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STATUS OF MALARIA PROGRAMS IN THE AMERICAS

XXIX REPORT

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XXIX REPORT

Introduction

The lack of progress of many malaria programs in the Region has created serious concern of the Member Governments of the Organization. In 1978, the XX Pan American Sanitary Conference adopted a resolution, reaffirming that eradication is the goal of the malaria program in the Americas and declaring 1980 as the "Year of Frontal Struggle with malaria in the Americas." In the XXVII Meeting (1980) of the Directing Council, the malaria program was reviewed and a resolution was adopted, requesting the Member Governments as well as the Organization to review and reformulate national malaria plans fitted to the specific situation in each country; to give highest priority to the financing and implementation of those plans; to explore all possible sources of funds for the support of malaria activities on the national and hemispheric scale, to strengthen the training program and to intensify field research activities.

Following the general guide-line of this resolution and the recommendations of the III Meeting of Directors of National Malaria Eradication Services in the Americas held in Oaxtepec, Mexico in March 1979, a Hemispheric Plan of Action against Malaria was developed by the Organization in collaboration with the Member Governments. The major activities accomplished or initiated during 1979 and 1980 in relation to the implementation of this plan are summarized as follows.

1. Review of each national malaria program and reformulation of the national malaria plan. As of 30 June 1981, the programs of Belize, Bolivia, Colombia, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Mexico, Nicaragua, Panama and Suriname, have been reviewed with the participation of PAHO technical staff. Requests for PAHO's cooperation have been received from Brazil, Costa Rica, Dominican Republic and Peru for a similar program review before the end of 1981.

2. Presentation of the hemispheric plan in support of the malaria programs at the Subregional Planning Meetings in Guatemala, Buenos Aires, Lima and Port-of-Spain during February-May, 1980.

3. Studies on the needs for external supports to the malaria program, with the collaboration of two eminent public health administrators. During the period 12 October-15 November, 1980, the two consultants visited 4 countries (Colombia, Guatemala, Mexico and Peru) which were considered to represent diversity of situations of the malaria programs. The findings of the study are being used to provide information to promote external assistance and to explore possible sources of funds from international or bilateral financing agencies.

4. With the financial support of MAP/WHO and AID/USA, a plan was drafted to strengthen training activities in order to ensure that the malaria program would be able to acquire sufficient number of needed technical personnel. A study group was organized with the purpose of reviewing the training programs of the existing teaching institutions and to obtain the necessary information for a future plan in training. The study group composed of 8 experts in the fields of public health administration, epidemiology, malaria and training visited 6 countries: i.e., Mexico, Cuba, Venezuela, Brazil, Peru and Colombia, from 17 November through 10 December 1980. They visited training institutions and malaria programs, preparing an inventory of resources, reviewing training objectives and curricula of courses and identifying additional support needed for developing a regional training program. This study will serve as a basis for a meeting of a working group, with participation of the directors of the existing malaria training institutions, specialists and representatives of collaborating agencies. It is expected to hold this meeting early in 1982 to develop a medium-term training program, identifying technical and financial resources.

5. The Organization has continued to promote and support field research activities by national programs, such as the studies on malaria immunology being carried out at the National Institute of Health in Colombia; clinical trials with the new antimalarial drug, mefloquine, being conducted with the collaboration of SUCAM and the Health Services of the State of Pará in Belem, Brazil; continental studies on the susceptibility of P. falciparum to antimalaria drugs, being conducted in 19 countries of the Region and evaluation and field trials of new insecticides by the National Malaria Eradication Services of El Salvador, Guatemala, Haiti, and Nicaragua. For a better coordination and collaboration of such research activities, the research officer of AMRO-0202 Project (Research in Malaria and Parasitic Diseases) was transferred from Panama to the Central Office in Washington, D.C. During 1980, the Organization reoriented the activities of the regional malaria field research project (AMRO-0901) in Tapachula, Mexico, towards "technical cooperation for research on new methods of malaria control or eradication," in collaboration with the Governments of Mexico and Central American countries. The Organization continues to collaborate with the Government of Brazil in the study of the malaria problem, and the development of control strategies applicable to the conditions of the Amazon River basin.

To maintain the continuity of information and to facilitate evaluation of progress achieved, this report follows as much as possible the same order of the chapters appeared in previous reports. Efforts are made to up-date the general information on the present status of the malaria programs in the Region as of the end of June 1981 and to summarize the statistical data available up to the end of 1980.

I. PRESENT STATUS OF THE MALARIA ERADICATION PROGRAM

A. General Information:

The number of malaria cases registered in the Region continued to rise in 1980. In the last 5 years (1976-1980), the total number of cases increased by 56.6%, from 379,364 in 1976 to 599,216 in 1980, the slide positivity rate from 4.1% to 6.7% and the annual parasite incidence from 1.80 to 2.56 per 1,000 inhabitants in the malarious areas (table 5). This trend is alarming and if it is not checked, the development of basic health services in the rural areas could be seriously affected.

Traditionally, the progress of a malaria program has been expressed in terms of the four phases defined in the Six Report of the Expert Committee on Malaria (1956); that is: preparatory, attack, consolidation and maintenance. As few countries have short-term malaria eradication programs, these phases have somewhat lost their original meaning, and the criteria have been, at times, loosely applied. Nevertheless, they are still considered to be the best indicator of the status of the program in relation to the goal of eradication, although they do not show quantitative progress of a control program before a general interruption of transmission. In terms of the population living in the originally malarious areas at the end of 1980, 114.6 million inhabitants (49.5%) were in areas where malaria has been eradicated (maintenance phase). 58.1 million (25.1%) in areas where malaria transmission has been interrupted (consolidation phase) and 58.7 million (25.4%) in areas where transmission still exists (attack phase). For details, please refer to Tables 2, 3 and 4 and maps 1 and 2.

In 1979, the III Meeting of Directors of National Malaria Eradication Services adopted a classification of the 33 political units of the originally malarious areas into 4 groups to indicate their status, taking into consideration the extent of progress, the magnitude of problems and availability of resources. This classification is still considered to be valid (See Table 1) with minor changes which can be summarized as follows.

Group I: Includes 12 countries or territories with a population of 72.8 millions or 31.5% of the population in the originally malarious area. (Chile, Cuba, Dominica, Grenada and Carriacou, Guadaloupe, Jamaica, Martinique, Saint Lucia, Trinidad and Tobago, mainland United States, Puerto Rico and the U. S. Virgin Islands). More cases were registered in 1980 in comparison with previous years but all of them were classiffied as imported and no evidence of transmission was observed. It must be mentioned that the majority of the cases in this Group occurred in the United States of America and they were imported from various parts of the world; of the 2,249 cases recorded in 1980, 1933 or 86% were in USA.

