 254	91.6	173 817
(2 cycles propoxur)	-	-	-	44 479	41 700	94.0	44 479	42 258	95.0	-	-	-	83 958
French Guiana	2 000	1 600	80.0	2 000	1 800	90.0	-	-	-	-	-	-	3 400
Guyana	5 408	1 534	28.4	5 408	2 830	52.3	-	-	-	-	-	-	4 364
Haiti	111 446	109 841	98.6	119 947	103 952[b]	87.0	-	-	-	-	-	-	213 793
Honduras (Semestrial)	105 950	79 456	80.0	94 191	57 672	61.2	-	-	-	-	-	-	137 128
(Quarterly, propoxur)	39 577	37 424	95.0	40 031	38 145	95.3	44 493	38 459	86.4	41 323	36 160	87.5	150 188
Mexico (Sem. attack)	1 425 424	1 366 648	96.0	1 443 124	1 396 368	97.0	-	-	-	-	-	-	2 763 016
(Semestrial, consolidation)	27 431	26 910	98.1	27 735	27 444	99.0	-	-	-	-	-	-	54 354
Nicaragua (1 cycle DDT)	45 842	35 412	77.2	-	-	-	-	-	-	-	-	-	35 412
(Quarterly, Propoxur)	38 389	33 239	87.0	37 534	32 606	87.0	38 070	33 493	88.0	34 616	32 617	94.2	131 955
Panama (Smestrial)	28 423	25 815	91.0	29 632	25 447	86.0	-	-	-	-	-	-	51 262
(Propoxur)	3 371	3 311	98.2	3 484	3 437	99.0	3 115	2 330	75.0	-	-	-	9 078
Paraguay	68 548	65 436	95.5	64 829	55 075	85.0	-	-	-	-	-	-	120 511
Peru	158 281	54 036	34.1	158 281	53 852	34.0	-	-	-	-	-	-	107 888
Suriname	8 458	2 379	28.1	-	-	-	-	-	-	-	-	-	2 379
Venezuela (Semestrial)	9 794	19 608	200.0	22 746	9 840[g]	43.3	-	-	-	-	-	-	29 448
(Quarterly, HCH)	2 080	1 043	50.1	2 080	1 073	52.0	2 080	1 727[g]	83.0	-	-	-	3 843
(4-month cycles DDT)	138 110	131 110	95.0	149 567	133 575	89.3	149 578	28 624[g]	19.1	-	-	-	293 309
Total	5 712 756	5 021 360	-	5 303 207	4 637 235	-	354 170	212 591	-	148 862	136 008	-	10 007 194

a) DDT semestrial cycles unless otherwise indicated. b) Incomplete cycle. c) 130,527 houses were sprayed in emergency cycles.
d) Up to October. e) Cycle from November 1976, June 1977. f) April/October 1977. g) Up to September.

Table 11

INSECTICIDES USED IN THE MALARIA PROGRAMS

1977 AND ESTIMATED 1978

Country or other political or administrative unit	DDT (kg.)				Propoxur 50% (kg.)		Other	
	1977		1978 (Est.)		1977	1978 (Est.)	1977	1978 (Est.)
	100%	75%	100%	75%				
Argentina	397	13 917	1 000	15 000	-	-	-	-
Belize	1 468	6 147	3 056	13 015	-	-	-	-
Bolivia	34	48 675	180	95 627	-	-	-	-
Brazil	...	...	341 472	2 613 410	-	-	-	-
Colombia	1 057	205 861	1 100	234 078	7 448	9 600	101 842a)	45 000a)
Costa Rica	1 054	17 390	873	11 228	1.229	-	-	-
Dominican Republic	852	4 568	1 814	6 804	-	-	-	-
Ecuador	-	215 063	10 000	300 000	-	-	2 230b)	30 000b)
El Salvador	992	16 870	...	...	-	160 000	-	-
French Guiana	900	288	990	317	-	-	c)	
Guatemala	-	-	2 268	42 185	-	-	400d)	e)
Guyana	4 188	6 959	4 990	9 072	-	-	-	-
Haiti f)	180	71 957	228	72 532	-	-	989g)	1 200g)
Honduras	1 056	64 634	5 502	73 872	35 391	75 560	-	-
Mexico	31 204	1 303 436	...	...	-	-	24h)	-
Nicaragua	500	20 000	1 000	45 000	70 000	65 000	-	-
Panamaf)	3 015	28 872	2 000	42 000	11 075	8 700	-	-
Paraguay	-	68 272	-	81 878	-	-	-	-
Peru	-	78 595	-	340 200	-	-	-	-
Suriname	572	931	700	4 200	-	-	-	-
Venezuela	1 855	217 100	-	320 000	-	-	(i)	-
TOTAL	49 324	2 389 535	377 173	4 320 418	-	-	-	-

a) Kg. malathion 50%. In 1977 there were also used 9,514 Kg. of Carbaril 85%, and in 1978, 37,600 Kg. will be used. b) Kg. Fenitrothion 40% c) In 1977 there were used 2,685 Lt. malathion 50%; 1,780 Lt. malathion ULV; 475 Kg. Baytex powder; 1,950 Kg. Abate granulated and 132 Kg. Abate emulsion. d) Liters of Baytex 50%. e) In 1978 there were used 166,000 Kg. Clorfoxim 50%, 460,000 Kg. Sumithion 50% and 1,500 Lt. Baytex 50%. g) Liters of malathion 95%. h) Liters of Abate 500-E. i) In 1977 there were used 68,355 Lt. DDT-C.E. 30%; 11,836 Lt. malathion 94%; 2,661 Kg. HCH, 25% and 3,276 Lt. Baytex 95%.

Table 12

COMPARATIVE RESULTS OF ACTIVE AND PASSIVE CASE DETECTION IN MALARIA PROGRAMS IN THE AMERICAS, 1977

Country or other political or administrative unit	Active case detection				Passive case detection						Total	
	Average number of evaluators	Blood slides			Average number of notification posts	Average of notification posts producing slides per month	Blood slides			Average of slides per month per productive notification posts	Blood slides	
		Examined	Positive	Percent			Examined	Positive	Percent		Examined	Positive
Argentina	56	41 183	364	1.0	678	141	5 658	99	1.7	3.3	46 841	463
Belize	9	5 561	405	7.3	122	41	33 590	489	1.4	68.7	39 151	894
Bolivia	132	96 925	4 456	4.6	2 871	294	21 077	5 650	27.0	6.0	118 002	10 106
Brazil	3 638	1 839 388	25 480	1.4	31 601	13 973	799 375	78 956	10.0	5.0	2 638 763	104 436
Canada	-	-	-	-	-	-	...	100	-	-	...	100
Colombia	342	143 824	16 374	11.4	7 015	3 944	257 797	47 514	18.4	5.4	401 621	63 888
Costa Rica	78	172 828	136	0.1	880	287	3 283	81	2.5	1.0	176 111	217
Cuba	-	16 049	0	-	-	-	304 970	168	0.05	-	321 019	168
Dominican Republic	163	259 913	645	0.2	4 394	1 820	104 887	100	0.1	5.0	364 800	745
Ecuador	137	100 609	1 898	2.0	5 943	2 604	206 931	9 377	4.5	6.6	307 540	11 275
El Salvador	102	119 718	5 047	4.2	2 753	2 078	351 391	27 196	8.0	14.1	471 109	32 243
French Guiana	-	13 154	212	2.0	32	...	3 754	276	7.3	...	16 908	488
Guatemala	155	182 697	6 502	3.5	6 564	3 400	289 600	28 405	9.0	7.1	472 297	34 907
Guyana	...	...	...	...	...	...	...	...	...	...	121 075	1 563
Haiti	50	185 965	6 515	3.5	6 716	3 205	214 059	21 164	10.0	5.6	400 024	27 679
Honduras	45	17 246	897	5.2	3 147	1 725	246 987	38 517	15.6	12.0	264 233	39 414
Jamaica	-	3 484	0	-	-	-	11 902	4	0.03	-	15 386	4
Mexico	1 200	1 416 828	7 921	0.6	60 696	7 669	387 539	10 930	3.0	4.2	1 804 367	18 851
Nicaragua	93	18 799	334	2.0	4 238	2 238	196 294	11 250	6.0	7.3	215 093	11 584
Panama	241	341 352	562	0.1	1 090	271	35 707	112	0.3	11.0	377 059	674
Canal Zone	...	1 077	4	0.4	-	-	-	-	-	-	1 077	4
Paraguay	...	32 170	111	0.3	4 233	941	53 443	45	0.1	5.0	85 613	156
Peru	137	160 094	13 001	8.1	5 965	1 276	115 733	19 409	17.0	8.0	275 827	32 410
Puerto Rico	-	-	-	-	-	-	3	3	100.0	-	3	3
St. Lucia	-	-	-	-	-	-	5	0	-	-	5	0
Suriname	30	58 252	630	1.1	80	21	9 249	363	4.0	37.0	67 501	993
Trinidad & Tobago	-	78	0	-	-	-	6 571	2	0.03	-		
United States of America	-	-	-	-	-	-	354	354	100.0	-	354	354
Venezuela a)	400	174 535	2 567	1.5	2 627	568	78 911	2 410	3.1	13.0	253 446	4 977
Total	-	5 401 739	94 061	1.7	-	-	3 739 070	302 974	8.1	-	9 261 874	398 598

a) Information up to November.

Table 13

PERSONNEL EMPLOYED IN THE MALARIA PROGRAMS IN THE AMERICAS
31 DECEMBER 1976 AND 1977

(Part-time personnel in parentheses)

Title	1976	1977
Engineers	115	106 (1)
Spraying Chiefs	325	366 (3)
Sector Chiefs	537	593
Squad Chiefs	2 312 (38)a)	2 182
Spraymen	9 959 (111)a)	8 477
Draftsmen	107	107 (3)
Medical Officers	194	183 (4)
Entomologists	60	67
Assistant Entomologists	180	184
Statisticians and Statisticians' Assistants	408	404
Evaluation Inspectors	1 735	1 874 (3)
Evaluators	7 069	7 583
Microscopists	891	912
Administrators	73	81
Administrative Assistants	744	697
Accountants	58	59
Disbursing Officers	52	55
Storekeepers	83	97
Storekeepers' Assistants	75	85
Secretaries	284	258
Others	683	1 302 (2)
Transport Chiefs, Mechanics and Assistant Mechanics	467	440
Drivers	1 013	1 026
Motorboat Operators	306	334
Boatmen	90	51
TOTAL	27 820 (149)	27 523 (16)

a) In some programs this personnel performs epidemiological activities.

Table 14

MEANS OF TRANSPORT IN MALARIA PROGRAMS IN THE AMERICAS, 1977

Country or other political or administrative unit	Trucks (3 tons or more)		Trucks and "Pick-up" (less than 3 tons)		Jeeps		Automobiles and station wagons		Motor-cycles		Bicycles		Motor boats		Boats without motor		Saddle and pack animals	Other	
	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b		a	b
Argentina	-	1	27	24	22	18	5	1	-	-	7	6	-	-	-	-	-	-	-
Belize	-	-	1	5	-	4	-	-	-	-	-	-	-	3	-	-	-	-	-
Bolivia	-	-	7	4	15	18	2	-	7	8	-	-	14	9	-	-	84	16	35
Brazil	35	-	252	-	752	-	10	-	125	-	1 704	-	372	-	7	-	980	-	-
Colombia	11	5	40	58	66	117	25	6	18	20	155	71	172	67	30	8	783	-	-
Costa Rica	-	-	5	-	14	-	1	-	38	-	6	-	16	-	-	-	32	-	-
Dominican Republic ..	1	-	41	11	2	-	7	-	142	-	-	-	-	-	-	-	57	-	-
Ecuador	-	2	24	28	27	36	1	7	58	6	26	0	53	21	-	-	274	-	-
El Salvador	-	-	13	12	18	18	1	2	8	6	-	-	-	-	-	-	-	-	-
French Guiana	-	1	3	-	2	-	3	4	-	-	-	-	-	-	-	-	-	-	-
Guatemala	2	-	42	-	36	-	20	-	59	-	-	-	14	-	-	-	-	-	-
Guyana	1	-	-	-	12	-	-	-	5	-	3	-	12	-	-	-	6	-	-
Haiti	4	2	63	8	57	10	18	4	-	-	-	-	1	1	-	-	-	-	-
Honduras	2	0	34	10	16	6	9	4	24	8	-	-	2	-	-	-	-	-	-
Mexico	24	6	297	217	425	225	26	3	-	-	-	-	43	11	-	-	1 850	-	-
Nicaragua	-	-	20	8	42	13	13	1	28	3	-	-	2	8	10	-	-	-	-
Panama	1	-	12	12	12	12	1	1	21	7	22	2	1	-	68	8	-	61	30
Paraguay	1	1	21	6	5	0	12	2	141	44	33	17	21	-	-	-	-	26	15
Peru	2	1	35	32	5	15	13	39	34	10	-	1	68	247	-	-	-	-	-
Suriname	1	-	1	-	1	-	-	1	4	1	-	-	26	-	-	-	-	-	-
Venezuela	2	-	148	-	125	-	59	-	19	-	247	-	126	-	-	-	595	90	-
Total	87	19	1 086	435	1 654	492	226	75	731	113	2 203	97	943	367	115	16	4 661	193	80

a) In good working conditions. b) In bad working conditions.

Table 15

NATIONAL EXPENDITURES 1976-1977 AND BUDGET 1978 FOR THE MALARIA PROGRAMS IN THE AMERICAS

(In U.S. dollars)

Country or other political or administrative unit	National Expenditures 1976			Estimated National Expenditures 1977			National Budget 1978		
	Internal financing	Loans	Total	Internal financing	Loans	Total	Internal financing	Loans	Total
Argentina	170 817	-	170 817	330 829	-	330 829	322 509	-	322 509
Belize	92 867	-	92 867	110 577	-	110 577	133 848	-	133 848
Bolivia	620 456	-	620 456	664 462	-	664 462	1 854 895	-	1 854 895
Brazil	27 745 012	-	27 745 012	34 982 901	-	34 982 901	33 809 283a)	-	33 809 283a)
Colombia	3 412 560	-	3 412 560	4 479 440	-	4 479 440	4 932 613	-	4 932 613
Costa Rica	970 054	-	970 054	1 343 344	-	1 343 344	1 366 745	-	1 366 745
Dominican Republic	865 020	-	865 020	865 020	-	865 020	865 020	-	865 020
Ecuador	2 708 114	-	2 708 114	3 518 518	-	3 518 518	3 518 518	-	3 518 518
El Salvador	2 605 856	-	2 605 856	2 723 028	-	2 723 028	3 091 960	-	3 091 960
French Guiana	1 205 007	-	1 205 007	1 307 574	-	1 307 574	1 438 373	-	1 438 373
Guatemala	2 796 341	-	2 796 341	3 064 686	-	3 064 686	3 028 898	-	3 028 898
Guyana	372 549	-	372 549	...	...	...	...	...	...
Haiti	525 000	-	525 000	600 000	-	600 000	800 000	-	800 000
Honduras	1 219 360	-	1 219 360	1 643 229	-	1 643 229	1 935 405	-	1 935 405
Mexico	15 071 826	-	15 071 826	21 579 831	-	21 579 831	22 000 000b)	-	22 000 000b)
Nicaragua	2 962 097	-	2 962 097	2 883 914	-	2 883 914	3 234 143	-	3 234 143
Panama	1 765 174	-	1 765 174	1 678 987	-	1 678 987	1 948 117	-	1 948 117
Paraguay	1 232 013	-	1 232 013	1 186 843	-	1 186 843	1 414 865	-	1 414 865
Peru	1 498 152	-	1 498 152	917 017c)	-	917 017	1 561 902	-	1 561 902
Suriname	240 000	400 555	640 555	246 111	422 222	668 333	289 444	483 889	773 333
Venezuela	13 177 155	-	13 177 155	13 419 532	-	13 419 532	13 419 532	-	13 419 532
Total	81 255 430	400 555	81 655 985	97 545 843	422 222	97 968 065	100 966 070	483 889	101 449 959

a) National budget, exluding São Paulo State. b) Estimated. c) Expenditures up to October 1977.

Table 16

ESTIMATED REQUIREMENTS FOR MALARIA PROGRAMS
IN THE AMERICAS

	1977[a]	1978[b]	1979[b]	1980[b]
TOTAL COST	101 212 745	104 640 116	-	-
GOV. AND OTHER SOURCES	99 168 065	102 649 959	. .	...
PAHO/WHO PORTIONS:				
Personnel costs and travel	1 592 122	1 535 275	1 636 400	1 585 300
Supplies and Materials	363 698	316 182	250 500	249 900
Fellowships	47 013	106 200	94 000	99 600
Grants and others	41 847	32 500	40 000	40 000
TOTAL	2 044 680	1 990 157	2 020 900	1 974 800

SOURCES OF PAHO/WHO FUNDINGS

SOURCE	1977[a]	1978[b]	1979[b]	1980[b]
PAHO-Reg	1 194 231	1 271 500	1 347 800	1 227 700
PAHO-PG	86 639	101 557	-	-
OMS-Reg	763 810	617 100	673 100	747 100
TOTAL	2 044 680	1 990 157	2 020 900	1 974 800

PAHO/WHO PERSONNEL

CATEGORY	1977[a]	1978[b]	1979[b]	1980[b]
Medical Officers	16	14	14	14
Sanitary Engineers	6	4	4	3
Entomologists	3	5	5	4
Parasitologists	1	1	1	1
Sanitary Inspectors	9	9	9	9
Other	4	4	4	4
TOTAL	39	37	37	35

a) Expenses
b) Estimated requirements

Table 17

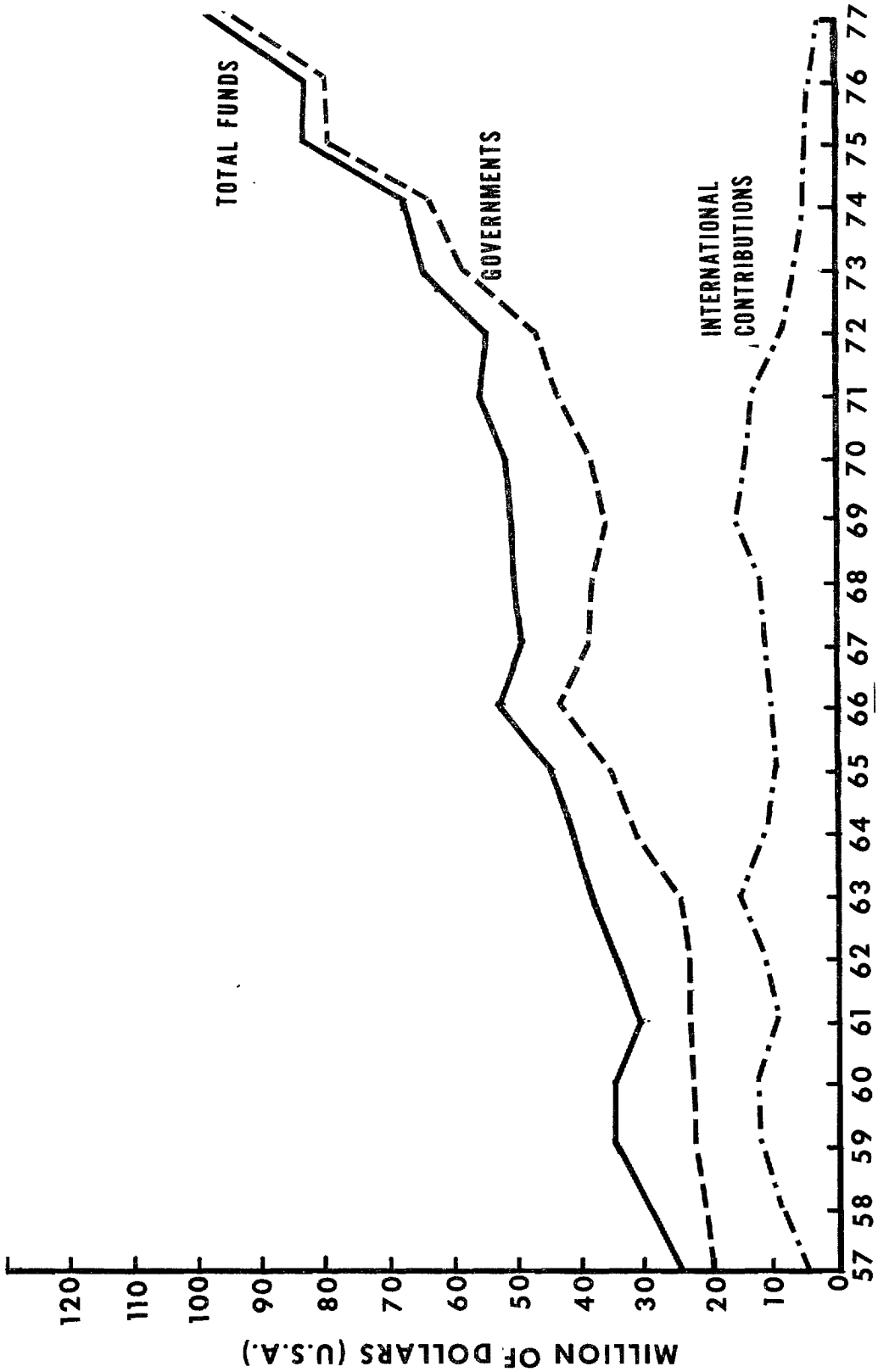
INTERNATIONAL CONTRIBUTIONS TO MALARIA PROGRAMS IN THE AMERICAS
1977 AND ESTIMATED 1978
(U.S. dollars)

Country or other political or administrative unit	Date of initiation of total coverage	1977 a)				1978 (estimated) a)			
		PAHO	WHO	AID (USA) (fiscal year)	Total	PAHO	WHO	AID (USA) (fiscal year)	TOTAL
Argentina	Aug. 1959	-	-	-	-	-	8 100	-	8 100
Belize	Feb. 1957	-	44 924	-	44 924	-	36 800	-	36 800
Bolivia	Sep. 1958	76 859	-	-	76 859	69 200	-	-	69 200
Brazil	Aug. 1959	273 226	-	-	273 226	297 100	-	-	297 100
Colombia	Sep. 1958	41 617	176 356	-	217 973	104 400	108 800	-	213 200
Costa Rica	Jul. 1957	-	58 592	-	58 592	-	56 300	-	56 300
Dominican Republic	Jun. 1958	49 657	-	-	49 657	54 100	-	-	54 100
Ecuador	Mar. 1957	3 985	-	-	3 985	-	-	-	-
El Salvador	Jul. 1956	-	67 179	-	67 179	-	35 600	-	35 600
French Guiana	Sep. 1963	5 963	-	-	5 963	7 900	-	-	7 900
Guyana	Jan. 1947	3 806	42 292	-	46 098	-	49 500	-	49 500
Haiti	Jan. 1962	221 434	-	1 200 000	1 421 434	213 700	-	1 200 000	1 413 700
Mexico	Jan. 1957	130 566	-	-	130 566	130 700	-	-	130 700
Nicaragua	Nov. 1958	47 270	41 188	-	88 458	44 000	45 200	-	89 200
Panama	Aug. 1957	-	84 605	-	84 605	-	86 600	-	86 600
Paraguay	Oct. 1957	-	44 062	-	44 062	-	45 000	-	45 000
Peru	Nov. 1957	65 111	-	-	65 111	62 400	-	-	62 400
Suriname	May. 1958	-	44 443	-	44 443	-	41 900	-	41 900
Inter-country projects, Headquarters	-	361 376	160 169	-	521 545	389 557	103 300	-	492 857
Total	-	1 280 870	763 810	1 200 000	3 244 680	1 373 057	617 100	1 200 000	3 190 157

a) Loans are shown in Table

Graph 1

FUNDS INVESTED IN THE MALARIA PROGRAMS IN THE AMERICAS, 1957-1977



GRAPH 2.

INTERNATIONAL FUNDS INVESTED IN THE MALARIA PROGRAMS IN THE AMERICAS, 1957-1977

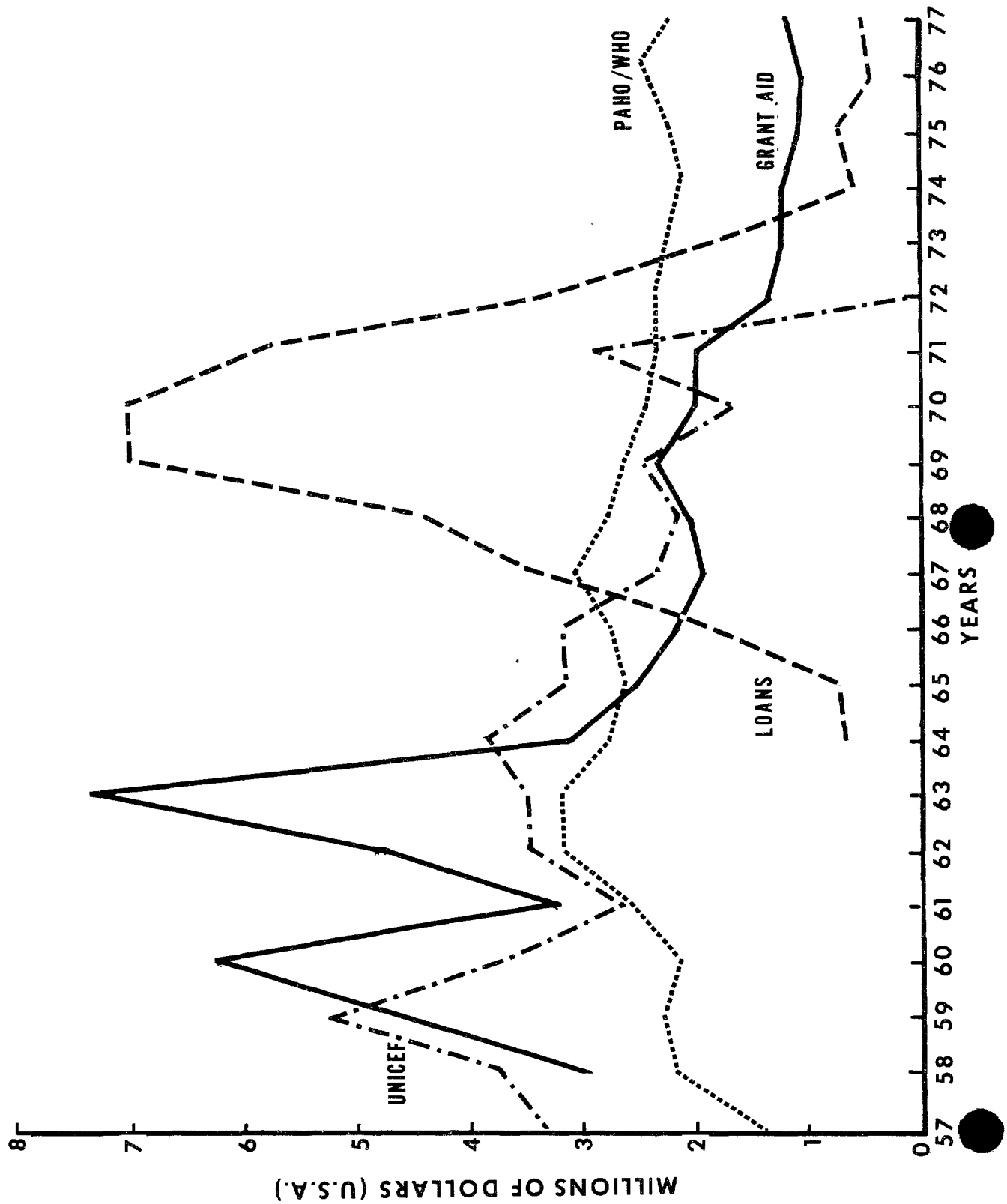


Table 18

GEOGRAPHICAL DISTRIBUTION OF AREAS WITH TECHNICAL PROBLEMS, 1977

Countries and Areas	Population of Affected Areas	Area Involved (Km^2)	Insecticides Used		Principal Vectors	Causes of the Problem
			Type Used	Years of Coverage		
Colombia						
1. Caribbean Coastal Zone; Magdalena River, Pacific Coastal Zone, Catatumbo Eastern Slope of Eastern Mountains, Alto Caqueta, Sarare	787 001	105 923	DDT MLT Propoxur	12-18	A. darlingi A. punctimac. A. nuñeztovari A. albimanus A. pseudopun. A. neivae A. albitarsis	Vector behavior; poor housing; colonization; social problems; parasite resistance to chloroquine; refusal to spraying; movement of people.
Ecuador						
2. Esmeraldas 3. Napo	307 572	46 836	DDT	10	A. punctimac. A. albimanus	Colonization; poor housing; parasite resistance to Chloroquine.
El Salvador						
4. Coastal Area	984 684	7 689	DDT Propoxur	17 6	A. albimanus	Vector resistance to DDT and Propoxur
Guatemala						
5. Pacific Coastal Zone	814 435	11 456	Propoxur	7	A. albimanus A. pseudopunc. A. vestitipen.	Vector resistance to Propoxur colonization.
Haiti						
6. Cité Simone O. Duvalier; Jacmel; Valle de la Coma; Gross-Morne; Southeast area; Petit-Goâve; Bois Neuf	482 325	3 645	DDT	13	A. albimanus	Vector resistance to DDT; population movements.
Mexico						
7. Basins of Rivers Fuerte Sinaloa, Humaya and Tamazula; 8. Huicot 9. Basin of Balsas River 10. Costa Chica of Guerrero and Oaxaca Coastal Zone 11. "El Istmo" Northeastern Slope of the Golf of Mexico, Oaxaca State 12. Tapachula-Suchiate 13. Central part of Chiapas	3 056 390	162 547	DDT	20	A. pseudopun. A. albimanus	Internal migration; poor housing; temporary shelters; modification of houses; vector resistance to DDT; actions that remove insecticides from surfaces.

Table 18 (Cont.)

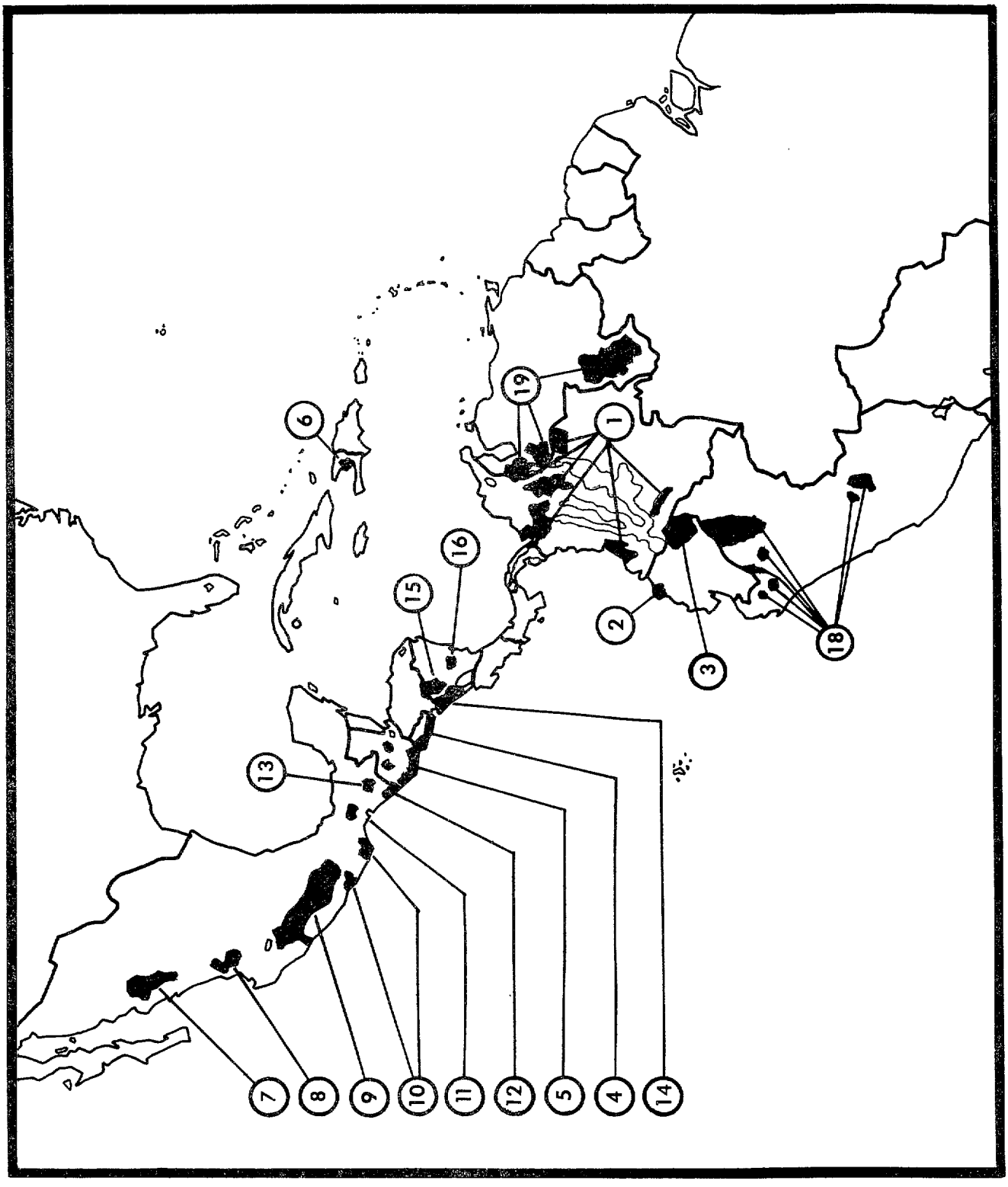
GEOGRAPHICAL DISTRIBUTION OF AREAS WITH TECHNICAL PROBLEMS, 1977 (Cont'd)

Countries and Areas	Population of Affected Areas	Area Involved (Km^2)	Insecticides Used		Principal Vectors	Causes of the Problem
			Type Used	Years of Coverage		
Nicaragua						
14. Pacific Coast; 15. Central Region; 16. Atlantic Region, Zelaya	1 753 129	30 138	DDT Malathion Propoxur	16 5 6½	A. albimanus	Vector resistance to DDT, Malathion and Propoxur.
Peru						
17 Chinchipe Ene Satipo San Lorenzo Bigote Bagua Bajo Maranon	181 107	129 265	DDT	14-20	A. pseudopunc. A. rangeli A. albimanus A. benarrochi	High vulnerability; poor housing; migration of laborers; temporary shelters; actions that remove insecticides from surfaces.
Venezuela						
18 Western and Southern areas	565 761	139 946	DDT	30	A. nuneztovari A. darlingi	Vector exophily; population movement; colonization; refusal to permit spraying poor public cooperation.
TOTAL	8 932 404	627 445				

Note: In the Americas, also exist regions with all types of problems of special characteristics, such as the Amazon Basin which includes areas of Bolivia, Colombia, Ecuador, Peru and a large extension of Brazil; in this latter country, for example, a large scale plan for socio-economic development which contemplates construction of unlimited number of highways and projects of colonization makes it necessary that anti-malarial campaign be carried out as a long term program.

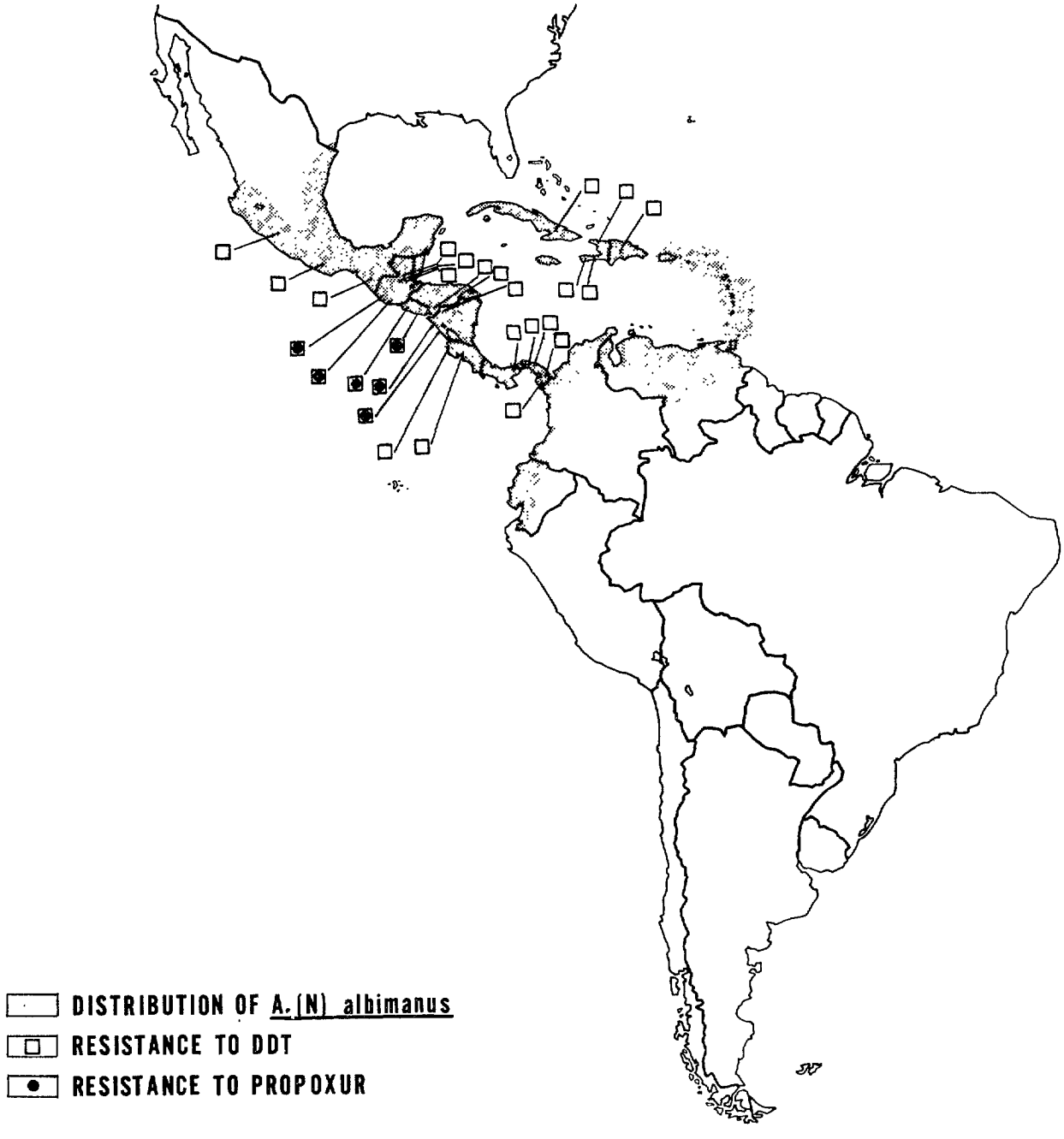
Map 3

GEOGRAPHICAL DISTRIBUTION OF AREAS OF TECHNICAL PROBLEMS, 1977



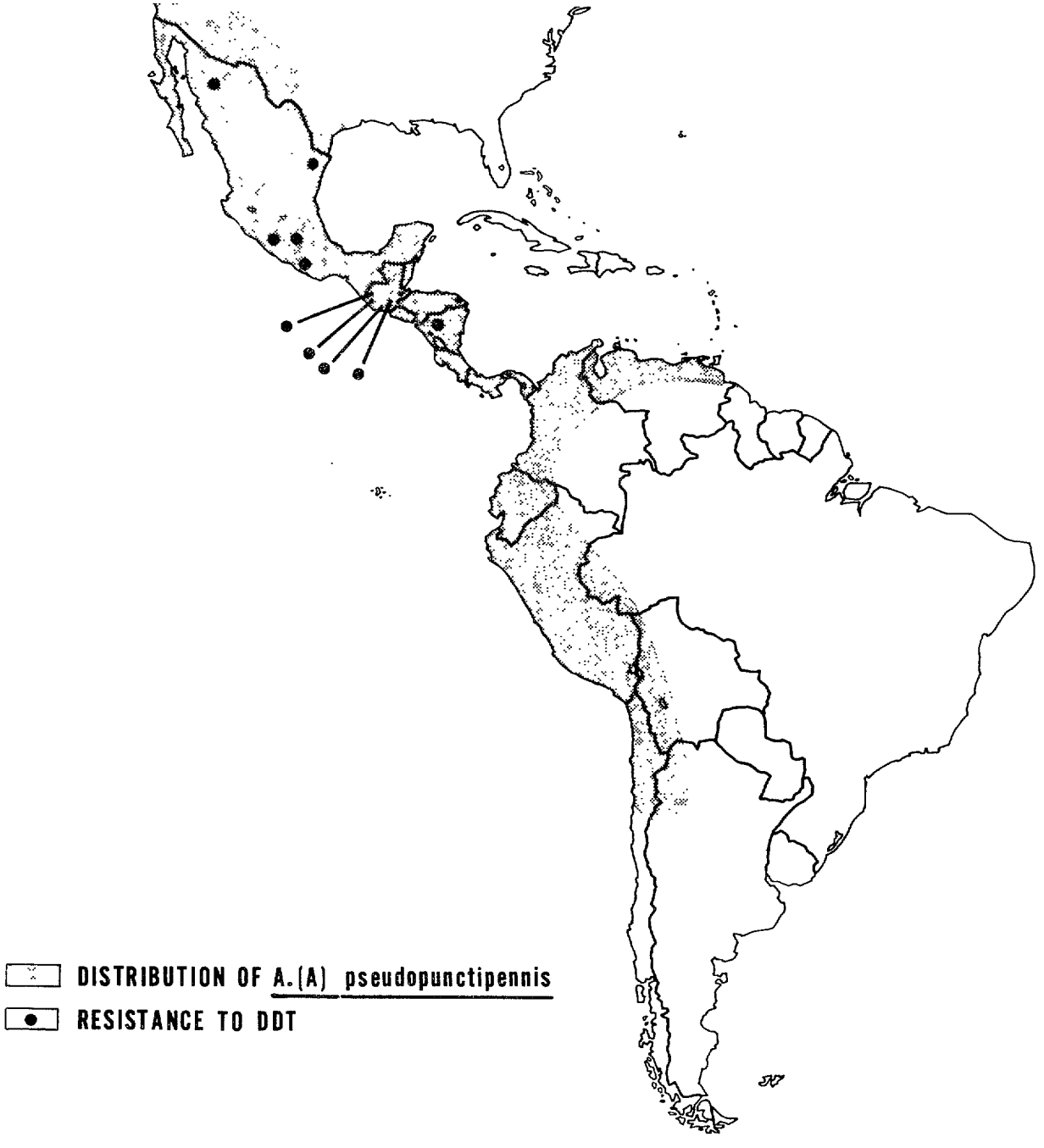
Map 4

DISTRIBUTION OF A. (N) albimanus AND RESISTANCE TO DDT AND PROPOXUR (DECEMBER 1977)