As far as other countries in this Group are concerned, no significant increase has been observed in the last five years, although with exception of Trinidad and Tobago very little information has been received in relation to their malaria vigilance activities.

Group II: Eight countries or territories are included in this group with a total population of 15.0 millions, (6.5% of those in the malarious area). Malaria transmission was once interrupted or practically eliminated, but importation of cases from the neighboring countries persisted. Argentina, Costa Rica, Panama and Paraguay have been suscessful in eliminating imported and/or secondary sources of infection through their effective surveillance operations, but the others have been unable to maintain their favorable status, having observed a steady increase in the number of autochthonous cases. In Dominican Republic and Guyana, malaria transmission has been reestablished with tendency toward further aggravation in extension and intensity. This deterioration has been due partly to increased importation of cases, but principally to insufficient coverage and/or untimely application of control measures, inadequate financial support to provide adequate equipment, materials and transport and inadequate antimalaria structure and personnel to cope with the magnitude of the epidemiological problems.

Group III: Comprises five countries with a total population of 101.7 millions or 43.9% of the total in the malarious area. Very little progress was observed in 1980. With exception of Venezuela, the number of malaria cases increased in 1980 in comparison with that in 1979. Brazil suspended DDT spraying in an area of 47,481 Km2 (with 680,671 inhabitants) and transferred another area of 11,641 km2 (with 58,297 inhabitants) from consolidation to maintenance phase. However, serious malaria outbreaks took place in the Amazon Region in areas of intensive colonization. The malaria situation in Suriname deteriorated considerably because of a serious outbreak on the Upper Suriname River where transmission had been practically interrupted in the previous years. Venezuela is the only country where steady decrease in the number of cases was observed since 1977. In Ecuador, one of the two principal foci made a remarkable progress, while the other deteriorated. No major changes were observed in the epidemiological situation in Mexico, but considerable studies were made in 1980 to identify the areas or localities with transmission for a better utilization of the available resources.

Group IV: Eight countries are included in this group with a total population of 41.9 millions or 18.1% of the total in the malarious area. In 1980, these countries registered 365,788 cases of malaria which represent 61.1% of the total recorded in the Americas. Generally speaking, the malaria endemicity is high and the attack measures applied are insufficient or ineffective to halt the trend of deterioration which

has been observed since 1975. The problems are multiple and most of them have no easy solution. The vector resistance to all the common insecticides in Central America along the Pacific Coast continues to be the most serious problem for El Salvador, Guatemala, Honduras and Nicaragua. Various alternative antimalaria measures have been applied, but due to their high costs they are only applied with limited coverage. In addition, some countries have experienced a serious socio-political problems which do not permit effective field operations. Honduras is still in the process of reprograming antimalaria activities within the general health service which integrated the malaria program in January 1979. Bolivia has obtained the needed financial support to reinitiate the malaria program, but, the national malaria plan has not yet been fully implemented. Careful epidemiological and entomological studies are needed for a better utilization of the resources and more effective application of antimalaria measures. Colombia continued to develop antimalarial activities along the line of the new strategy, stratifying the malarious areas and concentrating resources and efforts in accordance with the malaria endemicity and its impact on socioeconomic development. However, because of the complexity of problems associated with evasive behavior of vectors to insecticides, drug resistance of malaria parasites and extension of colonization areas, the attack measures applied have not been fully effective to reduce the intensity of malaria transmission. The vector in Haiti is resistant to DDT. A field trial on substitutive insecticides was initiated early in 1980 and it is being evaluated. Peru integrated its malaria program in the general health service in 1978 and since then no systematic antimalarial measures have been applied. The malaria situation has suffered a serious deterioration, and the epidemiological information provided by the network of voluntary collaborators has decreased to such an extent that precise evaluation of the malaria status is difficult. The Government is greatly concerned with this situation and is reviewing their antimalaria strategy with PAHO's cooperation.

Generally speaking, the areas in maintenance phase still conform with the original criteria, that is: absence of malaria transmission and a surveillance mechanism able to discover imported sources of infection or initial foci of transmission. The 12 countries in Group I conform with these criteria. In addition, there are 10 other countries where parts of their territories are in the maintenance phase. The population totals 41,776,000 and every year some autochthonous cases are registered, but they have not caused a reestablishment of endemicity. However, Dominican Republic shows a tendency toward deterioration and, according to the information received, some foci of transmission persist in the maintenance phase area. A similar situation may have occurred in maintenance areas of Peru.

The autochthonous cases recorded in the last five years in the areas in maintenance phase are shown below. (Also see tables 6 and 7).

COUNTRIES	Population in Thousands (1980)	AUTOCHTHONOUS CASES				
		1976	1977	1978	1979	1980
12 Countries in GROUP I	72,844	0	0	57	0	0
Argentina	3,191	1	37	74	276	4
Brazil	14,799	194	129	3	5	175
Dominican Rep.	5,255	0	10	35	252	500
French Guiana	35	44	5	3	146	231
Guyana	841	0	0	0	0	0
Mexico	5,422	0	0	0	13	3
Paraguay	625	0	0	0	2	16
Peru	1,641	0	665	539	0	26
Suriname	218	0	0	0	0	0
Venezuela	9,749	207	60	84	153	47
Total	114,620	446	906	795	847	1,002

In the areas in consolidation phase, transmission foci have appeared in many countries and the overall Annual Parasite Incidence criterion of 0.1 per 1000 inhabitants is hardly met. However, the deterioration is not widely spread, but it is usually confined to certain areas or localities. The following summary shows the number of autochthonous cases registered in the last five years in the 14 countries which have areas in consolidation phase (Also see Tables 6 and 8).

COUNTRIES	Population in Thousands (1980)	AUTOCHTHONOUS CASES				
		1976	1977	1978	1979	1980
	72,844	0	0	57	0	0
Argentina	70	0	0	2	21	0
Belize	84	166	67	87	4	9
Brazil	16,748	396	177	481	645	974
Colombia	12,127	519	871	1,548	2,975	2,339
Costa Rica	453	73	47	127	96	81
Dominican Rep.	46	-	3	11	28	35
Ecuador	2,070	689	464	276	86	120
French Guiana	20	99	51	64	105	128
Guyana	17	-	0	0	0	-*
Mexico	20,830	196	189	453	667	889
Panama	1,579	33	32	21	20	3
Paraguay	1,219	0	38	4	0	1
Peru	2,790	1,365	2,013	1,100	0	38
Suriname	34	31	-*	0	0	17
Total	58,087	3,507	3,952	4,174	3,747	4,634

* No information.

The increase in the number of malaria cases is principally due to the deterioration in the malaria situation in the areas in attack phase, especially in the countries in Groups III and IV above. If the number of cases exported to the areas in consolidation and maintenance phases and non-malarious areas is taken into account, the areas in the attack phase have produced 99% of the total registered in this Region. (See Tables 7, 8, 9 and 10).