Map 5

DISTRIBUTION OF A. (A) pseudopunctipennis AND RESISTANCE TO DDT (DECEMBER 1977)



AREAS WITH CONFIRMED CASES OF P. falciparum RESISTANT TO CHLOROQUINE

No.	Country and Area
	BRAZIL
1	Barcelos (Amazonas)
2	Pto. Velho (Rondonia)
3	R. Machado (Rondonia)
4	Cuiabá (Mato Grosso)
5	Três Lagoas (Mato Grosso)
6	Conceição da Barra (Esp. Santo)
7	Alenquer (Pará)
8	Santarém (Pará)
9	S. Miguel Guamá (Pará)
10	Belém (Pará)
11	Igarapemirim (Pará)
12	Barcarena (Pará)
13	Carretera Belém-Brasilia (Pará)
14	R. Gurupi (Pará)
15	Braz Aguiar (Roraima)
16	Mucajaí (Roraima)
17	Boa Vista (Roraima)
18	Macapá (Amapá)
	COLOMBIA
19	Curiche (Chocó)
20	Río de Oro (Cesar)
21	Caucasia (Antioquia)
22	Cimitarra y Bolívar (Santander)
23	Pto. Boyacá (Boyacá)
	ECUADOR
24	Putumayo (Napo)
	FRENCH GUIANA
25	Bellevue (Iracoubo)
	GUYANA
26	Lethem
	PANAMA
27	Las Cumbres y Chilibre Lago Gatún San Blas Garachiné-Sambú
	SURINAM
28	Alalaparoe
29	Lawa y Marowijne rivers
	VENEZUELA
30	Barinas
31	Zulia
32	T. F. Delta Amacuro
33	T. F. Amazonas

Map 6

Table 19

PAHO/WHO TECHNICAL STAFF ASSIGNED TO MALARIA PROGRAMS IN THE AMERICAS
FROM 1975 TO 1978

Country or other political or administrative unit	Medical Officers				Sanitary Engineers				Sanitary Inspectors				Entomologists				Others			
	1975	1976	1977	1978	1975	1976	1977	1978	1975	1976	1977	1978	1975	1976	1977	1978	1975	1976	1977	1978
Belize	-	-	-	-	-	-	-	-	1	1	1	1	-	-	-	-	-	-	-	-
Bolivia	1	1	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-
Brazil	3	2	2	2	2	1	1	1	-	-	-	-	-	-	-	-	2a)	1b)	1b)	1b)
Colombia	1	1	1	1	-	-	-	-	3	2	2	2	1	1	1	1	-	-	-	-
Costa Rica	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1b)	-	-	-
Dominican Republic	-	-	-	-	-	1	-	-	1	-	1	1	-	-	-	-	-	-	-	-
Ecuador	1	1	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-
El Salvador	1	1	1	-	1	-	-	-	1	1	1	1	1	1	-	-	-	-	-	-
El Salvador-0201	1	-	-	-	-	-	-	-	2	-	-	-	2	-	-	-	-	-	-	-
Guatemala	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1c)	-	-	-
Guyana	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Haiti	-	1	1	1	-	1	1	1	3	3	3	2	-	-	-	1	2d)	-	-	-
Honduras	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Mexico	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Nicaragua	1	1	1	1	-	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-
Panama	-	-	-	-	1	1	1	1	1	1	-	-	1	1	1	1	-	-	-	-
Paraguay	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Peru	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Suriname	-	-	-	-	-	-	-	-	1	1	1	1	-	-	-	-	-	-	-	-
Headquarters and AMRO Projects	5	6	5	5	1	1	-	-	-	-	-	-	-	-	1	1	1e)	-	-	-
Total	20	19	16	14	7	7	6	4	17	11	9	9	5	3	3	5	7	1	1	1

a) One parasitologist, and one laboratory adviser. b) Parasitologist. c) Administrative methods officer. d) Epidemiologists.
e) Economist.

Table 20

DRUGS PROVIDED BY PAHO/WHO TO THE MALARIA PROGRAMS IN THE AMERICAS, 1958-1977

(In thousands of tablets)

Country or other political or administrative unit	Total 1958-1976[a]							1977						
	Chloroquine 150 mg.	Primaquine		Pyrimethamine	Combined drug	Aspirin 0.50 0.20 mg.	Fanasil	Chloroquine 150 mg	Primaquine		Pyrimethamine	Combined drug[b]		Fanasil
		15 mg.	5 gm.	25 mg.	(b)				15 gm.	5 gm.	25 mg.	Adult size	Infant size	
Argentina	2 018	399	222	712	-	-	-	-	-	-	-	-	-	-
Belize	653	82	107	6	22	140	-	85	35	6	-	-	-	-
Bolivia	10 170	1 520	691	960	670	200	15	150	50	-	-	-	-	-
Brazil	135 335	2 674	1 379	396	2 825	-	372	2 500	840	100	100	200	100	-
Colombia	33 895	2 718	830	6 649	11 827	120	502	1 060	25	-	-	1 343	-	-
Costa Rica	7 794	1 253	547	223	1 385	308	-	-	-	-	-	-	-	-
Cuba	4 350	38	69	80	-	-	-	-	-	-	-	-	-	-
Dominica	90	1	1	45	-	40	-	-	-	-	-	-	-	-
Dominican Republic	14 277	91	225	847	406	20	-	250	-	-	-	100	10	-
Ecuador	15 086	1 213	271	430	1 013	-	-	150	-	-	-	-	-	-
El Salvador	20 855	1 029	938	128	2 070	-	-	600	75	50	-	-	-	-
French Guiana	608	443	67	76	48	-	12	150	100	-	50	-	-	2
Grenada	43	-	-	45	-	20	-	-	-	-	-	-	-	-
Guatemala	19 598	1 397	466	127	8 049	250	2	1 400	100	100	-	-	-	-
Guyana	1 157	297	109	378	-	30	25	85	10	3	25	20	-	4
Haiti	13 900	102	5	1 480	31 608	-	-	-	-	-	-	-	-	-
Honduras	16 786	2 164	1 326	88	1 290	-	-	1 000	150	20	-	-	-	-
Jamaica	879	18	-	288	50	-	-	-	-	-	-	-	-	-
Mexico	83 916	11 786	15 372	10 679	6 942[c]	-	-	4 350	450	375	-	-	-	-
Nicaragua	14 399	2 853	2 155	156	6 933	-	-	-	-	-	-	-	-	-
Panama	6 780	1 046	595	505	1 907	-	61	-	60	50	45	-	30	-
Canal Zone	-	-	-	-	90	-	-	-	-	-	-	-	-	-
Paraguay	12 734	271	118	77	94	-	14	150	-	-	-	-	-	-
Peru	25 806	1 689	758	3 323	4 089	473	-	1 050	-	-	-	-	-	-
St. Lucia	68	1	-	70	-	36	-	-	-	-	-	-	-	-
Suriname	3 505	709	313	916	285	138	15	350	99	-	52	300[c]	10	-
Trinidad & Tobago	840	961	426	127	400	132	-	-	-	-	-	-	-	-
Total	445 542	34 755	26 990	28 811	82 003	1 907	1 018	13 330	1 994	704	272	1 963	150	6

a) During this period, Chloroquine, Pyrimethamine and Primaquine powder and Tricalcium phosphate have been provided to different malaria proyects.
b) Chloroquine/Primaquine combined. c) Includes Daraclor tablets (Chloroquine/Pyrimethamine combined).

PAN AMERICAN HEALTH ORGANIZATION

WORLD HEALTH ORGANIZATION

XX PAN AMERICAN SANITARY CONFERENCE

XXX REGIONAL COMMITTEE MEETING

ST. GEORGE'S, GRENADA
SEPTEMBER - OCTOBER 1978

Provisional Agenda Item 30

CSP20/9, ADD (Eng.)
17 August 1978
ORIGINAL: ENGLISH-SPANISH

STATUS OF MALARIA PROGRAMS IN THE AMERICAS

XXVI REPORT

TABLE OF CONTENTS

TABLES, MAPS AND GRAPHS

Page

Tables (Cont.)

Maps

Graphs

REPORT ON THE STATUS OF THE MALARIA PROGRAMS IN THE AMERICAS

XXVI REPORT

Introduction

In its XXV Meeting, in 1977, the Directing Council of the Pan American Health Organization examined the document presented by the Government of Mexico on "Control vs. Eradication in the Malaria Programs", reaffirmed that the final goal was malaria eradication in the Americas, and recognized that control activities were an intermediate stage toward this goal.

The priorities established by the Governing Bodies in the last three years determined the policy for the Organization to direct its activities of the malaria program toward: a) the convening of groups of specialists to make recommendations to the Director; b) the promotion of changes of strategy in accordance with the actual epidemiological and financial situations of the countries; c) a technical review of malaria programs in conjunction with national technical staff with a view to the progressive adoption of more effective methods in areas with persistent transmission; d) the promotion and collaboration in research and training activities; e) the coordination of activities in all the malaria programs of the Americas and in border meetings; and f) the selection and preparation of technical information material for distribution.

This report consists of six chapters. The first contains information on the status of the program as a whole and summaries on the progress of the work in each country. The second considers the technical problems that have arisen, and the application of remedial measures to solve them. The third is on research; and the fourth on personnel training and distribution of information. The fifth deals with international coordination and cooperation; and the last, with other vector-borne parasitic diseases.

The information presented in this report was taken from the replies of the Governments to the questionnaire sent to them every year; and from monthly statistical reports, quarterly narrative reports, and special reports.

I. STATUS OF MALARIA PROGRAMS

A. General Information

The population of the Americas, on 31 December 1977, was estimated at 576,942,000 persons, of which 215,550,000 lived in originally malarious areas. Of the latter figure, 104,567,000 (48.5%) lived in areas in which malaria had been eradicated (maintenance phase), 50,610,000 (23.5%) in areas where malaria transmission had been interrupted (consolidation phase), and 60,373,000 (28%) in areas with continuing transmission (attack phase).

Progress achieved in the malaria programs in the Americas has been various from country to country and even from one area to another in the same country. In 1977, the epidemiological situation improved in some countries while making little progress or even worsening in others. Viewing the situation as a whole, however, there was a net gain in population areas free of malaria transmission; the population residing in areas of maintenance and consolidation increased from 71 per cent on 31 December 1976 to 72 per cent in 1977. In Paraguay, 271,010 Km^2 with 631,000 inhabitants were transferred from the consolidation to the maintenance phase, and 50,570 Km^2 with 500,000 inhabitants from the attack to the consolidation phase. In Brazil, 5,194 Km^2 with 150,000 inhabitants were transferred from the attack to the consolidation phase, and 46,277 Km^2 with 1.8 million inhabitants from consolidation to maintenance. Moreover, in an area containing 5.7 million inhabitants, the use of insecticides was suspended because transmission had been interrupted; the parasite incidence of this area was 0.08 per 1,000 inhabitants.

Table 1 shows the population of malarious areas in the Americas by phases and years since 1958, and Tables 2 and 3, the population and areas in square kilometers by country and phase of the program. Maps 1 and 2 convey the geographical extent of the areas in the various phases of the program in December 1976 and 1977.

During 1977, a total of 9,261,874 blood slides were examined, of which 398,598 were found positive for malaria parasites giving an annual blood examination rate (ABER) of 4.3 per cent and an annual parasite incidence (API) of 1.85 per 1,000 inhabitants. Table 4 summarizes the number of slides examined, and of those found to be positive, and the morbidity from malaria since 1958. Table 5 gives the results of blood slide examinations during 1977 by country and phase of the program. The results of the examinations, the number of positives found, the parasite species, and the classification of cases in each phase of the program are provided in Tables 6, 7, 8, and 9.

On the basis of the situation in 1977, the malaria programs in the Region may be classified in two groups:

Group I encompasses 12 countries or territories in which malaria eradication has been certified for the whole of the country: Chile, Cuba, Dominica, United States of America, including the Virgin Islands and Puerto Rico, Grenada and Carriacou, Guadeloupe, Jamaica, Martinique, Saint Lucia, and Trinidad and Tobago. This group has a population of 71,651,000 persons living in originally malarious areas, or 33.2 per cent of the total population of the originally malarious area in the Hemisphere. During 1977, 358 cases of imported malaria, which did not cause local transmission, were recorded in seven of these countries or territories.

Group II includes 21 countries or territories in which malaria control programs were in progress. On the basis of the epidemiological situation in 1977, the group has been subdivided into two areas as follows:

GROUP II

Country	AREA A			AREA B		
	Consolidation and maintenance (with imported cases or limited foci)			Attack (With and without attack measures)		
	Population (thousands)	Cases	API	Population (thousands)	Cases	API
Argentina	3 073	88	0.03	73	375	5.1
Belize	75	144	1.9	66	750	11.4
Bolivia	1 116	947	1.0	759	9 098	12.0
Brazil	26 095	2 080	0.1	19 533	99 795	5.1
Colombia	10 448	8 185	1.0	4 906	55 394	11.3
Costa Rica	419	79	0.1	174	94	0.5
Dominican Republic	4 858	349	0.1	88	396	4.5
Ecuador	1 871	781	0.4	2 541	10 466	4.1
El Salvador	-	-	-	3 871	31 745	8.2
French Guiana	50	187	3.7	5	301	60.2
Guatemala	-	-	-	2 481	34 283	14.0
Guyana	839	19	0.02	38	1 544	40.6
Haiti	-	-	-	4 126	27 679	6.7
Honduras	490	602	1.2	2 180	38 772	17.8
Mexico	17 719	453	0.03	14 474	18 295	1.3
Nicaragua	-	-	-	2 355	11 584	5.0
Panama	1 395	62	0.04	310	612	2.0
Canal Zone	40	4	0.10	-	-	-
Paraguay	1 870	43	0.02	476	113	0.2
Peru	4 182	9 635	2.3	1 318	22 775	17.3
Suriname	243	22	0.1	33	950	28.8
Venezuela	8 941	735 a)	0.1	566	4 024 a)	7.1
Total	83 724	24 415	0.3	60 373	369 045	6.1

a) Information up to November.

In Area A, there were 24,415 recorded cases, of which 5,397 were autochthonous. Of the autochthonous cases, 2,678 were in Peru (49.6%), 871 in Colombia (16.1%), 531 in Bolivia (9.8%), 464 in Ecuador (8.6%), and the rest (15.9% in the other 17 countries. In general, this area is subject to constant importation of cases from Area B, and transmission is observed in residual or new foci originated from imported cases. In most of the countries, the foci are effectively eliminated by emergency measures. In the last three years, however, a deterioration has been observed in the epidemiological situation of Peru, Colombia, Bolivia, and Ecuador. In Guyana there were malaria outbreaks in 1976, but the epidemiological situation improved during 1977.

Area B has a population of 60,373,000 inhabitants, or 28.0 per cent of the total in all malarious areas in the Hemisphere, but they account for 369,045 cases of malaria, which is 92.6 per cent of the 398,598 cases recorded during the year. This area, in addition to harboring foci of persistent transmission, is responsible for most of the foci reestablished in Area A.

B. Country Information

ARGENTINA - Malaria Cases: 1976 - 70 1977 - 463

Transmission had been interrupted at the beginning of the decade, and the disease has not been endemic in the country. However, there is high receptivity and vulnerability in the originally malarious areas. Cases imported from the neighboring countries often have originated foci of transmission, but they have so far been effectively eliminated by emergency measures. The preventive application of two DDT spraying cycles is continuing in the norther border area, and epidemiological surveillance is being maintained in the rest of the originally malarious area. The number of cases increased during 1977 because of small outbreaks caused by imported cases.

BELIZE - Malaria Cases: 1976 - 199 1977 - 894

The program was in an advanced stage and transmission had been confined to a number of foci frequently originated from imported cases. In 1976 and 1977, the epidemiological situation worsened with the importation of larger number of cases and a shortage of insecticides and funds for the timely application of emergency measures. Transmission was again observed in the two northern districts, and in 1977 all-out antimalaria operations were resumed.

BOLIVIA - Malaria Cases: 1976 - 6,714 1977 - 10,106

Administrative and financial problems remained the principal impediment to the normal conduct of the program. A shortage of DDT compelled the Malaria Service to apply this insecticide on a priority basis in localities of high malaria incidence. With the arrival of DDT supplies in mid-1976, the coverage of spraying was extended considerably, but proved insufficient to affect the situation during that period. During 1977 the situation worsened considerably in the departments of Pando, Beni, and Tarija.

BRAZIL - Malaria Cases: 1976 - 89,959 1977 - 104,436

In the last few years, a steady progress has been observed in the short-term eradicaiion area. In 1977, this area harbored 36 million inhabitants, of which 31.7 million (88.1%) were already free of the disease. This last figure included 26.0 million inhabitants of areas in consolidation and maintenance. In the long-term eradication area, with a population of 9.6 million, noteworthy progress was also made, and transmission was confined to isolated foci. By the end of the year, attack measures had been suspended in areas of 2.8 million inhabitants where transmission had been interrupted. However, outbreaks occurred in areas of intensive settlement where virgin jungle was being cleared for crop and livestock raising, which caused the increase in the total number of cases for the country. The Government assigned high priority to the program.

COLOMBIA - Malaria Cases: 1976 - 39,022 1977 - 63,888

The worsening trend of the last four years continued because of technical and financial problems aggravated by instability and human migration into agricultural settlement areas. In other areas, malaria control measures were not well received by the populace, which resulted in inadequate protection against infection. Intensive epidemiological studies by area and locality were in progress to identify the problems and apply specific measures suited to local conditions.

COSTA RICA - Malaria Cases: 1976 - 473 1977 - 217

Malaria transmission has been virtually interrupted in the country and epidemiological surveillance has been the principal activity since 1974. Regular DDT sprayings were continued in the border areas because of the frequent importation of cases. In 1976 and 1977, these imported cases caused small outbreaks which, however, were effectively eliminated by emergency measures that included propoxur sprayings and the distribution of antimalarial drugs.

DOMINICAN REPUBLIC - Malaria Cases: 1976 - 537 1977 - 993

Epidemiological surveillance was effectively maintained despite a steady influx of imported cases from the neighboring country. Regular DDT spraying was continued in the border areas and antilarval operations (sanitary landfill, rectification of irrigation channels, lining and cleaning of ponds, and adequate water management of irrigation systems) were intensified. During 1976 and 1977 larvivorous fish, Poecilia reticulata (guppies), were distributed in water collections of different kinds in 46 municipalities.

ECUADOR - Malaria Cases: 1976 - 10,974 1977 - 11,275

A marked deterioration of the epidemiological situation has been observed in the provinces of Esmeraldas and Napo in the last few years because of operational and administrative problems that have impeded the proper application of attack measures. Transmission was confined to small, isolated communities of difficult access. The renovation of land and river transport in 1977 considerably facilitated operations and improved the coverage of DDT spraying and treatment of malaria cases. A new insecticide, fenitrothion, was tried in an area with persistent transmission and heavy population movements in the north of the country. In the city of Esmeralds, antilarval measures were applied, including the use of larvivorous fish and small engineering works.

EL SALVADOR - Malaria Cases: 1976 - 83,290 1977 - 32,243

The program has deteriorated in recent years chiefly because vector resistance to DDT and propoxur has increased in intensity and extension. Consequently, insecticide sprayings were reduced. Antimalarial drugs were widely distributed to fever cases in areas where the use of insecticide was suspended. In comparison with previous years, 1977 showed a sharp decline in the number of cases registered. This drop was credited to an extended drought--from November 1976 to May 1977--and to an improved organization of the Malaria Service, which made it possible to upgrade operations in the field. During 1977, half of the evaluators of the Malaria Service attended a 10-week training course for rural health aides.

FRENCH GUIANA - Malaria Cases: 1976 - 394 1977 - 488

The situation has remained virtually unchanged in recent years. In the coastal region, which was in the consolidation and maintenance phases, small foci of transmission had appeared every year, originated from imported cases or residual sources of transmission, but were effectively controlled by emergency insecticide spraying and the administration of antimalarial drugs. In the hinterland, which was in the attack phase, DDT spraying of houses was continued regularly in close coordination with Suriname. The most important problem was the movement of laborers, some of them infected, along the Oyapock River.

GUATEMALA - Malaria Cases: 1976 - 9,616 1977 - 34,907

In the second half of 1975, the situation took a turn for the worse as vector resistance to insecticides increased. In 1977, a lack of insecticides obliged the Malaria Service to suspend spraying operations, and a shortage of antimalarial drugs made it difficult to arrest the trend toward further deterioration; the number of cases rose sharply toward the end of the year. During 1977, epidemiological studies were carried out area by area and locality by locality, and 325 areas (containing 543 of the 9,352 localities in the country) were identified as the principal foci of transmission and the sources for 71.3 per cent of all cases occurring in the country. A field trial of copper sulphate as a larvicide was made and susceptibility tests were conducted with fenitrothion and chlorfoxim in search for substitutes for DDT and propoxur.

GUYANA - Malaria Cases: 1976 - 4,642 1977 - 1,563

Transmission had been virtually interrupted in 1974, but the suspension of antimalarial operations in 1974 and 1975 led to a resurgence of the disease in all the hinterland districts that had been in the consolidation phase. In 1976, a series of outbreaks occurred and attack measures were resumed, including residual house spraying with DDT, the distribution of medicated salt, mass blood examination of the inhabitants of affected localities, and presumptive and radical cure treatments. The incidence of malaria dropped considerably in 1977, but transmission was not interrupted.

HAITI - Malaria Cases: 1976 - 15,087 1977 - 27,679

Vector resistance to DDT compelled a considerable curtailment of spraying operations. In some localities with high malaria incidence, antilarval measures were applied (drainage, sanitary landfill, stream diversion in swamplands, and use of larvivorous fish). A total of 19 major engineering projects were launched in the last two years to eliminate or reduce permanent mosquito breeding places at some major foci of transmission in the central and southern parts of the country. Much progress was made toward reducing the incidence of malaria until the second half of 1977, when heavy rainfall created a multitude of temporary breeding places, causing a series of outbreaks, particularly in the southern peninsula. The number of cases rose sharply toward the end of the year. Efforts were made to control the situation using antimalarial drugs, space spraying, and larviciding.

HONDURAS - Malaria Cases: 1976 - 48,804 1977 - 39,414

Because of difficulties in obtaining needed funds and insecticides, spraying operations had to be suspended between April 1974 and mid-1976. The situation worsened rapidly from 1975, and the limited available resources were devoted to emergency measures to prevent further deterioration. Spraying operations were resumed in July 1976 with the arrival of insecticides donated by the European Economic Community. In 1977, a pilot project was planned for integrating the malaria program into the rural health services using the resources of the community for house spraying, antilarval measures, improvement of housing, laboratory diagnoses and the treatment of malaria cases.

MEXICO - Malaria Cases: 1976 - 18,153 1977 - 18,851

The overall epidemiological situation in the country has been stationary in recent years. In the Gulf coast region and on the Yucatan Peninsula, transmission had been virtually interrupted and effective epidemiological surveillance maintained. In 1977, there was a small outbreak (51 cases) caused by imported cases in 11 localities in the Rio Hondo area. Emergency measures eliminated the focus. In the northwestern part of the Pacific slope, the situation improved somewhat, but in the southern part, a slight deterioration was observed. The School of Public Health, in collaboration with the Organization, began a course leading to the degree of Master in Public Health, with emphasis on malaria and other parasitic diseases; the first course was given in 1976, the second in 1977, and others will continue to be given in the future.

NICARAGUA - Malaria Cases: 1976 - 26,228 1977 - 11,584

A general deterioration in the epidemiological situation, in 1975 and 1976, was caused by an increase in vector resistance to propoxur on the Pacific coast, where the chief foci of transmission were located. In 1976, antilarval operations were launched in the four most important foci: Managua, the San Antonio and Montelimar sugarcane plantations, and Tipitapa. Meanwhile, antimalarial drugs were distributed in rural areas. A marked improvement was observed in 1977, particularly in areas where antilarval operations had been undertaken. During the period from January to October 1977, the number of registered cases in the four principal foci was 1,425, down steeply from 7,745 in the same period of the previous year. In the second half of 1977, there were some outbreaks in rural areas along the Pacific coast, but a special program of mass drug administration brought the situation under control.

PANAMA - Malaria Cases: 1976 - 727 1977 - 674

Transmission has been interrupted in the country except at three foci: Bocas del Toro, Darién and San Blás. In the last few years efforts have been directed at the elimination of these foci, and considerable progress has been made. In 1977 a small outbreak was noted in the Province of Colón, but it was brought under control by the end of the year. The number of cases was very much reduced in Bocas del Toro, and the San Blás focus was almost eliminated. Also, an effective surveillance system was established to prevent a resurgence of transmission from imported cases. In Darién, however, transmission persisted, though at a low level, because of constant importation of cases from the neighboring country.

PARAGUAY - Malaria Cases: 1976 - 140 1977 - 156

Though transmission had been interrupted, the constant importation of cases necessitated continued insecticiding in the border area. In 1977 there was a small outbreak in a locality near the Brazilian border, and 35 autochthonous cases were recorded. Emergency measures taken by the Malaria Service quickly eliminated the focus. As a result of a review of the program in December 1976, eight departments, aggregating 631,000 inhabitants in 271,010 km^2, were transferred from the consolidation to the maintenance phase, and another area (with some 500, 000 inhabitants) from the attack to the consolidation phase. Py the end of December only 476,000 people (20.3% of the total population of the malarious areas) remained in the attack phase.

PERU - Malaria Cases: 1976 - 18,462 1977 - 32,410

In the areas in the attack and consolidation phase the epidemiological situation has been deteriorating severely, and in every one of the last seven years there has been an increase in the number of cases. Although vectors were still susceptible to DDT, spraying coverage was insufficient because of operating problems and intimely supply of insecticides, materials, equipment and transportation.

SURINAME - Malaria Cases: 1976 - 537 1977 - 993

For the operation of the malaria program, the country was divided into 25 areas, five of them in the attack phase and the rest in the consolidation and maintenance phases. The attack phase area had a population of 31,530 persons (16.6% of the population of the originally malarious area). Transmission was observed only in the attack phase area. Residual DDT spraying and the mass distribution of antimalarial drugs succeeded, despite a limited coverage, in considerably reducing the number of cases in the last four years, except in the Tapanahony River area which, with a population of 9,700 inhabitants, accounted for 87 per cent of all the cases in the country.

VENEZUELA - Malaria Cases: 1976 - 4,740 1977 - 4,977 (up to Nov)

No major changes have been observed in the last four years. Limited transmission continued in the western part of the country, particularly in the State of Barinas. Attack measures were taken, including residual house spraying with DDT and HCH in four to six-month cycles, malathion was sprayed at ultralow volume, antilarval operations with Baytex were carried out, and antimalarial drugs were administered.

C. Field Operations

The use of insecticides has declined considerably in the last five years, from 16,971,930 sprayings in 1973 to 10,007,194 in 1977. This is chiefly because of the high cost of insecticides and the spreading of the vector resistance problem. In some areas, however -- in Brazil, for example-- sprayings were suspended because transmission had been interrupted. In general, insecticiding is still the most important attack method in malaria control. DDT is the insecticide most utilized in the program, and is applied in six-month, four-month and yearlong cycles.

Where vector resistance to DDT is a problem, propoxur is applied in three-month cycles. The use of propoxur has also declined, however, from 956,056 sprayings in 1976 to 551,012 in 1977, because of increased vector resistance. Trials with fenitrothion on a limited scale were begun in Ecuador and Guatemala. Country data on houses sprayed in each cycle are given in Table 10, and the insecticides used in 1977 and estimated for 1978 in Table 11.

As more problems of resistance to insecticides arise, antimalarial drugs become more important. In addition to using drugs in presumptive and radical cure treatments, they are distributed to the population at large in selected localities either in response to epidemic outbreaks or for lack of any other effective measures, because of the problem of vector resistance to insecticides or special ecological conditions in areas of agricultural settlement or in encampments of laborers building roads, dams, etc.

In Haiti and Nicaragua, antilarval measures such as larviciding, drainage and landfill were expanded with good results. In Ecuador these techniques were also used in a city located in the area of persistent transmission. In the Dominican Republic the distribution of larvivorous fish was extended to different areas of 46 highly receptive and vulnerable municipalities. In Brazil, malathion at ultralow volume was applied experimentally in an area of settlement in the State of Pará.

Table 12 summarizes the results of active and passive case detection work by country, and Table 13 the personnel of the malaria programs by function. Table 14 shows the means of transport used in the malaria program in each country; poor transport facilities are a serious problem of field operations in some countries.

D. Budget

Table 15 summarizes the expenditures made by the Governments in 1976, the budgets approved for 1977, and the estimated budgets for malaria programs in 1978. Of the 21 countries and territories that had malaria programs, the budget was increased in 15, remained unchanged in one, and was reduced slightly in four, and no information is available on one. As can be seen, the national funds assigned to malaria programs increased from US$81,655,965 in 1976 to US$97,968,065 in 1977 (a 20 per cent increase).

Table 16 illustrates the expenses incurred by PAHO/WHO in 1977 and its budget for technical cooperation with the countries in 1978-1980. The PAHO/WHO and USA/AID contributions assigned to each country in 1977, and the amounts estimated for 1978, are presented in Table 17.

A total of US$1,084,908,666 was invested in malaria programs in the Americas between 1957 and 1977, of which 82.1 per cent was put up by national governments and 17.9 per cent by cooperating international agencies. Graphs 1 and 2 present the funds invested by governments in malaria programs and the contributions of international agencies during those years. In addition, between 1971 and 1973 the Government of the Federal Republic of Germany contributed US$2,546,000 in grants to the malaria program in the Americas.

II. TECHNICAL PROBLEMS

Table 18 and Map 3 show the geographical distribution of the areas with technical problems. In most countries there was no significant change from the situation in 1976, except in Guatemala, where fewer areas are reported on and Honduras, which made no report on problem areas. These areas where malaria transmission persists because of technical problems harbor 8.9 million inhabitants, or 13.6 per cent of the total population of the areas still in the attack phase (60 million). In addition to the areas shown in Table 18, the Amazon Basin, which embraces parts of Bolivia, Colombia, Ecuador and Peru, and an extensive area of Brazil, has special problems associated with low population density and socioeconomic development projects like agricultural settlement and highway construction.

In these areas, inaccessibility and the high cost of operations pose a great problem in efforts to achieve adequate coverage.

Map 4 shows the distribution of A. (N) albimanus and its resistance to DDT and propuxur, and Map 5 the distribution of A. (A) pseudopunctipennis and its resistance to DDT.

A. albimanus, the principal vector, has developed resistance to DDT in areas of the Pacific Coast from Southern Mexico to Panama. This problem has diminished and even nullified the effectiveness of DDT in malaria control. In El Salvador, Guatemala, Honduras and Nicaragua, DDT has been replaced by propoxur since 1970 and 1971. The epidemiological situation improved in the first four or five years, but the vector developed resistance to the new insecticide and, as a result, transmission increased. The area of insecticiding has been progressively curtailed in recent years as resistance has spread and grown stronger. The population of the areas in which vectors are resistant to insecticides is 20 per cent of the total population of the malarious area in these countries.

P. falciparum resistance to chloroquine is widespread in Brazil, Colombia, Ecuador, French Guiana, Guyana, Panama, Suriname and Venezuela. The problem has not yet been detected, in Mexico or in Central America and the Caribbean. To learn more about the geographical distribution of the resistant strains, a survey has been scheduled to cover 100 areas in 20 countries in 1978 where national personnel have been trained in the techniques of in vitro testing for P. falciparum susceptibility to antimalarial drugs.

Most areas of persistent transmission have difficult access and poor socioeconomic development. In these areas the problems are associated with human ecology and ethology, and include makeshift housing, habits and customs that expose humans to increase contacts with the vector, and different kinds of human migrations. No single attack standards and measures can be established as equally effective in all areas, because the epidemiological conditions differ from one to another. In 1976 and 1977 epidemiological studies were begun in most of the countries facing these problems, and an effort was made to find a measure or combination of measures to arrest or diminish transmission. On the whole, more resources are needed for the antimalarial measures in these areas to be effective.

III. RESEARCH

The technical problems detected during execution of the malaria program have made it necessary to intensify epidemiological and applied research studies for developing new and more efficient measures to interrupt or reduce transmission. The principal lines of research pursued in 1977 are summarized as follows:

A. Field Insecticide Trials

In the last four years, Stage III to V trials of several new insecticides have been conducted in El Salvador (AMRO-0901). Of the insecticides tested, only chlorfoxim and permethrin gave encouraging results against DDT and Propoxur-resistant strains of A. albimanus. On the basis of this observation, a field test of chlorfoxim (Stages VI and VII) was arranged for 1978. The Government of Nicaragua, with the technical cooperation of PAHO (AMRO-0901), drew up a protocol and began the preparatory steps, including the selection of localities aggregating 5,000 houses, where this insecticide could be applied in early 1978.

In Brazil, a trial of diclorvos was carried out in 1976 and 1977 in the State of Santa Catarina, to observe its effectiveness against Kerteszia-transmitted malaria. The insecticide appeared to have interrupted transmission, but the result was not conclusive because of other impoundering factors. Malathion was also tested at ultralow volume (ULV) in an agricultural settlement area in the State of Pará. No definite conclusions have been obtained because of operational difficulties. Another trial has been scheduled to be carried out in 1978 with the active participation of project Brazil-0200.

In September 1977 the Government of Ecuador, with the cooperation of project Ecuador-0100, began an experiment with fenitrothion in an area of

3,000 houses in the Province of Esmeraldas. Preliminary results indicate that the insecticide was well received by the population, no toxicological effects were observed among either spraymen or dwellers because of the precautions taken; in addition, autochthonous cases stopped turning up in the localities sprayed with this insecticide, though they increased in the control localities.

B. Larvivorous Fish Trials

A total of 16 potentially larvivorous fish species have been identified in El Salvador since 1974. Only three of these species are considered as potentially usable biological control agents, and of these Poecilia sphenops exhibits the most useful traits. A field trial for the breeding and distribution of Poecilia sphenops was begun in Nicaragua in the course of this year.

A test of the larva control potential of Poecilia reticulata was conducted in the Dominican Republic in 1976. The results were highly satisfactory, and in 1977 were put into extended practical application with the distribution of fish to mosquito breeding places in 46 municipalities.

In Haiti and Ecuador, on the basis of the good results of the studies in 1977, plans were made for large-scale distribution of Poecilia reticulata in 1978.

C. Immunological studies

A research project on malaria immunology was established by the Organization, the Ministry of Health of Colombia and the University of New Mexico in 1976 with US/AID financial assistance. A laboratory was set up in the National Institute of Health of Bogotá in 1977. The laboratory was outfitted in the course of the year and the national technical staff was trained. Studies on the susceptibility of different Aotus species to the plasmodium, to evaluate the immune mechanism and the in vitro cultivation of P. falciparum were begun in 1978.

D. Malaria chemotherapy

Studies of the geographical distribution of the chloroquine-resistant strain of P. falciparum were continued. In 1977 a plan was drawn up for the training of national personnel to expand studies on the in vitro with a view to susceptibility-testing in 20 countries. In addition, a protocol was drawn up to conduct clinical trials of mefloquine in Brazil. These two projects will be carried out with the support of the WHO Special Program for Research and Training in Tropical Diseases.

E. Serological studies

The Governments of Mexico, Panama, Brazil and Costa Rica continued their seroepidemiological studies during the year with the technical cooperation of the Organization.

F. Entomological studies

Collaborative and entomological studies were continued with the University of California (Riverside) on the cross-resistance of the principal vector in Central America to organochlorine, organophosphorous, carbamate and pyrethroid insecticides. These studies contributed to the choice of chlorfoxim for field trials because it gave no evidence of any appreciable cross-resistance with DDT and propoxur, and also because of its low toxicity for mammals. These results were borne out by field observations in project AMRO-0901 in El Salvador.

Behavioral and cytogenetic studies of anophelines continued in Colombia, Venezuela and Brazil in collaboration with the Florida Medical Entomological Laboratory to determine the geographical distribution of the different Karyotypes of A. albitarsis and A. nuñeztovari and study the association of karyotypes with epidemiologically important traits like behavior or vectorial capacity.

IV. PERSONNEL TRAINING AND INFORMATION DISTRIBUTION

The School of Malariology and Environmental Sanitarion of Maracay, Venezuela, completed its XXXIII International Course in Malaria and Environmental Sanitarion. In addition to local participants, two professionals from Haiti and Panama attended under Venezuelan Government fellowship with the support of the Organization. The course began on 17 January and ended on 28 October 1977.

The School of Public Health of the Ministry of Public Health and Welfare of Mexico conducted its second Master's Course in Public Health with Emphasis on Malaria and Other Parasitic Diseases from 14 February to 15 December 1977. The course was attended by 12 physicians: four from Mexico, two from Brazil and the other six from Argentina, Costa Rica, Haiti, Nicaragua, Paraguay and Venezuela.

The School of Public Health of Sao Paulo University, Brazil, conducted its second course on entomology and epidemiology from 1 August to 8 November 1977. The course was attended by five professionals from Brazil, Colombia, Ecuador, Guatemala, Mexico and Paraguay under PAHO fellowships.

The following technical publications were translated, prepared or distributed during the year:

1. Manual on Larval Control Operations in Malaria Programmes - MPD/WHO
2. Manual on Personal and Community Protection against Malaria - MPD/WHO
3. Mosquito Prevention on Irrigated Farms - U.S Department of Agriculture
4. Guide to Malaria in Primary Health Care Services - PAHO
5. Guide for Engineers in Antimalaria Work - PAHO
6. The Use of Larvivorous Fish in Mosquito Control - PAHO (in preparation)
7. Guidelines on the Chemotherapy of Human Malaria - PAHO (in preparation).

V. INTERNATIONAL COORDINATION AND COOPERATION

PAHO/WHO continued its support to malaria programs by providing personnel and some equipment, antimalarial drugs, and materials. It also collaborated in the organization of training courses for national technicians and provided fellowships. Table 19 shows the distribution of the PAHO/WHO technical staff assigned to malaria programs in the Americas from 1975 to 1978 by category (medical officers, sanitary engineers, sanitary inspectors, entomologists and others). Table 20 summarizes the quantities of antimalarial drugs supplied to the countries.

The Government of Venezuela continued its policy of providing six fellowships or candidates selected by the Organization to participate in the training courses at the School of Malariology and Environmental Sanitation at Maracay.

The United States of America, through the Agency for International Development, continued its financial support to the program in Haiti, and in 1977 approved a five-year plan for continuing this aid. This agency also continued its national assistance to the Malaria Immunology Research Project in Colombia.

The following meetings were held in connection with malaria programs during 1977:

a. Meeting of the Study Group on Malaria Control, held at Washington, D.C., from 12 to 15 April 1977.

b. The meeting on The Use of Non-human Primates in Human Malaria Research, held at Washington, D.C., on 7 and 8 July 1977.

c. The following intercountry meetings of the heads of the NEMSs and PAHO staff:

Bolivia-Brazil, at Brasilia, Brazil, 21 October.

Costa Rica-Panama, at Puerto Armuelles, Panama, 6 July.

Guatemala-El Salvador-Nicaragua, at Guatemala City, Guatemala, 28 October.

Haiti-Dominican Republic, at Pedernales, Dominican Republic, in June.

Haiti-Dominican Republic, at Malpasses, Haiti, in August.

VI. OTHER PARASITIC DISEASES

In recent years the Organization has expanded its program for the control of parasitic diseases, particularly American Trypanosomiasis or Chagas' disease, schistosomiasis and the filariasis, including onchocercosis, pursuant to resolutions of the Directing Council, which in its XXIV Meeting recognized the importance of these diseases as causes of morbidity and mortality in the Americas.

Research and training for the purpose of intensifying epidemiological studies and activities for the control of these diseases have been given priority and enjoy the support of national institutions, specific PAHO projects and the WHO Special Program for Research and Training in Tropical Diseases.

A. Chagas' Disease

Chagas' disease, which afflicts millions of persons in this Hemisphere, is one of the most serious public health problems because of its prevalence and the gravity of its manifestations and because of the difficulties of controlling it.

The World Health Organization and the Pan American Health Organization have recognized the gravity of the problem posed by this disease, and the need to promote research and exchanges of information in order to make headway toward its control. In the last four years PAHO has sponsored a series of meetings, including the one on the Immunology of Chagas' disease in December 1974, the International Symposium on New Orientations in American Trypanosomiasis Research in March 1975, the Symposium on Chagas' Disease in New York on 27 June 1977 on the occasion of the International Congresses on Parasitology, Protozoology and Tropical Medicine, and the meeting of a Scientific Working Group convened by the WHO Special Program for Research and Training in Tropical Diseases (TDR) in Buenos Aires, Argentina, in November 1977.

National institutions with adequate installed capacity that are interested in doing research with the support of the Organization have been identified, and priority has been given to the awarding of fellowships for training national staff in this field. The WHO Special Program (TDR) is collaborating in these activities.