In 1980, a total of 8,900,046 blood slides was examined with 599,216 positive for malaria parasites. Against the population in the malarious area, i.e. 231,366,000 inhabitants, the annual blood parasite incidence (API) 2.59 per 1,000 inhabitants. (In 1979, ABER was 3.80% and API 2.28 per 1,000 inhabitants). Blood slides were collected by malaria program evaluators in active case detection (ACD) and by information posts (voluntary collaborators or health services establishments) in passive case detection (PCD). The breakdown of the ACD and PCD slides by country is given in Table 11.

B. Field Operations:

Residual spraying with insecticides is still the princioal measure applied in the malaria programs and DDT is the choice if the vector is susceptible. In areas where the vector is resistant to DDT, other insecticides (malathion, fenitrothion, propoxur,) have been substituted or experimented. However, in the Central American countries, none of these insecticides seems to be sufficiently efficient in interrupting malaria transmission along the Pacific Coast and the new insecticides, chlorphoxim and deltamethrin are being evaluated. In Haiti, malathion and fenitrothion have been tested with good results and the evaluation of the comparative effectiveness is scheduled for October 1981. In 1980, the total residual spraying carried out amounted to 9,377,942 sprayings of which 9,152,957 or 97.6% were with DDT, 36,623 (0.39%) with propoxur, 80,244 (0.86%) with fenitrothion and 105,118 (1.15%) with other insecticides. (See Tables 12 and 13).

In Haiti, antilarval measures were applied through construction of drainage canals and landfill of breeding places in 19 localities in 1977 and 1978. Although no new construction was undertaken in 1979 and 1980, the previous work has been maintained, protecting a total population of 584,250. Nicaragua informed antilarval activities with 384,183 inhabitants protected by larviciding, 50,000 persons by engineering work (drainage) and 20,000 by biological control measures. Reports were received from Ecuador and Guatemala on the use of larviciding, protecting 77,065 and 25,272 persons, respectively. El Salvador informed the use of larviciding in 75 localities and engineering work of 17 projects. Biological control was used in Colombia with 18,255 persons protected and in Guatemala for the protection of 1,124 inhabitants.

Antimalarial drugs continued to be used extensively in all the programs in presumptive as well as in radical cure treatments through the collaboration of 187,000 existing information posts and 7,100 evaluators in the Region. Antimalarial drugs were also distributed as mass drug administration in order to control or prevent epidemic outbreaks, to protect certain groups of populations such as immigrants in land settlement areas, workers in temporary encampments for construction of roads, dams, etc. or to use it as a principal control measure in areas where other control measures are not practicable or ineffective. During 1980, mass drug administrations were provided in Colombia to 122,584 inhabitants, in El Salvador to 92,766, in Haiti to 279,434, in Honduras to 62,000 and in Nicaragua to 43,231 persons. In Guyana, antimalarial drugs were distributed in the form of medicated salt to 36,400 inhabitants.

Table 14 shows the personnel of the malaria programs by category and Table 15 the means of transportation used by the programs.

C. Budget

Table 16 summarizes, by country, the expenditures for the malaria programs in 1979 and 1980 and the estimated budget for 1981. The government expenditures in 1980 amounted to US$ 131,426,259, which represents an increase of 18.1% compared with 1979. As far as the PAHO/WHO contribution is concerned, it is budgeted on a biennial basis. The figures for 1980 are the actual expenditures incurred during the year, while those estimated for 1981 are the balance of the biennial budget (1980/1981) after substracting the 1980 expenditures. Table 17 shows the expenditures of PAHO/WHO in 1980, the estimates for 1981 and the proposed program and budtget for the next two bienniums, 1982/83 and 1984/85. Bolivia continued to receive financial supports from US/AID in 1980 through PL-480 financing. The malaria program in Nicaragua received US$2,000,000 from the United Nations Capital Development Fund (UNCDF) as a donation to replace vehicles, equipment antimalarial drugs and other supplies which were lost during the civil war. Honduras received a donation of US$100,000 from the United Nations Emergency Operations (UNEO) to purchase the needed insecticides.

The total investments made in the malaria programs in the Americas from 1957 through 1980 amount to US$1,422,824,416, of which US$1,256,943,911 or 88.34% were provided by national governments and US$165,880,505 or 11.66% by international and bilateral cooperation. Graphs 1 and 2 show the funds invested by the governments and the contributions of international and bilateral agencies in the same years.

D. Country Information

ARGENTINA

During 1980, about 57% of the activities planned for house spraying and 63.4% for active case detection were carried out in areas with high risk of reinfection; that is the areas in the attack phase in the North of the Province of Salta. The program continued to have the problem of untimely provision of funds. However, the operational capacity of the Malaria Service has increased through training of technical officers in an intensive malaria course, held with the collaboration of the Organization. The number of malaria cases registered for 1980 was 341, of which 112 cases were imported from the neighboring country. In 1979, those figures were 936 and 75, respectively. It is interesting to note that in the Province of Arce, Bolivia (immediate border with the Province of Salta) the number of reported cases also dropped from 1,807 in 1979 to 299 in 1980.

BELIZE

The malaria situation in Belize continued to follow the trend of deterioration in 1980, increasing in the number of cases and the localities affected. P. falciparum which was completely eliminated in 1972 reappeared in 1978 and spread to more localities in the last two years. Many efforts have been made to revert the trend, but they have not been fully successful because of shortage of personnel, transport and DDT. As a result, the coverage with antimalarial measures has been inadequate in quantity and in quality. Upon the request of the Government, PAHO appointed 3 short-term consultants in 1980 to collaborate in planning and organization of the Malaria Services, in the training of personnel in entomology and laboratory techniques and in the elaboration of job descriptions for personnel at all levels. With the collaboration of the consultants, the National Malaria Service was reorganized during the first semester of 1980 and noteworthy improvements were observed in case detection, epidemiological investigation and radical cure treatment activities in the second semester.

BOLIVIA

The Malaria Program of Bolivia was thoroughly reviewed in May 1980 by a group of national and international malariologists and a series of recommendations were made to improve the malaria situation in the country, including detailed suggestions on antimalarial measures to be applied. With a financial assistance received from PL-480 funds of US/AID, the program is assured to have a good financing until 1983. During the year of 1979 through early 1980, many changes occurred in the Government Administration including the Direction of the Malaria Service and therefore delays were observed in the implementation of the recommended plan. However, on October 1, 1980 a new Director was appointed for the Malaria Service and since then efforts have been made to improve the field operations with insecticides, case detection activities and treatment of confirmed malaria cases. Malaria transmission has been persistent in some limited foci along the rivers (Rios Itenez, Benisito, Yata and Geneshuaya in the North and Rios Grande, Pilcomayo and Pilaya in the South) and it requires further epidemiological and entomological studies to identify its causes.

BRAZIL

In 1980, DDT spraying was suspended in an area of 47,481 km2 with 680,671 inhabitants. In the State of Sao Paulo, an area of 11,641 km2 with 58,297 inhabitants was transferred from consolidation to maintenance phase. However, a further increase in the number of malaria cases has been observed in the country due principally to the exacerbation of malaria transmission in the Amazon Region, particularly in the States of Rondonia, Para, Roraima and Mato Grosso. In general terms, the Amazon Region has been responsible for 95% of the total malaria cases registered in the country and it has indirectly affected the malaria situation in the consolidation and maintenance phase areas in the coastal region, although no serious deterioration has been observed in the latter region. Spraying coverage with DDT in the attack phase area was only 85% of what had been planned due to shortage of field personnel in some area. In order to improve the efficacy of antimalaria measures, a series of studies was undertaken with the cooperation of the Organization; such as epidemiological studies in Rondonia to determine the factors for continuing transmission, testing of new insecticides, monitoring of P. falciparum susceptibility to chloroquine and clinical trial of mefloquine. The program continues to receive a high priority and corresponding financial support from the government.

COLOMBIA

Tha malaria program continues to develop its antimalarial activities along the lines of the new strategy, stratifying the malarious areas and concentrating resources and efforts in accordance with the malaria endemicity and its impact on socioeconomic development. In the attack phase area, residual house spraying with insecticides continues to be the principal attack measure applied. DDT is still the insecticide of choice as the vectors are still susceptible to it. Small amounts of other insecticides (propoxur, malathion and carbaril) were used in 1980 principally to improve acceptance of spraying. In the consolidation area, efforts were concentrated on the elimination of residual or reestablished transmission foci, especially in areas with high receptivity. During 1980, a total of 57,346 malaria cases was registered, of which 49,787 cases or 86% were in the attack phase area. Of the latter, 24,612 cases or 49.4% were in the areas under intensive agricultural colonization. These areas have a population of 1.8 million or 10% of the total population in the originally malarious area. A course on malariology was given in Medellin, Cali and Bogota for a period of 11 weeks (September 22 December 5, 1980) with 10 participants (6 from Colombia, 1 from Argentina, 1 from Brazil, 1 from Costa Rica, and 1 from Honduras). This was the first course held in Colombia for training professionals for the program and it was organized by the Ministry of Health with the cooperation of the University of Antioquia, University of Valle and the Pan American Health Organization.

COSTA RICA

The National Malaria Eradication Service, (NMES) continues its efforts for malaria surveillance activities to prevent reestablishment of malaria transmission. The major problem has been the importation of malaria cases from the neighboring countries where transmission still exists. Although the majority of the imported cases have been detected effectively through the use of the surveillance card to register migratory laborers, local transmission does occur from time to time, producing introduced or autochthonous cases. During 1980, a total of 376 cases was registered, of which 236 or 62.8% were classified as imported. Malaria surveillance activities have been increased by the formation of new working areas. As of this date, the NMES has been very efficient in detecting imported cases and in eliminating foci of transmission without too much delay.

DOMINICAN REPUBLIC

Although 98.23% of the population in the originally malarious area now live in the areas in consolidation and maintenance phase, there has been a very serious increase of malaria cases observed in the last five years. Importation of malaria cases through migratory laborers from the neighboring country, and their concentration in receptive areas under conditions favorable for transmission constitute the major problem in the program. The magnitude of this problem seems to be increasing as the laborers, previously working only in the sugar-cane fields, are now spreading over the country, engaging in other types of agricultural work. Furthermore, A. albimanus in the northern frontier region has become more and more resistant to DDT in the last few years and has become a new obstacle to an effective control of residual and or imported sources of infection. While the problems are rapidly increasing in magnitude and extension, the financial resources are limited and unable to cope with the increasing needs in manpower and renovation of old vehicles which have been in use for many years. For a better coordination of antimalaria activities, the First Meeting of the Directors of the Malaria Services of Dominican Republic and Haiti was held in January 1980.

ECUADOR

No significant change has been observed in the epidemiological situation in 1980 in relation to 1979. Malaria transmission continued to be focalized in the Provinces of Esmeraldas and Napo, although in the latter Province the malaria incidence was reduced by 62% and P. falciparum infection was practically eliminated. On the other hand, in the Province of Esmeraldas, malaria transmission increased in intensity and extension. This Province with 6% of the population in the malarious area, registered 63% of malaria cases and 85% of P. falciparum infections of the entire country in 1980. A plan to intensify antimalarial activities was made and the necessary resources were allocated; however, due to the multiple problems which had no easy solution, the plan was not totally implemented. The Province of Esmeraldas also has a technical problem of resistance of P. falciparum to chloroquine as confirmed by the in vitro tests carried out in July. Although this constitutes a problem to limit the action of chloroquine, the parasite is still susceptible to available alternative drugs and the vector to DDT. It may be assumed than an adequate insecticide coverage could interrupt or greatly reduce malaria transmission as demonstrated in the Province of Napo. The Government has continued to give a high priority to the malaria program with good financial support.

EL SALVADOR

Since 1978, stratification of malarious areas has been undertaken through careful epidemiological studies, locality by locality. As a result, six operational areas (Polos Operacionales) have been identified as basis for planning antimalaria activities in accordance with epidemiological priorities, and the program has been reorganized. Each operational area has a General Coordinator, a Field Chief for epidemiology, a Field Chief for operations, a Group Chief for entomology and the necessary auxiliary personnel. The personnel in each operational area is responsible for planning, directing and supervising all antimalaria activities within the area of assignment. Epidemiological data are reviewed and analyzed every week and the necessary actions are taken in accordance with the situation found, following the norms established for such actions. The voluntary collaborators network is thoroughly reviewed and frequency of visits by the evaluators is determined and correlated with the annual parasite incidence (API) of the 5-year period, 1973-1977. To acelerate timely treatments of malaria cases, each operational area has been equipped with a diagnostic laboratory, aiming at the initiation of treatment within 72 hours after a blood smear was taken. However, during 1980 the implementation of the new work plan was partial as field activities could not be carried out in many parts of the country due to socio-political unrest. A further increase in the number of malaria cases was observed in 1980.