With PAHO support, the Member Governments have carried out control operations with the means at hand. Short-term consultants have been assigned, at the request of two countries, to collaborate with their national authorities in the preparation of projects for control of the disease.

Epidemiological studies and methods for the control of Chagas' disease have been emphasized in the International Master's Course in Public Health of the Ministry of Health and Welfare of Mexico. The Organization collaborated in this course with short-term consultants. The Research and Reference Center on Vector Biology and Control, a PAHO project in Maracay, Venezuela, is engaged in research and training with emphasis on vectors of Chagas' disease.

During the period PAHO edited an distributed the following publications on Chagas' disease:

1. Scientific Publication No. 318, American Trypanosomiasis Research (1975) in English, generated by an International Symposium held at Belo Horizonte, Brazil.

2. Scientific Publication No. 319, Quantitatively Standardized Complement-Fixation Methods for Critical Evaluation of Antigens prepared from Trypanosoma cruzi (1976), in English and Spanish, based on the efforts of a Collaborative Working Group on the Serological Diagnosis of Chagas' disease sponsored by the Pan American Health Organization.

3. Scientific Publication No. 347, Chagas' Disease, generated by an International Symposium held in New York in June 1977 of the occasion of the 5th International Congress of Protozoology.

B. Schistosomiasis

In the Americas the problem of schistosomiasis (S. mansoni) is confined to areas of South America (chiefly the Brazilian northeast, the north central part of Venezuela and part of the Suriname coastal belt) and to small foci on some Caribbean Islands (the Dominican Republic, Puerto Rico, Vieques, Saint Martin, Guadeloupe, Martinique and Saint Lucia).

It is difficult to estimate the number of new cases each year because patients easily develop the chronic forms of the disease. The number of persons infected with S. mansoni in the Region of the Americas is estimated to exceed 7 - 8 million. The areas subject to the risk of transmission harbor more than 36 million inhabitants.

The intermediate host regarded as the most important one epidemiologically because of its widespread distribution in the Hemisphere, its vectorial capacity and its resistance to desiccation is the snail Biomphalaria glabrata. The snail B. straminea occurs from Costa Rica to Northern Argentina and is epidemiologically significant, but its record of infection is not as great as that of B. glabrata in endemic areas. Another intermediate host, B. tenagophila has a more limited area of distribution than the other two species. The countries in which the disease is endemic have instituted control programs: a) Brazil, Suriname and Venezuela are using chemotherapy, molluscicides and sanitation works, b) Saint Lucia is using chemotherapy and environmental sanitation, and c) Puerto Rico and the Dominican Republic are using molluscicides and sanitation works.

The Planorbid Identification Center for the Americas (CIPA) is the reference center for snail taxonomy and is currently operating in the Oswaldo Cruz Institute at Rio de Janeiro, Brazil. This Center has done research on possible intermediate hosts of Schistosoma spp; and to identify other snails that could compete with B. glabrata or serve as a bait for parasites impeding the completion of the life cycle.

The program includes epidemiological surveillance activity in areas free of the disease but subject to importation of cases and harboring potential intermediate hosts.

C. Filariases

The nocturnally periodic form of filariasis caused by Wuchereria bancrofti occurs in Central and South American coastal areas, particularly on the Atlantic and some Caribbean Islands. Foci have lately been observed in Trinidad and Haiti. On the whole, prevalence has declined in recent years thanks to mosquito control measures, urban and environmental sanitation, and chemotherapy.

There have also been in the Region infections of D. perstans and M. ozzardi though apparently of slight epidemiological significance, and infections of Onchocerca volvulus, which present a serious public health problem in areas of Guatemala and Mexico, and in limited foci in Brazil, Colombia and Venezuela.

In October 1977 the Organization sponsored an International Meeting on Onchocercosis in Guatemala City as a forum for the exchange of information on the state of the problem in the affected countries, the unification of working techniques and the selection of research priorities.

Table 1

POPULATION IN THE MALARIOUS AREAS
IN THE AMERICAS, 1958-1977

(Population in thousands)

Year	Originally malarious areas					Total population
	Maint. phase	Consolid. phase	Attack phase	Prep. phase or program not yet started	Total	
1958	52 866	1 996	46 196	34 351	135 409	387 276
1959	52 856	9 349	56 292	27 423	145 920	394 606
1960	54 363	10 101	53 400	25 722	143 586	400 500
1961	56 979	17 879	39 021	33 413	147 292	416 008
1962	59 299	30 424	49 276	14 743	153 742	427 919
1963	56 546	33 901	31 910	29 664	152 021	434 950
1964	57 414	32 277	34 426	34 525	158 642	447 666
1965	60 975	34 731	38 575	12 108	146 389	455 527
1966	69 760	36 128	43 369	17 212	166 469	463 649
1967	70 720	41 581	44 766	12 834	169 901	474 868
1968	72 441	45 812	56 234	217	174 704	484 664
1969	72 757	46 987	56 375	206	176 325	491 483
1970	80 770	40 518	59 807	162	181 257	505 819
1971	81 306	43 644	60 396	146	185 492	513 544
1972	86 634	42 016	61 645	153	190 448	524 774
1973	87 969	45 535	61 915	109	195 528	535 109
1974	91 527	46 042	63 130	56	200 755	544 865
1975	99 405	44 633	61 834	-	205 872	555 676
1976	101 068	48 813	61 205	-	211 086	565 249
1977	104 567	50 610	60 373	-	215 550	576 942

Table 2

STATUS OF THE MALARIA PROGRAM IN THE AMERICAS, BY POPULATION, 1977

(Population in thousands)

Country or other political or administrative unit	Total population	Population of originally malarious areas							
		Total		Malaria eradication claimed (maintenance phase)		Consolidation phase		Attack phase	
		Total	%	Total	%	Total	%	Total	%
Antigua	71a)	-	-	-	-	-	-	-	-
Argentina	26 100	3 146	12.1	3 009	95.7	64	2.0	73	2.3
Bahamas	211a)	-	-	-	-	-	-	-	-
Barbados	247a)	-	-	-	-	-	-	-	-
Belize	141	141	100.0	-	-	75	53.2	66	46.8
Bermuda	57	-	-	-	-	-	-	-	-
Bolivia	5 914	1 875	31.7	-	-	1 116	59.5	759	40.5
Brazil	113 209	45 628	40.3	13 129	28.8	12 966	28.4	19 533	42.8
British Virgen Isl..	12a)	-	-	-	-	-	-	-	-
Canada	23 113a)	-	-	-	-	-	-	-	-
Cayman Islands	14a)	-	-	-	-	-	-	-	-
Chile	10 967	237b)	2.2	237	100.0	-	-	-	-
Colombia	25 987	15 354	59.1	-	-	10 448	68.8	4 906	32.0
Costa Rica	2 061	593	28.8	-	-	419	70.7	174	29.3
Cuba	9 657	3 225	33.4	3 225c)	100.0	-	-	-	-
Dominica	80	16d)	20.0	16c)	100.0	-	-	-	-
Dominican Republic	4 978	4 946	99.4	4 813	97.3	45	1.0	88	1.7
Ecuador	7 193	4 412	61.3	-	-	1 871	42.4	2 541	57.6
El Salvador	4 496	3 871	86.1	-	-	-	-	3 871	100.0
Falkland Islands	2	-	-	-	-	-	-	-	-
French Guiana	55	55	100.0	34	61.8	16	29.1	5	9.1
Grenada	110	41	37.3	41c)	100.0	-	-	-	-
Guadeloupe	360a)	315d)	87.4	315c)	100.0	-	-	-	-
Guatemala	6 651	2 481	37.3	-	-	-	-	2 481	100.0
Guyana	877	877	100.0	823	93.9	16	1.8	38	4.3
Haiti	4 698	4 126	87.8	-	-	-	-	4 126	100.0
Honduras	2 939	2 670	90.8	-	-	490	18.3	2 180	81.7
Jamaica	2 072a)	1 618d)	78.1	1 618c)	100.0	-	-	-	-
Martinique	369a)	230d)	62.4	230	100.0	-	-	-	-
Mexico	64 594	32 193	49.8	-	-	17 719	55.0	14 474	45.0
Montserrat	13	-	-	-	-	-	-	-	-
Netherland Antilles	241	-	-	-	-	-	-	-	-
Nicaragua	2 355	2 355	100.0	-	-	-	-	2 355	100.0
Panama	1 771	1 705	96.3	-	-	1 395	81.8	310	18.2
Canal Zone	40a)	40	100.0	-	-	40	100.0	-	-
Paraguay	2 805	2 346	83.6	631	26.9	1 239	52.8	476	20.3
Peru	16 580	5 500	33.2	1 538	28.0	2 644	48.1	1 318	23.9
Puerto Rico	3 214b)	3 214b)	100.0	3 214c)	100.0	-	-	-	-
St. Kitts, Nevis, Anguilla	66	-	-	-	-	-	-	-	-
St. Lucia	118	99	84.0	99c)	100.0	-	-	-	-
St. Pierre & Miquelon	5	-	-	-	-	-	-	-	-
St. Vincent	110	-	-	-	-	-	-	-	-
Surinam	435	276d)	63.5	196d)	71.0	47d)	17.0	33d)	12.0
Trinidad & Tobago	1 170b)	1 054b)	90.1	1 054c)	100.0	-	-	-	-
Turks & Caicos Islands	6	-	-	-	-	-	-	-	-
United States of America	215 118a)	61 309d)	28.5	61 309c)	100.0	-	-	-	-
Uruguay	2 798a)	-	-	-	-	-	-	-	-
Venezuela	12 737	9 507	74.6	8 941e)	94.1	-	-	566	5.9
Virgen Islands (USA)	95	95	100.0	95c)	100.0	-	-	-	-
Total	576 942	215 550	37.4	104 567	48.5	50 610	23.5	60 373	28.0

a)1976 population. Latest available figure. (Population and Vital Statistics Report, United Nations,Jan.1978.b)1976 population figure provided by country. c) Population in areas where eradication of malaria has been certified by PAHO/WHO. d) Estimated. e) Includes an area with 6,862,282 inhabitants, where eradication of malaria has been certified by PAHO/WHO.

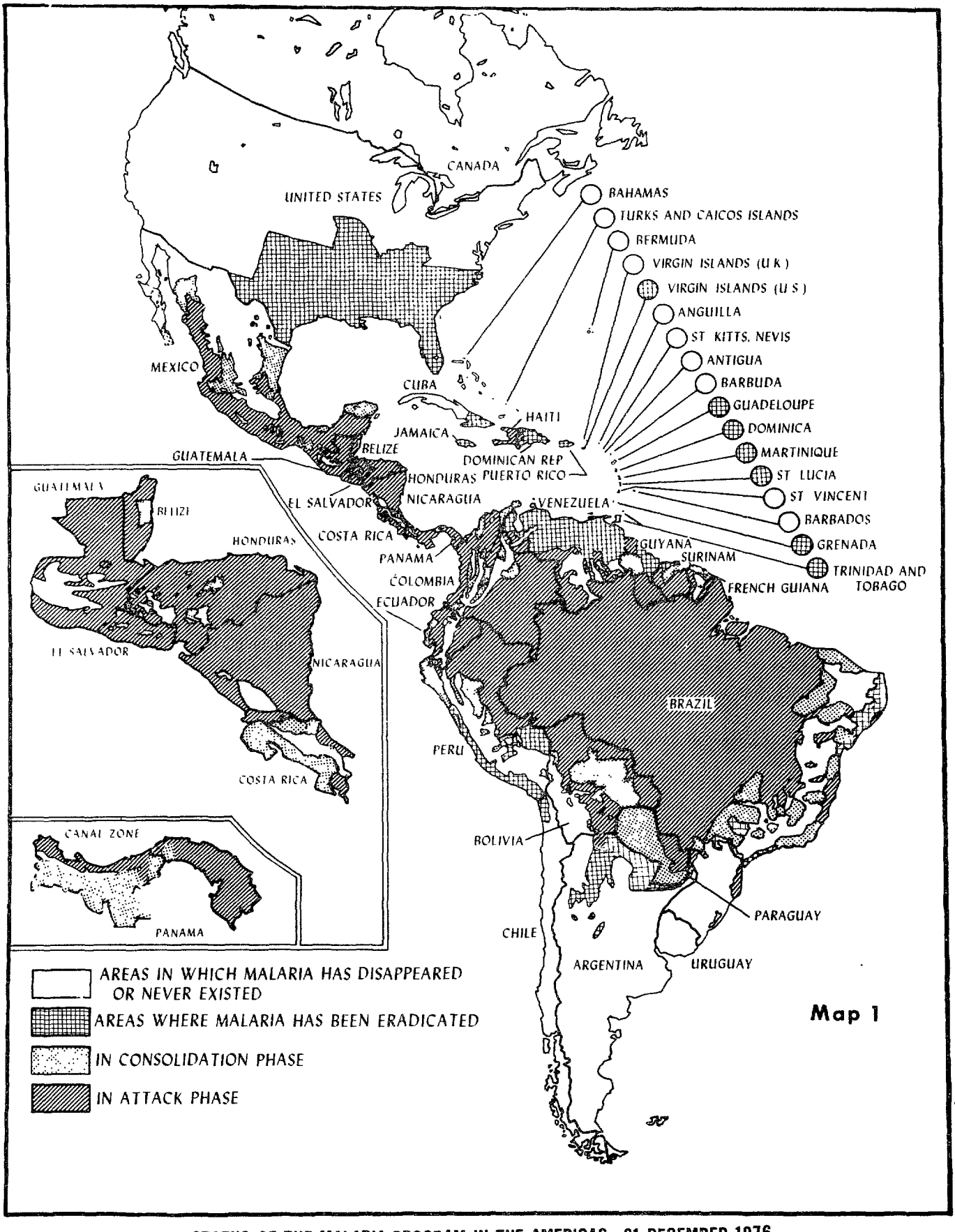
Table 3

STATUS OF THE MALARIA PROGRAM IN THE AMERICAS, BY AREA, 1977

(Area in Km^2)

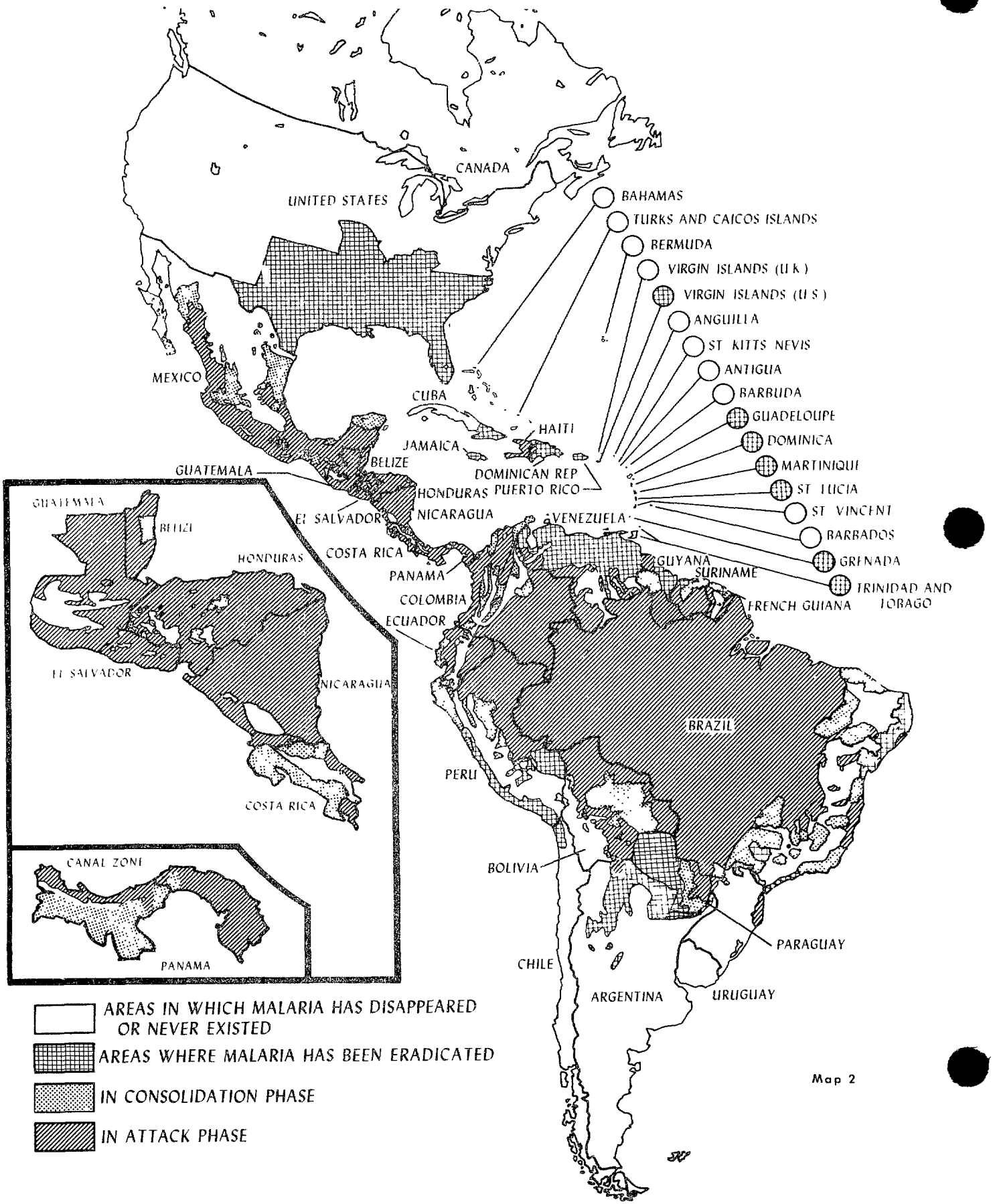
Country or other political or administrative unit	Total area	Originally malarious areas							
		Total		Malaria eradication claimed (maintenance phase)		Consolidation phase		Attack phase	
		Total	%	Total	%	Total	%	Total	%
Antigua	280	-	-	-	-	-	-	-	-
Argentina	4 024 458	349 051	-	334 527	-	3 249	-	11 275	-
Bahamas	11 396	-	-	-	-	-	-	-	-
Barbados	430	-	-	-	-	-	-	-	-
Belize	22 965	22 965	100.0	-	-	7 943	34.6	15 022	-
Bermuda	53	-	-	-	-	-	-	-	-
Bolivia	1 098 581	821 346	74.8	-	-	367 940	44.8	453 406	55.2
Brazil	8 511 965	6 897 891	81.0	179 189	2.6	484 746	7.0	6 233 956	90.4
British Virgin Islands	174	-	-	-	-	-	-	-	-
Canada	9 221 016	-	-	-	-	-	-	-	-
Cayman Islands	183	-	-	-	-	-	-	-	-
Chile	797 054	55 287	6.9	55 287a)	100.0	-	-	-	-
Colombia	1 138 914	970 849	85.2	-	-	113 176	11.7	857 673	88.3
Costa Rica	50 900	35 446	69.6	-	-	22 653	63.9	12 793	36.1
Cuba	114 524	37 502	32.7	37 502a)	100.0	-	-	-	-
Dominica	751	152	20.2	152a)	100.0	-	-	-	-
Dominican Republic	48 442	47 562	98.2	44 281	93.1	1 096	2.3	2 185	4.6
Ecuador	291 906	175 462	60.1	-	-	27 797	15.8	147 665	84.2
El Salvador	21 149	18 655	88.2	-	-	-	-	18 655	100.0
Falklan Islands	11 961	-	-	-	-	-	-	-	-
French Guiana	90 000	90 000	100.0	200	0.2	82 300	91.5	7 500	8.3
Grenada	344	103	29.9	103	100.0	-	-	-	-
Guadeloupe	1 779	1 136	63.9	1 136	100.0	-	-	-	-
Guatemala	108 889	80 350	73.8	-	-	-	-	80 350	-
Guyana	215 025	215 025	100.0	39 437	18.3	84 114	39.1	91 474	42.6
Haiti	27 750	19 100	68.8	-	-	-	-	19 100	-
Honduras	112 088	101 351	90.4	-	-	7 023	6.9	94 328	93.1
Jamaica	11 310	10 028	88.7	10 028	100.0	-	-	-	-
Martinique	1 080	300	27.8	300	100.0	-	-	-	-
Mexico	1 967 183	1 150 000	58.5	-	-	483 724	42.1	666 276	57.9
Montserrat	84	-	-	-	-	-	-	-	-
Netherland Antilles	961	-	-	-	-	-	-	-	-
Nicaragua	127 358	118 358	92.9	-	-	-	-	118 358	100.0
Panama	75 650	69 840	92.3	-	-	29 705	42.5	40 135	57.5
Canal Zone	1 432	1 432	100.0	-	-	1 432	100.0	-	-
Paraguay	406 752	406 552	100.0	271 010	66.6	80 749	19.9	54 793	13.5
Peru	1 285 215	961 171	74.8	195 418	20.3	222 330	23.1	543 423	56.6
Puerto Rico	8 899	8 899	100.0	8 899	100.0	-	-	-	-
St. Kitts, Nevis, Anguilla	396	-	-	-	-	-	-	-	-
St. Lucia	603	510	84.6	510a)	100.0	-	-	-	-
St. Pierre y Miquelon	240	-	-	-	-	-	-	-	-
St. Vincent	389	-	-	-	-	-	-	-	-
Suriname	163 820	163 750	100.0	8 955	5.5	55 345	33.8	99 450	60.7
Trinidad & Tobago	5 605	5 444	97.1	5 444a)	100.0	-	-	-	-
Turks & Caicos Islands	522	-	-	-	-	-	-	-	-
United States of America	9 365 604	2 309 876	24.7	2 309 876a)	100.0	-	-	-	-
Uruguay	186 926	-	-	-	-	-	-	-	-
Venezuela	915 741	600 000	65.5	460 054	76.7	-	-	139 946	23.3
Virgen Islands (USA)	345	345	100.0	345a)	100.0	-	-	-	-
Total	40 449 092	15 745 738	38.9	3 962 653	25.2	2 075 322	13.2	9 707 763	61.6

a) Area where eradication of malaria has been certified by PAHO/WHO. b) Includes an area of 407,945 Km^2 where eradication of malaria has been certified by PAHO/WHO.