GUATEMALA

The country is divided into 3 ecological zones; i.e., Northern, Centro-oriental and Pacific Zones. During 1980, the major resources of the program were dedicated to the Northern and Centro-oriental Zones where fenitrothion house spraying was applied, in addition to the use of antimalarial drugs in radical cure treatments. The Northern Zone responded well to the attack measures and reduction of malaria incidence was observed, but the Centro-oriental Zone did not show much improvement. The Pacific Zone has the worst problem of multiresistance of the vector, A. albimanus, to practically all the available insecticides. In this Zone, antimalarial activities were limited to radical cure treatments of the confirmed cases, as no insecticide has proved to be sufficiently efficient to interrupt the malaria transmission. Chlorphoxim was applied in a small area on an experimental basis, but no significant effects were observed. The country as a whole showed a slight reduction in the number of cases and a reduction of P. falciparum infection by 34.6%.

GUYANA

The Guyana Malaria Program was very advanced early in the 1970's and the entire country was either in consolidation or in maintenance phase until 1975. The principal antimalaria measures, i.e., DDT house spraying and medicated salt distribution, were suspended, but they were not replaced by an organized malaria surveillance. As a result, resurgence of malaria transmission occurred first in the Rupununi District in 1975 and spread to North West and Mazaruni/Cuyuni/Potaro Districts in 1976. A full antimalaria campaign was reinitiated in 1977, but it has not been fully effective to eliminate the sources of infection. Upon the request of the Government, the program was thoroughly reviewed by a PAHO Consultant in March-April 1980 and a series of recommendations was made to improve the coverage and quality of work in field operations. However, due to administrative and operational difficulties, the implementation has been slow. In February, 1981, a joint PAHO/AID Malaria Team visited the program and suggested that the previous recommendations made by the PAHO Consultant be fully implemented as soon as possible. The Team stressed the need of re-structuring the Vector Control Services and strengthening its professional human resources. In the meantime, the malaria situation showed a further deterioration in 1980, especially in the Rupununi District. Furthermore, a new transmission focus appeared in the vicinity of Linden City which is considered to be a part of the coastland where malaria transmission has been interrupted since the early 1950's.

HAITI

The principal antimalaria activity in Haiti during 1980 was a field trial of 3 residual insecticides (fenitrothion, malathion, and DDT), as recommended by a multidisciplinary team of the Government of Haiti, WHO and AID in April-May 1979. The objectives of the field trial are to determine the comparative efficacy of fenitrothion and malathion as a substitute to DDT and to assess the usefulness of DDT in areas where the vector is moderately resistant to it. The work was initiated in January following a protocol elaborated in Novemeber 1979 and it is still in progress. The final evaluation is schedulled for October 1981. Aside from the field trial, the Malaria Service continued to apply fenitrothion in the Southern Peninsula near the City of Les Cayes involving an area with 110,999 inhabitants. This area has been sprayed with this insecticide since July 1978 and the results seem to be very favorable with a reduction of Annual Parasite Incidence (API) from 62.5 per 1000 habitants 1978 to 4.5 in 1980, while the API in the Control Area increased from 12.4 in 1978 to 13.6 in 1980.

During the year, the Malaria Service initiated stratification of the malarious areas, having identified the principal foci of transmission and applied various antimalaria measures in these foci, such as mass drug administration, larviciding, use of larvivorous fishes and maintenance of drainage canals etc. As of the end of November 1980 a total of 48,880 cases (all P. falciparum) was registered.

HONDURAS

The malaria program has been completely integrated in the basic health services since January 1979. Antimalaria activities have been entrusted to the Sanitary Regions in which the country has been divided. The objectives of the malaria program are to reduce the intensity of malaria transmission with insecticides, where indicated, and to treat the malaria cases with antimalarial drugs, where possible. The planned activities are to be carried out by the Vector Control Auxiliaries at regional, area and local levels. During 1980, the plan was not fully implemented due to a series of logistic and administrative difficulties. The attack measures were applied with insufficient technical orientation and supervision. The coverage of DDT spraying was far below the effective level and the quality of work not up to the standard. As a result, the epidemiological situation continued to show further deterioration. In October 1980, the program was reviewed by a Joint Government-PAHO Evaluation Team and a series of recommendations were made to improve the field operations. Among others, the Team stressed the need to reinstate the technical direction of the program at the central level (Vector Control Division) and the execution of field operations at the regional and area levels, within the framework of the health system and with direct technical supervision specifically organized by the Vector Control Division.

MEXICO

Following the recommendations of a Review Team who visited the malaria program in 1978, the originally malarious area was carefully studied and reclassified in 1979. As a result, an area with 5.3 million inhabitants was transferred from consolidation to maintenance phase and another area with 2.5 million inhabitants from attack to consolidation phase. The present area in attack phase has a population of 9.7 million. Within the latter, areas with 5 million population were already in the advanced stage, prior to consolidation phase. In 1980, further analyses were made of the epidemiological information of the last 10 years, locality by locality, in order to precise the areas with transmission. Considering the country as a whole, a steady progress was observed during 1971 - 1976 with a decrease in both the number of malaria cases and the number of positive localities (localities with cases). In

1977 and 1978, the malaria situation appeared to be stagnant and in 1979 and 1980 it showed a certain deterioration with increase in the number of cases and the number of positive localities. Nevertheless, the total number of positive localities in 1980 was only 6,000 out of 151,502 existing localities in the entire malarious area. As a result of these analyses, a better use of the available resources is made, intensifying antimalarial activities in the localities which have been repeatedly positive for malaria cases in the last three years.

NICARAGUA

In 1979, because of the national revolution, antimalaria activities were practically suspended and as a result malaria incidence increased considerably, from 10,633 cases in 1978 to 18,418 cases in 1979. This trend continued until the middle of 1980, as the restructuring of the Malaria Service, training of personnel and requisition of equipment, supplies and vehicles took a considerable period of time before a full antimalaria operation was launched. Insecticides were used only in areas where the vector is still susceptible, e.g., DDT house spraying on the Atlantic Coast, chlorphoxim spraying in certain areas on the Pacific Coast. A new insecticide deltamethrin was tested in the Department of Managua in a small area with 2,000 houses. In the areas where the vector is multiresistant to the common insecticides, diversified antimalaria measures were applied, such as elimination or reduction of breeding places by drainage, land fill and diversion of streams, use of larvivorous fish (Poecilia sphenops), and chemotherapy with antimalarial drugs . In 1980, the Government of Nicaragua launched a literacy program with the participation of 80,000 students to cover all the localities in the country. With their collaboration, antimalarial drugs were distributed.

PANAMA

The malaria program continued with the same activities in 1980 as in the previous year. However, it must be mentioned that the Canal Zone, which had been operated under a separate administration, was incorporated into the National Malaria Eradication Service (NMES) in 1980 and since then all antimalaria activities have been integrated into the National Malaria Program. No major change has been observed in the malaria situation and the transmission continued to be focalized in the Provinces of Darien, Bocas del Toro and La Comarca de San Blas. Importation of cases from the neighboring countries still constitutes a major problem for the elimination of the transmission foci in the Province of Darien and La Comarca de San Blass. During 1980, a total of 304 cases was registered, of which 120 or 38.7% were imported cases from other countries.

PARAGUAY

Antimalarial activities continued in 1980 without any major change in strategy and methodology. There was a slight increase in the number of autochthonous cases in the areas with high receptivity and vulnerability, but the foci of transmission were eliminated quickly without reestablishment of endemicity. During the year, a small outbreak with 16 autochtonous cases was observed in Chaco Paraguayo, originated from an imported case from Bolivia. Chaco has been in the maintenance phase with low receptivity. However, malaria transmission continues in Gran Chaco, Bolivia, where the number of malaria cases increased from 756 in 1979 to 1,486 in 1980. Besides the importation of malaria cases from the neighboring countries, the major problems continue to be gradual deterioration of the vehicles and high cost of DDT, putting an additional strain on the malaria budget. For 1980, the Government increased its financial support to the program in order to maintain an efficient malaria surveillance program and to renew the fleet of vehicles by stages within the resources available.

PERU

Since 1978, the Malaria Program has been integrated in the Local Health Services. At the central level, only a malariologist has been retained to serve as a technical adviser. Antimalaria activities have been carried out irregularly and the malaria situation has deteriorated considerably in the last few years. The epidemiological information is collected mostly from the populated areas where the health services are located, and therefore it does not reflect the real malaria situation in the country. Officially, 4.4 million inhabitants or 75.5% of the population in the originally malarious area are still in the areas in maintenance and consolidation phases, but many localities in these areas have active malaria transmission. The Government is concerned about this situation and is requesting the Organization to collaborate in a complete review of the program to be conducted in October 1981.

SURINAME

A small outbreak of P. falciparum observed on the Upper Suriname River in October 1979 spread rapidly over the entire river and its tributaries in 1980, giving a total of 2,817 cases in this Operation Area plus 71 cases exported to others. This same area recorded 1 case in 1978 and 42 cases in 1979. Because of these outbreaks, there was a general deterioration in the epidemiological situation in the country, having registered 4,445 cases in 1980 in comparison to 903 cases in 1979. Much efforts and funds were devoted to control this situation, but they were largely ineffective because of a series of administrative and operational

problems, such as loss of time due to the expedition practice, problems of discipline of field workers, difficulties in maintaining good field supervision and state of disrepair of boats and outboard motors which are the principal means of transportation of the program. On the other hand, a new health service has been developed in the last few years under the Medical Mission to the Interior of Suriname (MEDIZEBS) which is an autonomous institution financed jointly by the Government and the private sector. At present, MEDIZEBS has more than 250 well-trained and disciplined staff members assigned to strategic points, forming a complete health service network in the interior which coincides with the area in the attack phase. Serious consideration is being given to integrate antimalaria activities into this new health service system.

II. PROBLEMS AFFECTING THE PROGRESS OF THF PROGRAM

As mentioned previously, there has been a steady increase in the number of malaria cases in the last seven years (1974-1980): during this period, the total number has increased from 269,003 to 599,216 (221 %) and P. falciparum infection from 88,531 to 192,423 (217%). However, this gradual deterioration in the malaria situation is not a generalized phenomenon throughout the entire malarious area in the Region.

In 1980, 12 countries reported areas where progress depends on the application of new attack measures to solve technical problems. (Table 18 and Map 3). These areas have a total population of 9,981,116 or 4.3% in the originally malarious area. The principal problems listed are: a) Physiological resistance or evasive behavior of vectors to insecticides, b) P. falciparum resistance to antimalarial drugs, c) Movement of population and poor housing in the areas with agricultural colonization or economic development projects, d) Increasing cost or operations and shortage of financial resources, and e) Problems associated with socio-political and cultural aspects and human behavior.

a) The physiologic resistance to insecticides is by far the most serious technical problem. In four countries in Central America (El Salvador, Guatemala, Honduras and Nicaragua), the vector, A. albimanus is resistant to practically all the common insecticides used in the malaria program. Attempts have been made to select the type of alternative insecticide for each area according to the susceptibility of the local strain, but usually after a few cycles it becomes ineffective and other insecticides have to be tried. Propoxur was once very effective in areas where the vector was resistant to DDT and it was used on a large scale from 1970 to 1974 on the Pacific coast of Central America with good results. After that, fenitrothion malathion, chlorphoxim and recently deltamethrin have been tried, but resistance to the first two is already present in some areas. Other alternative antimalarial measures, such as distribution of antimalarial drugs, drainage and land fill of the

breeding places, use of larvivorous fishes etc. are applied, but they are more expensive and of limited applicability. In many areas along the Pacific Coast of Central America where the vector is resistant to all the common insecticides, very little activities are being carried out today, except that antimalarial drugs are made available to the sick persons through health institutions and the voluntary collaborators.

In Haiti, the vector, A. albimanus, is resistant to DDT in some localities and new insecticides are being tested. The physiologic resistance to DDT was once reported from Costa Rica along the Pacific Coast and from Panama in the Canal Zone and La Comarca de San Blas, but it did not constitute a major problem, because the malaria transmission was interrupted by antimalarial drugs and propoxur. In the Dominican Republic, the vector has increased its resistance to DDT in the northwestern frontier region (Dajabon Area) where this insecticide has been in use during the last twenty years. Malathion is being considered to substitute DDT in areas where the latter is no longer fully effective in interrupting transmission. (Maps 4 and 5).

b) P. falciparum resistance to chloroquine is a serious problem in Brazil and Colombia and it is widely spread practically over the entire malarious area. In Peru, the resistant strain is found along Rio Yavari, and in Bolivia, according to the report of the Evaluation Team in May 1980, a resistant strain of P. falciparum is present in Guayaramerin, confirmed by in vitro test and observed frequently at the hospitals in that area. P. falciparum resistant to chloroquine is a serious technical problem, but at least effective alternative drugs are still available and may not constitute a major obstacle to malaria eradication in areas where control can be achieved with insecticides (See Map 6).

c) The movements of population and their precarious living conditions, especially in the areas with agricultural colonization and construction projects, constitute a great problem for the malaria program. In Brazil and Colombia, the principal foci of transmission are in the areas of extensive agricultural colonization where a constant flow of new settlers arriving at the virgin forest areas, constructing temporary or precarious houses and creating conditions favorable for transmission, but unfavorable for application of effective antimalarial measures. Similar situation has been reported in Bolivia, Ecuador, and Peru, although of less extent. In all Central American countries and Mexico, the migrating laborers within the country or among the countries are also a great problem for the malaria program. Besides, the major movements of population are observed in the areas where the vector is resistant to insecticides and where the malaria endemicity is high. A considerable movement of population along the frontier regions has been observed in the last few years in Central America due to socio-political unrest.

d) The need to use complementary or alternative antimalarial measures due to technical problems, the increase of geographical extension of malarious areas due to agricultural colonization and other economic developments and constant movements of population have added a tremendous strain to the already underfinanced malaria programs. In many countries, the present level of financing is hardly enough to protect the areas where malaria has been eradicated and at the same time to attack problems in areas with persistent malaria transmission. It has been the trend to utilize the limited resources on a priority basis to prevent epidemic outbreaks or to attend emergencies.

e) On the top of all the above mentioned problems, many malaria programs are facing countless difficulties of socio-political and cultural aspects and of human behaviour. These problems are known to play a vital role in the execution of the program, but they are difficult to quantify. In many countries, they are the principal factors for reducing the operational and supervisory capacities and consequently resulting in inadequate coverage and poor quality of field work.