STATUS OF THE MALARIA PROGRAM IN THE AMERICAS, 31 DECEMBER 1976

STATUS OF THE MALARIA PROGRAM IN THE AMERICAS, 31 DECEMBER 1977



Map 2

Table 4

MALARIA MORBIDITY IN THE AMERICAS
1958-1977

Year	Population		Blood Slides			Morbidity per 100,000 inhabitants	
	Total Country	Total malarious area	examined	Positive	%	Total Country	Malarious area
1958	387 276	135 409	1 716 103	56 705	3.3	14.64	41.88
1959	394 606	145 920	2 749 117	75 612	2.8	19.16	51.82
1960	400 500	143 586	3 955 149	79 998	2.0	19.88	55.71
1961	416 008	147 292	5 341 004	99 539	1.9	23.93	67.58
1962	427 919	153 742	7 221 367	177 089	2.5	41.38	115.19
1963	434 950	152 021	7 903 156	227 026	2.9	52.20	149.34
1964	447 666	158 642	8 156 290	254 572	3.1	56.87	160.47
1965	455 527	146 389	9 069 950	241 462	2.7	53.01	164.95
1966	463 649	166 469	11 731 451	333 245	2.8	71.87	200.18
1967	474 868	169 901	11 609 226	369 341	3.2	77.78	217.39
1968	484 664	174 704	12 522 696	282 773	2.3	58.34	161.86
1969	491 483	176 325	12 179 190	323 782	2.7	65.88	183.63
1970	505 819	181 257	9 925 162	344 170	3.5	68.04	189.88
1971	513 544	185 492	10 134 212	338 416	3.3	65.90	182.44
1972	524 774	190 448	9 695 953	284 813	2.9	54.23	149.55
1973	535 109	195 528	9 400 682	280 276	3.0	52.38	143.34
1974	544 865	200 755	8 997 318	269 003	3.0	49.37	134 00
1975	555 676	205 872	9 276 878	356 692	3.8	64.19	173.26
1976	565 249	211 086	9 351 875	379 364	4.1	67.11	179.72
1977	576 942	215 550	9 261 874	398 598	4.3	69.09	184.92

Table 5

CASE DETECTION BY COUNTRY AND PHASE OF PROGRAM, 1977

Country or other political or administrative unit	Total		Maintenance phase		Consolidation phase		Attack phase		Non-malarious areas	
	Slides examined	Positive	Slides examined	Positive	Slides examined	Positive	Slides examined	Positive	Slides examined	Positive
Argentina	46 841	463	31 422	77	5 708	11	9 711	375	-	-
Belize	39 151	894	-	-	18 023	144	21 128	750	-	-
Bolivia	118 002	10 106	-	-	26 574	947	90 759	9 098	669	61
Brazil	2 638 763	104 436	186 659	977	595 139	1 103	1 796 112	99 795	60 853	2 561
Canada	...	100	-	-	-	-	-	-	-	100
Colombia	401 621	63 888	-	-	154 808	8 185	245 031	55 394	1 782	309
Chile	0	0	-	-	-	-	-	-	-	-
Costa Rica	176 111	217	-	-	74 214	79	100 296	94	1 601	44
Cuba	321 019	168	-	-	-	-	-	-	321 019	168
Dominica	0	0	-	-	-	-	-	-	-	-
Dominican Republic	364 800	745	312 251	341	6 141	8	46 202	396	206	-
Ecuador	307 540	11 275	-	-	121 063	781	184 312	10 466	2 165	28
El Salvador	471 109	32 243	-	-	-	-	451 154	31 745	19 955	498
French Guiana	16 908	488	4 329	97	4 400	90	8 179	301	-	-
Grenada and Carriacou	0	0	-	-	-	-	-	-	-	-
Guadeloupe	0	0	-	-	-	-	-	-	-	-
Guatemala	472 297	34 907	-	-	-	-	462 100	34 283	10 197	624
Guyana	121 075	1 563	7 872	19	-	-	113 203	1 544	-	-
Haiti	400 024	27 679	-	-	-	-	400 024	27 679	-	-
Honduras	264 233	39 414	-	-	23 390	602	239 304	38 772	1 539	40
Jamaica	15 386	4	15 386	4	-	-	-	-	-	-
Mexico	1 804 367	18 851	-	-	514 491	453	1 270 376	18 295	19 500	103
Nicaragua	215 093	11 584	-	-	-	-	215 093	11 584	-	-
Panama	377 059	674	-	-	190 648	62	186 411	612	-	-
Canal Zone	1 077	4	-	-	1 077	4	-	-	-	-
Paraguay	85 613	156	4 343	2	50 231	41	30 937	113	102	-
Peru	275 827	32 410	48 494	768	121 318	8 867	106 015	22 775	-	-
Puerto Rico	3	3	3	3	-	-	-	-	-	-
St. Lucia	5	0	5	0	-	-	-	-	-	-
Surinam	67 501	993	2 324	6	16 059	16	47 821	950	1 297	21
Trinidad and Tobago	6 649	2	6 649	2	-	-	-	-	-	-
United States	354	354	354	354	-	-	-	-	-	-
Venezuela a)	253 446	4 977	150 736	735	-	-	101 500	4 024	1 210	218
Total	9 261 874	398 598	770 827	3 385	1 923 284	21 393	6 125 668	369 045	442 095	4 775

a) Information through November

Table 6

SLIDES EXAMINED AND POSITIVES, BY SPECIES AND CLASSIFICATION, MAINTENANCE AREAS, 1977

Country or other political or administrative unit	Blood slides examined	Total positive	Specie of parasite				Classification of cases							
			P. falciparum	P. vivax	P. malariae	Mixed infections	Autochthonous	Relapsing	Imported		Induced	Introduced	Criptic and Unclassified	No investigated
									from abroad	from areas within country				
Argentina	31 422	77	-	77	-	-	37	1	11	5	-	22	1	-
Brazil	186 659	977	246	715	-	16	129	4	1	662a)	6	3	1	171
Chile	0	0	-	-	-	-	-	-	-	-	-	-	-	-
Cuba	0	0	0	-	-	-	-	-	-	-	-	-	-	-
Dominica	0	0	-	-	-	-	-	-	-	-	-	-	-	-
Dominica Republic	312 251	341	341	-	-	-	10	-	170	-	-	126	-	35
French Guiana	4 329	97	71	26	-	-	5	-	15	34b)	-	6	30	7
Grenada	0	0	-	-	-	-	-	-	-	-	-	-	-	-
Guadeloupe	0	0	-	-	-	-	-	-	-	-	-	-	-	-
Guyana	7 872	19	3	16	-	-	-	1	1	-	-	-	-	17
Jamaica	15 386	4	2	2	-	-	-	-	4	-	-	-	-	-
Paraguay	4 343	2	-	2	-	-	-	-	2	-	-	-	-	-
Peru	48 494	768	-	767	1	-	665	5	2	92c)	1	-	-	3
Puerto Rico	3	3	-	2	-	1d)	-	-	3	-	-	-	-	-
St. Lucia	5	0	-	-	-	-	-	-	-	-	-	-	-	-
Suriname	2 324	6	6	-	-	-	-	-	-	6	-	-	-	-
Trinidad and Tobago	6 649	2	1	1	-	-	-	-	2	-	-	-	-	-
United States of America	354	354e)	71	229	14	3	-	3	349	-	2	-	-	-
Venezuela[f]	150 736	735	86	643	1	5	56	2	181	326	2	168	-	-
Total	770 827	3 385	827	2 480	16	25	902	16	741	1 125	11	325	32	233

a) One case imported from consolidation areas b) Ten cases imported from Attack and 24 from Consolidation phase areas
c) 79 cases imported from Attack and 13 from Consolidation phase areas. d) One case undetermined specie
e) Includes 8 P. ovale and 29 undetermined infection f) Information up to November.

Table 7

SLIDES EXAMINED AND POSITIVES, BY SPECIES AND CLASSIFICATION, CONSOLIDATION AREAS, 1977

Country or other political or administrative unit	Population (thousands)	Blood slides examined	Total cases	Specie of parasite					Origin of infections							
				API*	P.falciparum	P. vivax	P. malariae	Mixed infection	autochthonous	Relapsing	Imported		Induced	Introduced	Cryptic	Unclassified or not investigated
											from abroad	from areas within country				
Argentina	64	5 708	11	0.2	-	11	-	-	-	-	3	5	-	1	2	-
Belice	75	18 023	144	2.0	-	144	-	-	67	-	5	14	-	13	-	45
Bolivia	1 116	26 574	947	1.0	4	940	-	3	531	-	-	300	-	-	-	116
Brazil	12 966	595 139	1 103	0.1	282	814	1	6	177	7	8	625a)	1	33	6	246
Colombia	10 448	154 808	8 185	0.8	3 145	4 976	1	63	871	3	53	4 644	9	14	181	2 410
Costa Rica	419	74 214	79	0.2	9	70	-	-	47	1	21	4	-	5	1	-
Dominican Republic	45	6 141	8	0.2	8	-	-	-	3	-	5	-	-	-	-	-
Ecuador	1 871	121 063	781	0.4	257	523	-	1	464	4	-	164	-	4	5	140
French Guiana	16	4 400	90	6.0	51	37	-	2	51	-	18	8	-	9	3	1
Guyana	16	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-
Honduras	490	23 390	602	1.2	11	590	-	1	12	4	-	13	-	-	-	573
Mexico	17 719	514 491	453	0.03	-	451	2	-	189	28	14	175	4	-	19	24
Panama	1 395	190 648	62	0.04	28	33	1	-	32	3	8	16	-	3	-	-
Zona del Canal	40	1 077	4	0.1	1	3	-	-	-	-	3	-	-	-	1	-
Paraguay	1 239	50 231	41	0.03	-	41	-	-	38	-	3	-	-	-	-	-
Peru	2 644	121 318	8 867	3.4	-	8 867	-	-	2 013	20	-	330 b)	1	-	-	6 503
Suriname.....	47	16 059	16	0.3	16	-	-	-	-	-			-	-	1	-
Total	50 610	1 923 284	21 393	0.4	3 812	17 500	5	76	4 495	70	141	6 314	15	82	218	10 058

a) One case imported from non-malarious areas. b) Three cases imported from maintenance phase areas.

Table 8

SLIDES EXAMINED AND POSITIVES BY SPECIES
ATTACK AREAS, 1977

Country or other political or administrative unit	Slides examined			Species found			
	Total	Positive					
		Number	Percentage	P. vivax parum	P. vivax	P. malariae	Mixed infections
Argentina	9 711	375	3.9	-	375	-	-
Belize	21 128	750	3.6	-	750	-	-
Bolivia	90 759	9 098	10.0	1 196	7 894	-	8
Brazil	1 796 112	99 795	5.6	39 945	59 158	27	665
Colombia	245 031	55 394	22.6	26 608	28 318	47	421
Costa Rica	100 296	94	0.1	30	63	-	1
Dominican Republic	46 202	396	1.0	396	-	-	-
Ecuador	184 312	10 466	5.7	2 313	8 112	1	40
El Salvador	451 154	31 745	7.0	2 826	28 828	-	91
French Guiana	8 179	301	3.7	211	83	-	7
Guatemala	462 100	34 283	7.4	2 051	32 127	-	105
Guyana	113 203	1 544	1.4	629	907	-	8
Haiti	400 024	27 679	7.0	27 672	6	1	-
Honduras	239 304	38 772	16.2	1 227	37 431	-	114
Mexico	1 270 376	18 295	1.4	1	18 292	2	-
Nicaragua	215 093	11 584	5.4	1 619	9 913	-	52
Panama	186 411	612	0.3	277	332	-	3
Paraguay	30 937	113	3.5	7	102	-	4
Peru	106 015	22 775	21.5	3	22 750	22	-
Suriname	47 821	950	2.0	911	39	-	-
Venezuela a).....	101 500	4 024	4.0	1 043	2 915	7	59
Total	6 125 668	369 045	6.0	108 965	258 395	107	1 578

a) Information up to November.

Table 9

SLIDES EXAMINED AND POSITIVES BY SPECIES,

NON-MALARIOUS AREAS, 1977

Country or other political or administrative unit	Slides examined			Species found			
	Total	Positive		P. falciparum	P. vivax	P. malariae	Mixed infections
		Number	Percentage				
Bolivia	669	61	9.1	-	61	-	-
Brazil	60 853	2 561	4.2	851	1 694	-	16
Canada	...	100	-	...	...	...	...
Colombia	1 782	309	17.3	103	202	-	4
Costa Rica	1 601	44	3.0	7	37	-	-
Cuba	321 019	168	0.05	99	58	9	2b)
Dominican Republic	206	0	-	-	-	-	-
Ecuador	2 165	28	1.3	1	27	-	-
El Salvador	19 955	498	2.5	25	472	-	1
Guatemala	10 197	624	6.1	3	621	-	-
Honduras	1 539	40	2.6	1	38	-	1
Mexico	19 500	103	0.5	-	99	4	-
Paraguay	102	0	-	-	-	-	-
Suriname	1 297	21	1.6	12	9	-	-
Venezuela a)	1 210	218	18.0	19	194	3	2
Total	442 095	4 775	1.1	1 121	3 512	16	26

a) Information up to november.

b) Two cases P. ovale.

Table 10

HOUSES SPRAYED WITH RESIDUAL INSECTICIDES,[a] BY COUNTRY AND BY CYCLE, 1977

Country or other political or administrative unit	1st Cycle			2nd Cycle			3rd Cycle			4th Cycle			Total sprayings
	Houses planned	Houses sprayed	% sprayed	Houses planned	Houses sprayed	% sprayed	Houses planned	Houses sprayed	% sprayed	Houses planned	Houses sprayed	% sprayed	
Argentina	14 109	7 841	55.6	15 891	10 489	66.0	-	-	-	-	-	-	18 330
Belice	6 716	5 603	83.4	11 716	7 697	66.0	-	-	-	-	-	-	13 300
Bolivia	38 320	34 720	91.0	37 506	33 406[b]	89.1	-	-	-	-	-	-	68 126
Brazil	2 745 711	2 438 905	89.0	2 383 036	2 073 990	87.0	-	-	-	-	-	-	4 512 895[c]
Colombia (Semestrial)	329 330	240 689	73.1	346 911	283 076	69.0	-	-	-	-	-	-	523 765
(Annual cycle)	42 497	42 016	99.0	-	-	-	-	-	-	-	-	-	42 016
(Quarterly cycles)	2 016	1 977	98.1	2 048	1 973	96.3	2 063	2 005	97.2	2 103	2 029	96.5	7 984
Costa Rica (Semestrial)	12 351	12 559	102.0	12 651	6 331	50.0	-	-	-	-	-	-	18 890[d]
(Quarterly Propoxur)	...	1 041	-	...	127	-	...	358	-	...	490	-	2 016[d]
Dominican Republic	6 357	5 755	90.5	3 570	3 206	90.0	-	-	-	-	-	-	8 961
Ecuador (Semestrial)	164 100	144 982	88.3	174 183	168 070	96.5	-	-	-	-	-	-	313 052
(Annual cycle)[e]	84 366	58 995	70.0	-	-	-	-	-	-	-	-	-	58 995
(Quarterly cycles)	5 167	4 849	94.0	7 000	6 673	95.0	6 666	5 155	77.3	7 193	6 458	90.0	23 135
El Salvador (Annual DDT)	43 184	26 626	62.0	-	-	-	-	-	-	-	-	-	26 626[f]
(Quarterly, propoxur)	-	-	-	63 627	57 381	90.2	63 626	58 182	91.4	63 627	58 254	91.6	173 817
(2 cycles propoxur)	-	-	-	44 479	41 700	94.0	44 479	42 258	95.0	-	-	-	83 958
French Guiana	2 000	1 600	80.0	2 000	1 800	90.0	-	-	-	-	-	-	3 400
Guyana	5 408	1 534	28.4	5 408	2 830	52.3	-	-	-	-	-	-	4 364
Haiti	111 446	109 841	98.6	119 947	103 952[b]	87.0	-	-	-	-	-	-	213 793
Honduras (Semestrial)	105 950	79 456	80.0	94 191	57 672	61.2	-	-	-	-	-	-	137 128
(Quarterly, propoxur)	39 577	37 424	95.0	40 031	38 145	95.3	44 493	38 459	86.4	41 323	36 160	87.5	150 188
Mexico (Sem. attack)	1 425 424	1 366 648	96.0	1 443 124	1 396 368	97.0	-	-	-	-	-	-	2 763 016
(Semestrial, consolidation)	27 431	26 910	98.1	27 735	27 444	99.0	-	-	-	-	-	-	54 354
Nicaragua (1 cycle DDT)	45 842	35 412	77.2	-	-	-	-	-	-	-	-	-	35 412
(Quarterly, Propoxur)	38 389	33 239	87.0	37 534	32 606	87.0	38 070	33 493	88.0	34 616	32 617	94.2	131 955
Panama (Smestrial)	28 423	25 815	91.0	29 632	25 447	86.0	-	-	-	-	-	-	51 262
(Propoxur)	3 371	3 311	98.2	3 484	3 437	99.0	3 115	2 330	75.0	-	-	-	9 078
Paraguay	68 548	65 436	95.5	64 829	55 075	85.0	-	-	-	-	-	-	120 511
Peru	158 281	54 036	34.1	158 281	53 852	34.0	-	-	-	-	-	-	107 888
Suriname	8 458	2 379	28.1	-	-	-	-	-	-	-	-	-	2 379
Venezuela (Semestrial)	9 794	19 608	200.0	22 746	9 840[g]	43.3	-	-	-	-	-	-	29 448
(Quarterly, HCH)	2 080	1 043	50.1	2 080	1 073	52.0	2 080	1 727[g]	83.0	-	-	-	3 843
(4-month cycles DDT)	138 110	131 110	95.0	149 567	133 575	89.3	149 578	28 624[g]	19.1	-	-	-	293 309
Total	5 712 756	5 021 360	-	5 303 207	4 637 235	-	354 170	212 591	-	148 862	136 008	-	10 007 194

a) DDT semestrial cycles unless otherwise indicated. b) Incomplete cycle. c) 130,527 houses were sprayed in emergency cycles.
d) Up to October. e) Cycle from November 1976, June 1977. f) April/October 1977. g) Up to September.

Table 11

INSECTICIDES USED IN THE MALARIA PROGRAMS

1977 AND ESTIMATED 1978

Country or other political or administrative unit	DDT (kg.)				Propoxur 50% (kg.)		Other	
	1977		1978 (Est.)		1977	1978 (Est.)	1977	1978 (Est.)
	100%	75%	100%	75%				
Argentina	397	13 917	1 000	15 000	-	-	-	-
Belize	1 468	6 147	3 056	13 015	-	-	-	-
Bolivia	34	48 675	180	95 627	-	-	-	-
Brazil	...	...	341 472	2 613 410	-	-	-	-
Colombia	1 057	205 861	1 100	234 078	7 448	9 600	101 842a)	45 000a)
Costa Rica	1 054	17 390	873	11 228	1.229	-	-	-
Dominican Republic	852	4 568	1 814	6 804	-	-	-	-
Ecuador	-	215 063	10 000	300 000	-	-	2 230b)	30 000b)
El Salvador	992	16 870	...	...	-	160 000	-	-
French Guiana	900	288	990	317	-	-	c)	
Guatemala	-	-	2 268	42 185	-	-	400d)	e)
Guyana	4 188	6 959	4 990	9 072	-	-	-	-
Haiti f)	180	71 957	228	72 532	-	-	989g)	1 200g)
Honduras	1 056	64 634	5 502	73 872	35 391	75 560	-	-
Mexico	31 204	1 303 436	...	...	-	-	24h)	-
Nicaragua	500	20 000	1 000	45 000	70 000	65 000	-	-
Panama f)	3 015	28 872	2 000	42 000	11 075	8 700	-	-
Paraguay	-	68 272	-	81 878	-	-	-	-
Peru	-	78 595	-	340 200	-	-	-	-
Suriname	572	931	700	4 200	-	-	-	-
Venezuela	1 855	217 100	-	320 000	-	-	(i)	-
TOTAL	49 324	2 389 535	377 173	4 320 418	-	-	-	-

a) Kg. malathion 50%. In 1977 there were also used 9,514 Kg. of Carbaril 85%, and in 1978, 37,600 Kg. will be used. b) Kg. Fenitrothion 40% c) In 1977 there were used 2,685 Lt. malathion 50%; 1,780 Lt. malathion ULV; 475 Kg. Baytex powder; 1,950 Kg. Abate granulated and 132 Kg. Abate emulsion. d) Liters of Baytex 50%. e) In 1978 there were used 166,000 Kg. Clorfoxim 50%, 460,000 Kg. Sumithion 50% and 1,500 Lt. Baytex 50%. g) Liters of malathion 95%. h) Liters of Abate 500-E. i) In 1977 there were used 68,355 Lt. DDT-C.E. 30%; 11,836 Lt. malathion 94%; 2,661 Kg. HCH, 25% and 3,276 Lt. Baytex 95%.