III. RESEARCH

The Directing Council, and PAHO's Advisory Committee of Medical Research have stressed the need to develop field applied research in malaria particularly for designing adequate methodology to solve field problems. Current efforts are directed to the identification of sources for research funds, training of field investigators, and promotion of applied field research or activities of national malaria programs coordinated by a regional research program. In spite of several constraints the following research activities were in progress during 1980:

A) Field insecticide trials

In Guatemala, Deltamethrin (OMS-1998), was tested at doses of 0.025, 0.05, 0.075 and 0.1 grams per square meter in residual house spraying. Furniture, hanging objects and other household articles were not sprayed. Preliminary results of bioassay show mortality of 98.3% of A(N) albimanus on wood and 85.9% on block surfaces after 7 months of the spray. Nevertheless, some irritability may pose a serious program, which is being investigated. Problems have also been experienced with the impregnation of papers for susceptibility testing and the field performance of the test due to problems in obtaining an even distribution of the insecticide on the surface of test papers and the relatively high variation of toxicity of the insecticide with changes in temperature.

In Haiti, a field trial started in January 1980 to compare the relative efficacy of malathion, and fenitrothion, under local conditions in approximately 13,000 houses with each insecticide. DDT was added as the third test insecticide in order to assess its usefulness in areas where the vector resistance to this insecticide is not so marked. The bioassay tests on fenitrothion sprayed surfaces show 100% mortality of A(N) albimanus maintained through the end of the 3 months cycle, whereas with DDT and malathion, mortality is considerably reduced in the same period. Although the final evaluation of the trial is to be made in October 1981, the results of the periodic blood surveys are now available. At each blood survey, a blood slide was taken from everybody living in certain selected localities situated in the center of each test area. In the fenitrothion area, the Parasite rate (P.R.) dropped from 4.75% in January 1980 to 0.67% in January 1981. In the malathion area, the P.R. dropped from 8.31% to 4.21%, while in the control area from 14.43% to 6.48% in the same period. In the DDT area, P.R. showed no change (3.80% and 3.89%).

In an operational trial of fenitrothion initiated in 1978 in Les Cayes, Haiti, one of the two most important foci in the country, malaria transmission has been considerably reduced after six (6) four-month cycles; annual parasite incidence (API) dropped from 62.5 per 1,000 inhabitants in 1978 to 4.4°/oo in 1980.

B) Malaria Immunology

The Malaria Unit at the Instituto Nacional de Salud (INS) in Bogota, Colombia, is carrying out primate investigations of malaria immunology in non-human primates. Appropriate simian models are being developed for the study of human malaria, evaluating simian hosts for their value in producing malaria antigens and the optimum methods for collection and preservation of parasites for antigen preparation. Work has been initiated to compare protection immune mechanisms in the Simian host and in man, and conduct pathological and toxicological studies in primates with immunizing agents. The efficacy of malaria immunization in simians is being studied using purified merozoite preparations of P. falciparum with or without adjuvants.

The unit is using an in vitro continuous cultivation system, and serologic and immune complexes techniques. South American strains are being typed regarding to their response to antimalarial drugs and preliminary activities on biochemical and antigenic characterization of plasmodia strains are being started.

Efforts are being made to colonize Aotus in captivity at the field station in Armero and at the INS in Bogota.

C. Malaria Chemotherapy

The in vitro assessment of the sensitivity of P. falciparum to chloroquine shows that 80% of the isolates studied in Brazil, Colombia, Ecuador and Panama, are resistant to 1.5 nanomoles of chloroquine diphosphate per milliliter of blood or more (480 microgrammes/Liter).

In Haiti, isolates in 1980 showed that P. falciparum maintains a high susceptibility at the same levels observed in 1971. In Honduras and El Salvador no indication of resistance has been observed. Nicaragua results are somewhat different in 1980, since 1.25 nMol chloroquine/ml blood are required to inhibit maturation of schizonts, instead of 0.75 nMol/ml observed in 1976. Nevertheless, more cases should be investigated to confirm these observations. Bolivia reported P. falciparum resistant to chloroquine in Guayaramerin, Beni, through clinical observations in the hospitals confirmed by in vitro tests in January, 1980.

Clinical and follow-up routine observations in Brazil and Colombia suggest an increasing number of failures to cure falciparum infections with combined pyrimethamine sulfadoxine.

The malaria unit of the Instituto Nacional de Salud, Colombia, and the Evandro Chagas Institute, Brazil are planning to carry out P. falciparum strain typing and biochemical characterization together with close surveillance for better understanding of the epidemiology of the drug resistant phenomenon.

The Government of Brazil, with cooperation of PAHO/WHO and financial support of the WHO/WB/UNDP Special Programme (TDR) completed the phase II study for efficacy, tolerance and pharmacodynamics of mefloquine, an alternate antimalarial drug of the quinolinomethanol group. The analysis of the clinical and pharmacological data produced at the Hospital Barros Barreto in Belem do Para, Brazil, is in process, comparing with the results obtained from Thailand and Zambia where similar projects are in progress.

D. Seroepidemiology

Several countries in the Region (Brazil, Colombia, Costa Rica, Guyana, Mexico, Panama, Paraguay, Suriname and Venezuela), are interested in developing serodiagnostic units in the malaria programs as complementary tools for the study of malaria endemicity.

IV. TRAINING

The Continental Plan for the Promotion and Support of Malaria Programs in the Americas contemplates the strengthening of the Training Program as one of its most important components.

While the global time-limited eradication program was originally planned as the application of a specific methodology on a "total coverage" basis, following pre-defined stages, a control strategy required a closer adaptation to local conditions and demands a wider epidemiological knowledge of the malariologist to identify the problems and their magnitude, to select appropriate methodologies according to the local epidemiological situation and available resources, to design an evaluation system to assess the efficacy of the antimalarial measures applied, and to improve strategies or methodologies in the light of evaluation results and/or changes of epidemiological situation or resources.