Table 12

COMPARATIVE RESULTS OF ACTIVE AND PASSIVE CASE DETECTION IN MALARIA PROGRAMS IN THE AMERICAS, 1977

Country or other political or administrative unit	Active case detection				Passive case detection						Total	
	Average number of evaluators	Blood slides			Average number of notification posts	Average of notification posts producing slides per month	Blood slides			Average of slides per month per productive notification posts	Blood slides	
		Examined	Positive	Percent			Examined	Positive	Percent		Examined	Positive
Argentina	56	41 183	364	1.0	678	141	5 658	99	1.7	3.3	46 841	463
Belize	9	5 561	405	7.3	122	41	33 590	489	1.4	68.7	39 151	894
Bolivia	132	96 925	4 456	4.6	2 871	294	21 077	5 650	27.0	6.0	118 002	10 106
Brazil	3 638	1 839 388	25 480	1.4	31 601	13 973	799 375	78 956	10.0	5.0	2 638 763	104 436
Canada	-	-	-	-	-	-	...	100	-	-	...	100
Colombia	342	143 824	16 374	11.4	7 015	3 944	257 797	47 514	18.4	5.4	401 621	63 888
Costa Rica	78	172 828	136	0.1	880	287	3 283	81	2.5	1.0	176 111	217
Cuba	-	16 049	0	-	-	-	304 970	168	0.05	-	321 019	168
Dominican Republic	163	259 913	645	0.2	4 394	1 820	104 887	100	0.1	5.0	364 800	745
Ecuador	137	100 609	1 898	2.0	5 943	2 604	206 931	9 377	4.5	6.6	307 540	11 275
El Salvador	102	119 718	5 047	4.2	2 753	2 078	351 391	27 196	8.0	14.1	471 109	32 243
French Guiana	-	13 154	212	2.0	32	...	3 754	276	7.3	...	16 908	488
Guatemala	155	182 697	6 502	3.5	6 564	3 400	289 600	28 405	9.0	7.1	472 297	34 907
Guyana	...	...	...	...	...	...	...	...	...	...	121 075	1 563
Haiti	50	185 965	6 515	3.5	6 716	3 205	214 059	21 164	10.0	5.6	400 024	27 679
Honduras	45	17 246	897	5.2	3 147	1 725	246 987	38 517	15.6	12.0	264 233	39 414
Jamaica	-	3 484	0	-	-	-	11 902	4	0.03	-	15 386	4
Mexico	1 200	1 416 828	7 921	0.6	60 696	7 669	387 539	10 930	3.0	4.2	1 804 367	18 851
Nicaragua	93	18 799	334	2.0	4 238	2 238	196 294	11 250	6.0	7.3	215 093	11 584
Panama	241	341 352	562	0.1	1 090	271	35 707	112	0.3	11.0	377 059	674
Canal Zone	...	1 077	4	0.4	-	-	-	-	-	-	1 077	4
Paraguay	...	32 170	111	0.3	4 233	941	53 443	45	0.1	5.0	85 613	156
Peru	137	160 094	13 001	8.1	5 965	1 276	115 733	19 409	17.0	8.0	275 827	32 410
Puerto Rico	-	-	-	-	-	-	3	3	100.0	-	3	3
St. Lucia	-	-	-	-	-	-	5	0	-	-	5	0
Suriname	30	58 252	630	1.1	80	21	9 249	363	4.0	37.0	67 501	993
Trinidad & Tobago	-	78	0	-	-	-	6 571	2	0.03	-		
United States of America	-	-	-	-	-	-	354	354	100.0	-	354	354
Venezuela a)	400	174 535	2 567	1.5	2 627	568	78 911	2 410	3.1	13.0	253 446	4 977
Total	-	5 401 739	94 061	1.7	-	-	3 739 070	302 974	8.1	-	9 261 874	398 598

a) Information up to November.

Table 13

PERSONNEL EMPLOYED IN THE MALARIA PROGRAMS IN THE AMERICAS
31 DECEMBER 1976 AND 1977

(Part-time personnel in parentheses)

Title	1976	1977
Engineers	115	106 (1)
Spraying Chiefs	325	366 (3)
Sector Chiefs	537	593
Squad Chiefs	2 312 (38)a)	2 182
Spraymen	9 959 (111)a)	8 477
Draftsmen	107	107 (3)
Medical Officers	194	183 (4)
Entomologists	60	67
Assistant Entomologists	180	184
Statisticians and Statisticians' Assistants	408	404
Evaluation Inspectors	1 735	1 874 (3)
Evaluators	7 069	7 583
Microscopists	891	912
Administrators	73	81
Administrative Assistants	744	697
Accountants	58	59
Disbursing Officers	52	55
Storekeepers	83	97
Storekeepers' Assistants	75	85
Secretaries	284	258
Others	683	1 302 (2)
Transport Chiefs, Mechanics and Assistant Mechanics	467	440
Drivers	1 013	1 026
Motorboat Operators	306	334
Boatmen	90	51
TOTAL	27 820 (149)	27 523 (16)

a) In some programs this personnel performs epidemiological activities.

Table 14

MEANS OF TRANSPORT IN MALARIA PROGRAMS IN THE AMERICAS, 1977

Country or other political or administrative unit	Trucks (3 tons or more)		Trucks and "Pick-up" (less than 3 tons)		Jeeps		Automobiles and station wagons		Motor-cycles		Bicycles		Motor boats		Boats without motor		Saddle and pack animals	Other	
	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b		a	b
Argentina	-	1	27	24	22	18	5	1	-	-	7	6	-	-	-	-	-	-	-
Belize	-	-	1	5	-	4	-	-	-	-	-	-	-	3	-	-	-	-	-
Bolivia	-	-	7	4	15	18	2	-	7	8	-	-	14	9	-	-	84	16	35
Brazil	35	-	252	-	752	-	10	-	125	-	1 704	-	372	-	7	-	980	-	-
Colombia	11	5	40	58	63	117	25	6	18	20	155	71	172	67	30	8	783	-	-
Costa Rica	-	-	5	-	14	-	1	-	38	-	6	-	16	-	-	-	32	-	-
Dominican Republic ..	1	-	41	11	2	-	7	-	142	-	-	-	-	-	-	-	57	-	-
Ecuador	-	2	24	28	27	36	1	7	58	6	26	0	53	21	-	-	274	-	-
El Salvador	-	-	13	12	18	18	1	2	8	6	-	-	-	-	-	-	-	-	-
French Guiana	-	1	3	-	2	-	3	4	-	-	-	-	-	-	-	-	-	-	-
Guatemala	2	-	42	-	36	-	20	-	59	-	-	-	14	-	-	-	-	-	-
Guyana	1	-	-	-	12	-	-	-	5	-	3	-	12	-	-	-	6	-	-
Haiti	4	2	63	8	57	10	18	4	-	-	-	-	1	1	-	-	-	-	-
Honduras	2	0	34	10	16	6	9	4	24	8	-	-	2	-	-	-	-	-	-
Mexico	24	6	297	217	425	225	26	3	-	-	-	-	43	11	-	-	1 850	-	-
Nicaragua	-	-	20	8	42	13	13	1	28	3	-	-	2	8	10	-	-	-	-
Panama	1	-	12	12	12	12	1	1	21	7	22	2	1	-	68	8	-	61	30
Paraguay	1	1	21	6	5	0	12	2	141	44	33	17	21	-	-	-	-	26	15
Peru	2	1	35	32	5	15	13	39	34	10	-	1	68	247	-	-	-	-	-
Suriname	1	-	1	-	1	-	-	1	4	1	-	-	26	-	-	-	-	-	-
Venezuela	2	-	148	-	125	-	59	-	19	-	247	-	126	-	-	-	595	90	-
Total	87	19	1 086	435	1 654	492	226	75	731	113	2 203	97	943	367	115	16	4 661	193	80

a) In good working conditions. b) In bad working conditions.

Table 15

NATIONAL EXPENDITURES 1976-1977 AND BUDGET 1978 FOR THE MALARIA PROGRAMS IN THE AMERICAS

(In U.S. dollars)

Country or other political or administrative unit	National Expenditures 1976			Estimated National Expenditures 1977			National Budget 1978		
	Internal financing	Loans	Total	Internal financing	Loans	Total	Internal financing	Loans	Total
Argentina	170 817	-	170 817	330 829	-	330 829	322 509	-	322 509
Belize	92 867	-	92 867	110 577	-	110 577	133 848	-	133 848
Bolivia	620 456	-	620 456	664 462	-	664 462	1 854 895	-	1 854 895
Brazil	27 745 012	-	27 745 012	34 982 901	-	34 982 901	33 809 283a)	-	33 809 283a)
Colombia	3 412 560	-	3 412 560	4 479 440	-	4 479 440	4 932 613	-	4 932 613
Costa Rica	970 054	-	970 054	1 343 344	-	1 343 344	1 366 745	-	1 366 745
Dominican Republic ..	865 020	-	865 020	865 020	-	865 020	365 020	-	865 020
Ecuador	2 708 114	-	2 708 114	3 518 518	-	3 518 518	3 518 518	-	3 518 518
El Salvador	2 605 856	-	2 605 856	2 723 028	-	2 723 028	3 091 960	-	3 091 960
French Guiana	1 205 007	-	1 205 007	1 307 574	-	1 307 574	1 438 373	-	1 438 373
Guatemala	2 796 341	-	2 796 341	3 064 686	-	3 064 686	3 028 898	-	3 028 898
Guyana	372 549	-	372 549	...	...	...	...	...	...
Haiti	525 000	-	525 000	600 000	-	600 000	800 000	-	800 000
Honduras	1 219 360	-	1 219 360	1 643 229	-	1 643 229	1 935 405	-	1 935 405
Mexico	15 071 826	-	15 071 826	21 579 831	-	21 579 831	22 000 000b)	-	22 000 000b)
Nicaragua	2 962 097	-	2 962 097	2 883 914	-	2 883 914	3 234 143	-	3 234 143
Panama	1 765 174	-	1 765 174	1 678 987	-	1 678 987	1 948 117	-	1 948 117
Paraguay	1 232 013	-	1 232 013	1 186 843	-	1 186 843	1 414 865	-	1 414 865
Peru	1 498 152	-	1 498 152	917 017c)	-	917 017	1 561 902	-	1 561 902
Suriname	240 000	400 555	640 555	246 111	422 222	668 333	289 444	483 889	773 333
Venezuela	13 177 155	-	13 177 155	13 419 532	-	13 419 532	13 419 532	-	13 419 532
Total	81 255 430	400 555	81 655 985	97 545 843	422 222	97 968 065	100 966 070	483 889	101 449 959

a) National budget, exluding São Paulo State. b) Estimated. c) Expenditures up to October 1977.

Table 16

ESTIMATED REQUIREMENTS FOR MALARIA PROGRAMS
IN THE AMERICAS

	1977[a]	1978[b]	1979[b]	1980[b]
TOTAL COST	101 212 745	104 640 116	-	-
GOV. AND OTHER SOURCES	99 168 065	102 649 959	. .	...
PAHO/WHO PORTIONS:				
Personnel costs and travel	1 592 122	1 535 275	1 636 400	1 585 300
Supplies and Materials	363 698	316 182	250 500	249 900
Fellowships	47 013	106 200	94 000	99 600
Grants and others	41 847	32 500	40 000	40 000
TOTAL	2 044 680	1 990 157	2 020 900	1 974 800

SOURCES OF PAHO/WHO FUNDINGS

SOURCE	1977[a]	1978[b]	1979[b]	1980[b]
PAHO-Reg	1 194 231	1 271 500	1 347 800	1 227 700
PAHO-PG	86 639	101 557	-	-
OMS-Reg	763 810	617 100	673 100	747 100
TOTAL	2 044 680	1 990 157	2 020 900	1 974 800

PAHO/WHO PERSONNEL

CATEGORY	1977[a]	1978[b]	1979[b]	1980[b]
Medical Officers	16	14	14	14
Sanitary Engineers	6	4	4	3
Entomologists	3	5	5	4
Parasitologists	1	1	1	1
Sanitary Inspectors	9	9	9	9
Other	4	4	4	4
TOTAL	39	37	37	35

a) Expenses
b) Estimated requirements

Table 17

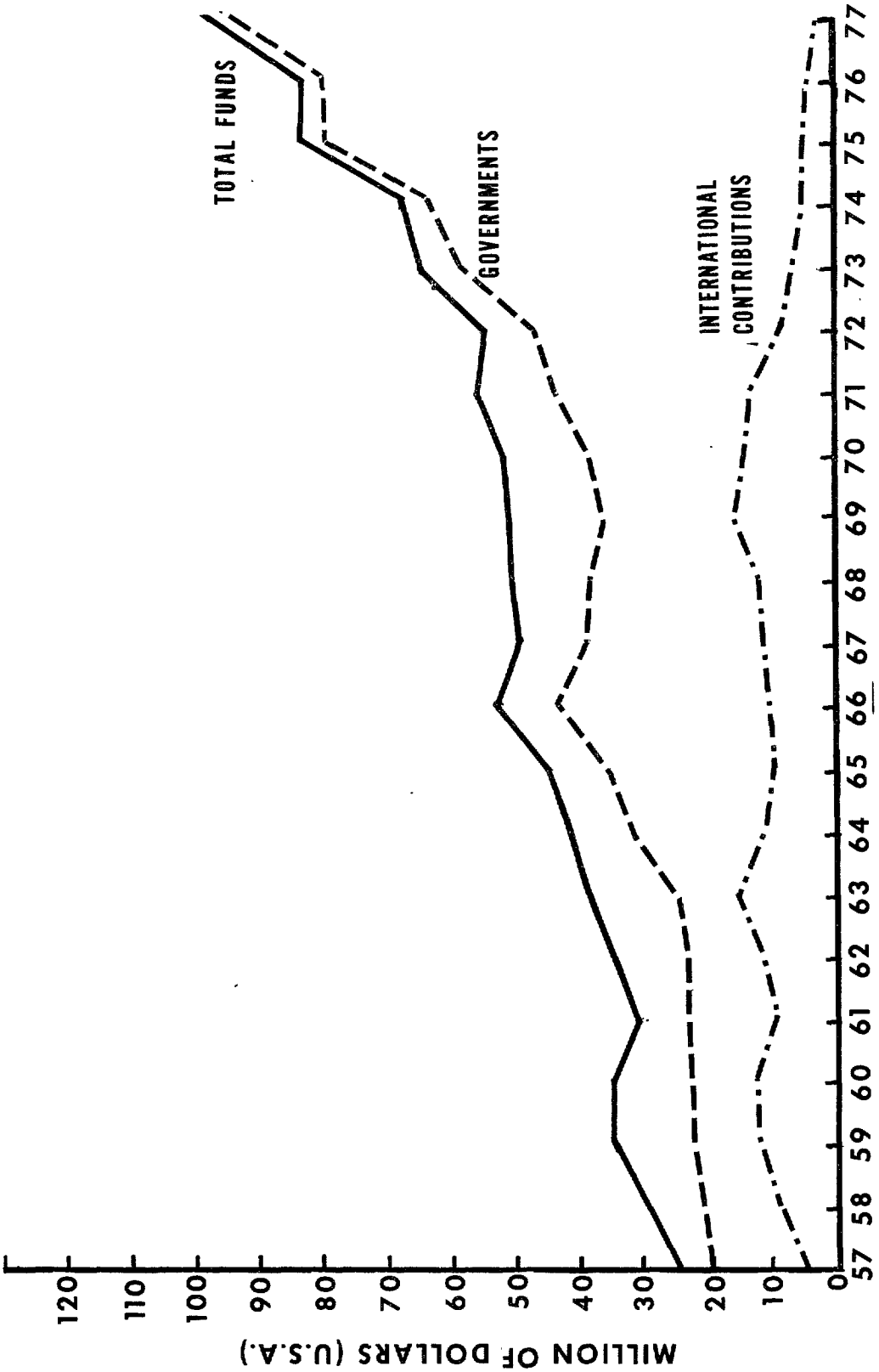
INTERNATIONAL CONTRIBUTIONS TO MALARIA PROGRAMS IN THE AMERICAS
1977 AND ESTIMATED 1978
(U.S. dollars)

Country or other political or administrative unit	Date of initiation of total coverage	1977 a)				1978 (estimated) a)			
		PAHO	WHO	AID (USA) (fiscal year)	Total	PAHO	WHO	AID (USA) (fiscal year)	TOTAL
Argentina	Aug. 1959	-	-	-	-	-	8 100	-	8 100
Belize	Feb. 1957	-	44 924	-	44 924	-	36 800	-	36 800
Bolivia	Sep. 1958	76 859	-	-	76 859	69 200	-	-	69 200
Brazil	Aug. 1959	273 226	-	-	273 226	297 100	-	-	297 100
Colombia	Sep. 1958	41 617	176 356	-	217 973	104 400	108 800	-	213 200
Costa Rica	Jul. 1957	-	58 592	-	58 592	-	56 300	-	56 300
Dominican Republic	Jun. 1958	49 657	-	-	49 657	54 100	-	-	54 100
Ecuador	Mar. 1957	3 985	-	-	3 985	-	-	-	-
El Salvador	Jul. 1956	-	67 179	-	67 179	-	35 600	-	35 600
French Guiana	Sep. 1963	5 963	-	-	5 963	7 900	-	-	7 900
Guyana	Jan. 1947	3 806	42 292	-	46 098	-	49 500	-	49 500
Haiti	Jan. 1962	221 434	-	1 200 000	1 421 434	213 700	-	1 200 000	1 413 700
Mexico	Jan. 1957	130 566	-	-	130 566	130 700	-	-	130 700
Nicaragua	Nov. 1953	47 270	41 188	-	88 458	44 000	45 200	-	89 200
Panama	Aug. 1957	-	84 605	-	84 605	-	86 600	-	86 600
Paraguay	Oct. 1957	-	44 062	-	44 062	-	45 000	-	45 000
Peru	Nov. 1957	65 111	-	-	65 111	62 400	-	-	62 400
Suriname	May. 1958	-	44 443	-	44 443	-	41 900	-	41 900
Inter-country projects, Headquarters	-	361 376	160 169	-	521 545	389 557	103 300	-	492 857
Total	-	1 280 870	763 810	1 200 000	3 244 680	1 373 057	617 100	1 200 000	3 190 157

a) Loans are shown in Table

Graph 1

FUNDS INVESTED IN THE MALARIA PROGRAMS IN THE AMERICAS, 1957-1977



GRAPH 2.

INTERNATIONAL FUNDS INVESTED IN THE MALARIA PROGRAMS IN THE AMERICAS, 1957-1977

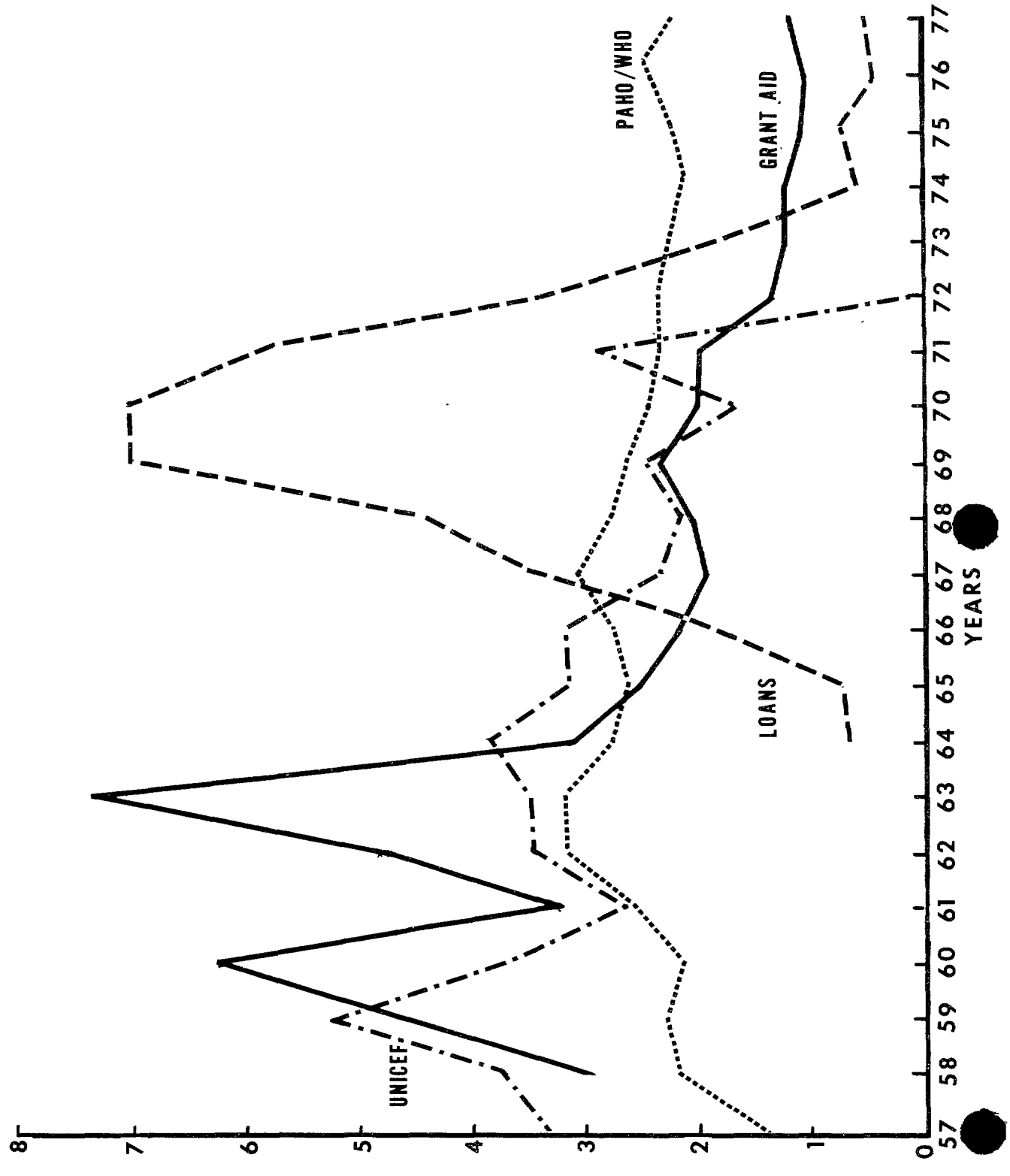


Table 18

GEOGRAPHICAL DISTRIBUTION OF AREAS WITH TECHNICAL PROBLEMS, 1977

Countries and Areas	Population of Affected Areas	Area Involved (Km^2)	Insecticides Used		Principal Vectors	Causes of the Problem
			Type Used	Years of Coverage		
Colombia						
1. Caribbean Coastal Zone; Magdalena River, Pacific Coastal Zone, Catatumbo Eastern Slope of Eastern Mountains, Alto Caqueta, Sarare	787 001	105 923	DDT MLT Propoxur	12-18	A. darlingi A. punctimac. A. nuñeztovari A. albimanus A. pseudopun. A. neivae A. albitarsis	Vector behavior; poor housing; colonization; social problems; parasite resistance to chloroquine; refusal to spraying; movement of people.
Ecuador						
2. Esmeraldas 3. Napo	307 572	46 836	DDT	10	A. punctimac. A. albimanus	Colonization; poor housing; parasite resistance to Chloroquine.
El Salvador						
4. Coastal Area	984 684	7 689	DDT Propoxur	17 6	A. albimanus	Vector resistance to DDT and Propoxur
Guatemala						
5. Pacific Coastal Zone	814 435	11 456	Propoxur	7	A. albimanus A. pseudopunc. A. vestitipen.	Vector resistance to Propoxur colonization.
Haiti						
6. Cité Simone O. Duvalier; Jacmel; Valle de la Coma; Gross-Morne; Southeast area; Petit-Goâve; Bois Neuf	482 325	3 645	DDT	13	A. albimanus	Vector resistance to DDT; population movements.
Mexico						
7. Basins of Rivers Fuerte Sinaloa, Humaya and Tamazula; 8. Huicot 9. Basin of Balsas River 10. Costa Chica of Guerrero and Oaxaca Coastal Zone 11. "El Istmo" Northeastern Slope of the Golf of Mexico, Oaxaca State 12. Tapachula-Suchiate 13. Central part of Chiapas	3 056 390	162 547	DDT	20	A. pseudopun. A. albimanus	Internal migration; poor housing; temporary shelters; modification of houses; vector resistance to DDT; actions that remove insecticides from surfaces.

Table 18 (Cont.)

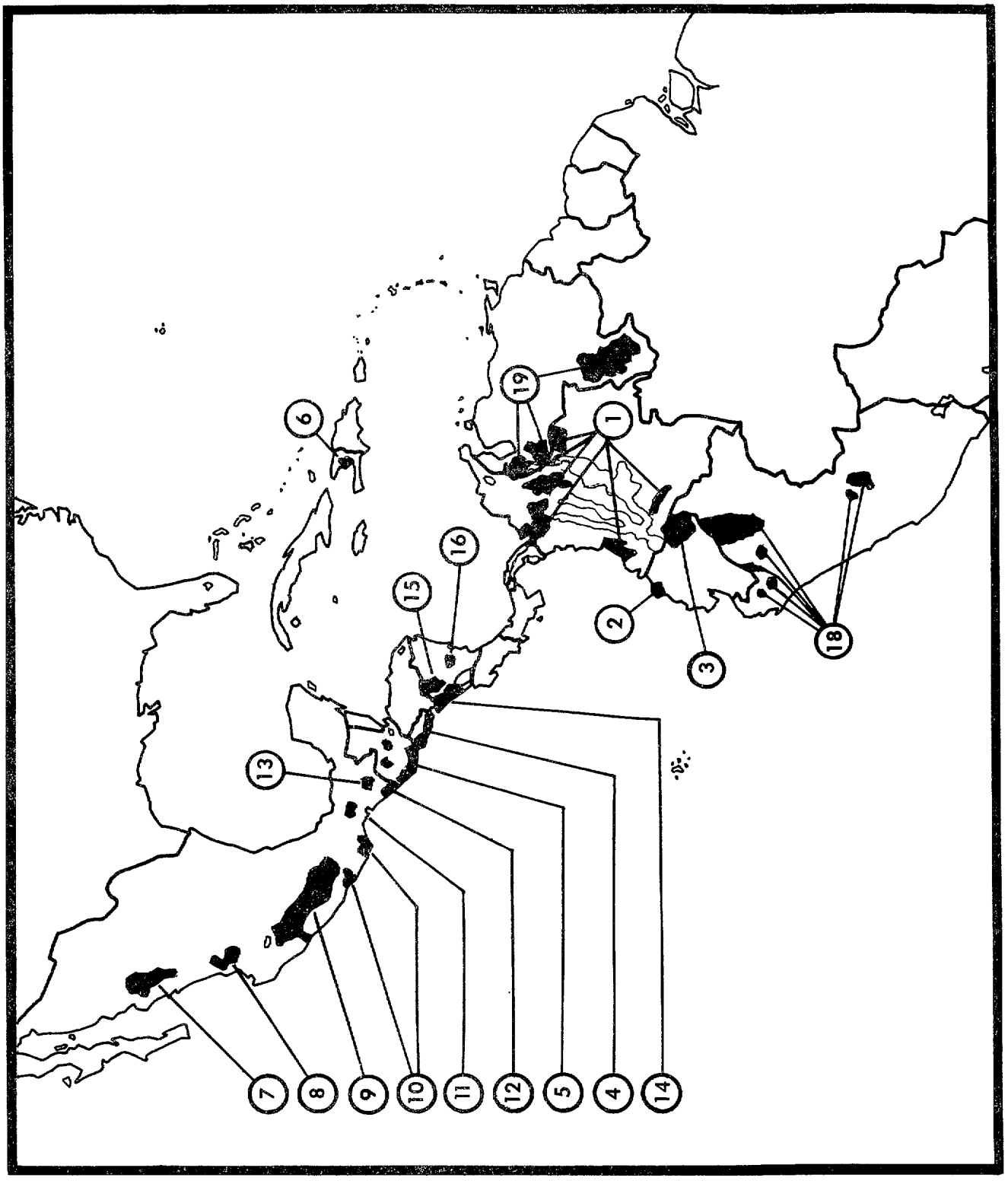
GEOGRAPHICAL DISTRIBUTION OF AREAS WITH TECHNICAL PROBLEMS, 1977 (Cont'd)

Countries and Areas	Population of Affected Areas	Area Involved (Km^2)	Insecticides Used		Principal Vectors	Causes of the Problem
			Type Used	Years of Coverage		
Nicaragua						
14. Pacific Coast; 15. Central Region; 16. Atlantic Region, Zelaya	1 753 129	30 138	DDT Malathion Propoxur	16 5 6½	A. albimanus	Vector resistance to DDT, Malathion and Propoxur.
Peru						
17 Chinchipe Ene Satipo San Lorenzo Bigote Bagua Bajo Marañon	181 107	129 265	DDT	14-20	A. pseudopunc. A. rangeli A. albimanus A. benarrochi	High vulnerability; poor housing; migration of laborers; temporary shelters; actions that remove insecticides from surfaces.
Venezuela						
18 Western and Southern areas	565 761	139 946	DDT	30	A. nuneztovari A. darlingi	Vector exophily; population movement; colonization; refusal to permit spraying poor public cooperation.
TOTAL	8 932 404	627 445				

Note: In the Americas, also exist regions with all types of problems of special characteristics, such as the Amazon Basin which includes areas of Bolivia, Colombia, Ecuador, Peru and a large extension of Brazil; in this latter country, for example, a large scale plan for socio-economic development which contemplates construction of unlimited number of highways and projects of colonization makes it necessary that anti-malarial campaign be carried out as a long term program.

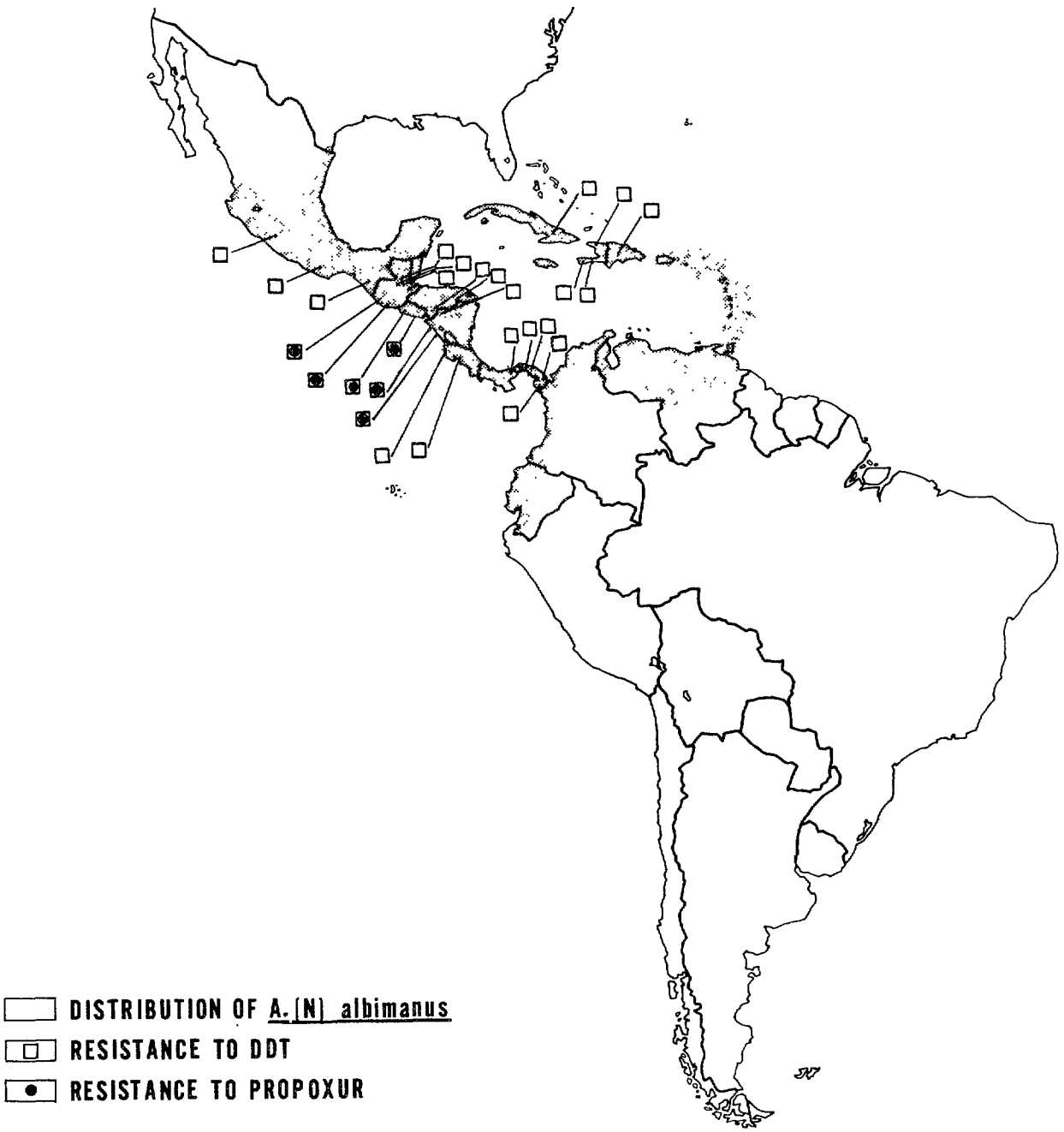
Map 3

GEOGRAPHICAL DISTRIBUTION OF AREAS OF TECHNICAL PROBLEMS, 1977



Map 4

DISTRIBUTION OF A. (N) albimanus AND RESISTANCE TO DDT AND PROPOXUR (DECEMBER 1977)



Map 5

DISTRIBUTION OF A. (A) pseudopunctipennis AND RESISTANCE TO DDT (DECEMBER 1977)

AREAS WITH CONFIRMED CASES OF P. falciparum RESISTANT TO CHLOROQUINE

No.	Country and Area
	BRAZIL
1	Barcelos (Amazonas)
2	Pto. Velho (Rondonia)
3	R. Machado (Rondonia)
4	Cuiaba (Mato Grosso)
5	Três Lagoas (Mato Grosso)
6	Conceição da Barra (Esp. Santo)
7	Alenquer (Pará)
8	Santarém (Pará)
9	S. Miguel Guamá (Pará)
10	Belém (Pará)
11	Igarapemirim (Pará)
12	Barcarena (Pará)
13	Carretera Belém-Brasilia (Pará)
14	R. Gurupi (Pará)
15	Braz Aguiar (Roraima)
16	Mucajaí (Roraima)
17	Boa Vista (Roraima)
18	Macapá (Amapá)
	COLOMBIA
19	Curiche (Chocó)
20	Río de Oro (Cesar)
21	Caucasia (Antioquia)
22	Cimitarra y Bolívar (Santander)
23	Pto. Boyacá (Boyacá)
	ECUADOR
24	Putumayo (Napo)
	FRENCH GUIANA
25	Bellevue (Iracoubo)
	GUYANA
26	Lethem
	PANAMA
27	Las Cumbres y Chilibre Lago Gatún San Blas Garachiné-Sambú
	SURINAM
28	Alalaparoe
29	Lawa y Marowijne rivers
	VENEZUELA
30	Barinas
31	Zulia
32	T. F. Delta Amacuro
33	T. F. Amazonas

Map 6

Table 19

PAHO/WHO TECHNICAL STAFF ASSIGNED TO MALARIA PROGRAMS IN THE AMERICAS
FROM 1975 TO 1978

Country or other political or administrative unit	Medical Officers				Sanitary Engineers				Sanitary Inspectors				Entomologists				Others			
	1975	1976	1977	1978	1975	1976	1977	1978	1975	1976	1977	1978	1975	1976	1977	1978	1975	1976	1977	1978
Belize	-	-	-	-	-	-	-	-	1	1	1	1	-	-	-	-	-	-	-	-
Bolivia	1	1	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-
Brazil	3	2	2	2	2	1	1	1	-	-	-	-	-	-	-	-	2a)	1b)	1b)	1b)
Colombia	1	1	1	1	-	-	-	-	3	2	2	2	1	1	1	1	-	-	-	-
Costa Rica	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1b)	-	-	-
Dominican Republic	-	-	-	-	-	1	-	-	1	-	1	1	-	-	-	-	-	-	-	-
Ecuador	1	1	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-
El Salvador	1	1	1	-	1	-	-	-	1	1	1	1	1	1	-	-	-	-	-	-
El Salvador-0201	1	-	-	-	-	-	-	-	2	-	-	-	2	-	-	-	-	-	-	-
Guatemala	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1c)	-	-	-
Guyana	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Haiti	-	1	1	1	-	1	1	1	3	3	3	2	-	-	-	1	2d)	-	-	-
Honduras	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Mexico	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Nicaragua	1	1	1	1	-	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-
Panama	-	-	-	-	1	1	1	1	1	1	-	-	1	1	1	1	-	-	-	-
Paraguay	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Peru	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Suriname	-	-	-	-	-	-	-	-	1	1	1	1	-	-	-	-	-	-	-	-
Headquarters and AMRO Projects	5	6	5	5	1	1	-	-	-	-	-	-	-	-	1	1	1e)	-	-	-
Total	20	19	16	14	7	7	6	4	17	11	9	9	5	3	3	5	7	1	1	1

a) One parasitologist, and one laboratory adviser. b) Parasitologist. c) Administrative methods officer. d) Epidemiologists.
e) Economist.

Table 20

DRUGS PROVIDED BY PAHO/WHO TO THE MALARIA PROGRAMS IN THE AMERICAS, 1958-1977

(In thousands of tablets)

Country or other political or administrative unit	Total 1958-1976[a]							1977						
	Chloroquine 150 mg.	Primaquine		Pyrimethamine	Combined drug	Aspirin 0.50 0.20 mg.	Fanasil	Chloroquine 150 mg.	Primaquine		Pyrimethamine	Combined drug[b]		Fanasil
		15 mg.	5 gm.	25 mg.	(b)				15 gm.	5 gm.	25 mg.	Adult size	Infant size	
Argentina	2 018	399	222	712	-	-	-	-	-	-	-	-	-	-
Belize	653	82	107	6	22	140	-	85	35	6	-	-	-	-
Bolivia	10 170	1 520	691	960	670	200	15	150	50	-	-	-	-	-
Brazil	135 335	2 674	1 379	396	2 825	-	372	2 500	840	100	100	200	100	-
Colombia	33 895	2 718	830	6 649	11 827	120	502	1 060	25	-	-	1 343	-	-
Costa Rica	7 794	1 253	547	223	1 385	308	-	-	-	-	-	-	-	-
Cuba	4 350	38	69	80	-	-	-	-	-	-	-	-	-	-
Dominica	90	1	1	45	-	40	-	-	-	-	-	-	-	-
Dominican Republic	14 277	91	225	847	406	20	-	250	-	-	-	100	10	-
Ecuador	15 086	1 213	271	430	1 013	-	-	150	-	-	-	-	-	-
El Salvador	20 855	1 029	938	128	2 070	-	-	600	75	50	-	-	-	-
French Guiana	608	443	67	76	48	-	12	150	100	-	50	-	-	2
Grenada	43	-	-	45	-	20	-	-	-	-	-	-	-	-
Guatemala	19 598	1 397	466	127	8 049	250	2	1 400	100	100	-	-	-	-
Guyana	1 157	297	109	378	-	30	25	85	10	3	25	20	-	4
Haiti	13 900	102	5	1 480	31 608	-	-	-	-	-	-	-	-	-
Honduras	16 786	2 164	1 326	88	1 290	-	-	1 000	150	20	-	-	-	-
Jamaica	879	18	-	288	50	-	-	-	-	-	-	-	-	-
Mexico	83 916	11 786	15 372	10 679	6 942[c]	-	-	4 350	450	375	-	-	-	-
Nicaragua	14 399	2 853	2 155	156	6 933	-	-	-	-	-	-	-	-	-
Panama	6 780	1 046	595	505	1 907	-	61	-	60	50	45	-	30	-
Canal Zone	-	-	-	-	90	-	-	-	-	-	-	-	-	-
Paraguay	12 734	271	118	77	94	-	14	150	-	-	-	-	-	-
Peru	25 806	1 689	758	3 323	4 089	473	-	1 050	-	-	-	-	-	-
St. Lucia	68	1	-	70	-	36	-	-	-	-	-	-	-	-
Suriname	3 505	709	313	916	285	138	15	350	99	-	52	300[c]	10	-
Trinidad & Tobago	840	961	426	127	400	132	-	-	-	-	-	-	-	-
Total	445 542	34 755	26 990	28 811	82 003	1 907	1 018	13 330	1 994	704	272	1 963	150	6

a) During this period, Chloroquine, Pyrimethamine and Primaquine powder and Tricalcium phosphate have been provided to different malaria proyects.
b) Chloroquine/Primaquine combined. c) Includes Daraclor tablets (Chloroquine/Pyrimethamine combined).