During the period 15 November-13 December 1980 a group of experts, including staff members and consultants of WHO, PAHO and US/CDC, visited six countries in a first attempt, to review curricula of existing courses, training facilities and staff, to prepare an inventory of resources, to study continental needs for National and international training, and to estimate needs for external cooperation and financial supports.

The study group was divided into two subgroups, one traveling to Brazil, Peru, and Colombia and the other to Mexico, Cuba, and Venezuela. They visited selected training institutions and interviewed the persons responsible for the malaria program, and those responsible for courses in specific fields, particularly malariology, environmental health, tropical diseases, parasitology, entomology, public administration, and research on malaria and other parasitic diseases. Some schools of agriculture, involved in parasitology and agricultural entomology, were also visited. Further attempts have been made to collect information from other countries than those visited by the study group. On the basis of the material gathered, working documents will be prepared and presented at a one week seminar to be convened early in 1982 in order to review a draft regional training program, the guidelines for its implementation and to develop mechanisms of coordination. It is anticipated that this seminar would involve directors of training institutions identified as possible participants in the Regional Training Program, the users of said programs represented by selected Directors of National Eradication Services, invited experts from potential collaborating agencies, and short terms consultants, in addition to PAHO and WHO staff involved in the training program.

The Ministry of Health of Colombia organized an international course of malariology for medical officers with the participation of the Malaria Service (SEM), National Institute of Health (INS), National School of Public Health/ University of Antioquia, University of Valle and PAHO. The course was conducted during September 22-December 4, 1980, through the utilization of a modular system. The course was attended by 10 trainees; 6 national staff and 4 international fellows (Argentina, Brazil, Costa Rica and Honduras). Some minor problems were observed through this approach, but the course was considered to be successful by the Health Authorities, the professors and the students themselves. It has been planned to repeat the course in 1981.

The School of Malariology and Environmental Sanitation in Maracay, Venezuela held its XXXVI International Course for Malaria and Environmental Sanitation from 15 January through 31 October, 1980. In addition to national trainees, the course received 5 trainees from other countries (Bolivia-1, Colombia-2, Cuba-1, Haiti-1). The Government of Venezuela paid the stipends, while PAHO paid the costs of transportation to and from Venezuela. The XXXVII Course was initiated on 19 January 1981 and it will be completed on 31 October 1981. PAHO selected 8 trainees for this course (Bolivia-1, Ecuador-1, Haiti-2, Nicaragua-2, Peru-2). The Government of Venezuela paid stipends for 4, while PAHO paid the others and transportation for all 8 fellows.

The School of Public Health of the Department of Health and Welfare of Mexico held its fifth "Master's Degree course in Public Health with emphasis on Malaria and other Parasitic Diseases" from 11 February to 12 December, 1980. The course was attended by nine students (Mexico 6, Argentina 1, Colombia 1, Dominican Republic 1).

The sixth course was initiated on 9 Februrary, 1981 and it is expected to be completed on 11 December, 1981. This course is being attended by nine students (Mexico 7, Dominican Republic 1, Guatemala 1).

The National Malaria Eradication Service of Mexico (CNEP) offered the II International Training Course for malaria field supervisors from 20 April to 31 July, 1981. In addition to the National trainees, 5 PAHO fellows attended this course (Costa Rica-1, Panama-2, Peru-2). The CNEP announced its X International Malaria Course for medical officers and engineers to be held from 10 August to 19 November, 1981. As of July, PAHO received two candidates for the course (Cuba and Panama).

V. INTERNATIONAL COOPERATION AND COORDINATION

The XXVI Meeting of the PAHO Directing Council (1979) in their recommendation on malaria requested the Director and the Governments to explore all possible sources of funds for the support of malaria activities on the national and hemispheric scale. The XXVII Meeting of the same Council (1980), requested the Director to continue the effort to channel extra budgetary funds to the support of malaria control in the Hemisphere. In compliance with these resolutions, the Director appointed a study team to look into the administrative and financial problems of the programs and their needs for external collaborations. The team was composed of two eminent public health administrators with global experiences in health administration and communicable disease control. During 12 October-15 Novemeber 1980, the team visited 4 countries (Colombia, Guatemala, Mexico and Peru) which were considered to represent the diversity of situations of the malaria programs in the Hemisphere. The team analyzed the problems principally in relation to administrative matters, such as the structure of the malaria service, trained technical personnel, logistics, transportation and financing. The report of the team provides the base to estimate the needs for external support. It contains also a series of recommendations to improve the management and administration of the regional malaria program.

Through the AMRO projects and technical personnel assigned to the malaria programs, the Organization continues its collaboration with the governments in antimalarial activities within the framework of technical cooperation. The comparative figures indicating the distribution and the number of PAHO/WHO technical personnel in the years of 1960, 1970, 1980 and 1981 are shown in Table 19 and the total number by category from 1957 to 1981 in Table 20. Upon request, the Organization also provides technical collaboration in specific fields by contracting short-term consultants. During the period, January 1979-March 19S1, PAHO/WHO staff and consultants participated in the program evaluation and reformulation of the national plans in Belize, Bolivia, Colombia, Ecuador, Guatemala, Guyana, Haiti, Honduras, Mexico, Nicaragua, Panama, and Suriname. This task has been carried out as a part of the hemispheric plan of action against malaria, as accorded at the III Meeting of Directors of National Malaria Eradication Services held in Oaxtepec, State of Morelos, Mexico in March 1979. The Organization also provides within the available funds budgeted in each country project, some equipment, antimalarial drugs, vehicles and entomological tests materials to the malaria program. Upon request and with the national funds, the organization provides services to purchase insecticides, antimalarial drugs, spraying equipment, vehicles and other equipment and supplies.

During 1980, the Special Program for Research and Training in Tropical Diseases of WHO/UNDP/World Bank (TDR) provided the necessary test kits to 18 countries for their study on susceptibility of P. falciparum to antimalarial drugs. TDR also continues its support to a research project for Clinical Trials of Mefloquine in Belem, Brazil. The United Nations Capital Development Fund (UNCDF) donated two million dollars to the malaria program in Nicaragua in 1980 to purchase vehicles and equipment which were destroyed or lost during the civil war and to provide insecticides, antimalarial drugs and other needed supplies. The World Health Organization also donated $41,000 in 1980 to the malaria program in Nicaragua to purchase antimalarial drugs. The United Nations Emergency Operations (UNEO) contributed $100,000 in 1980 and $60,000 in 1981 to Honduras to purchase insecticides and antimalarial drugs.

The Governments of Colombia, Mexico and Venezuela collaborated in training malaria personnel through their international training courses. The Government of Venezuela, in addition to providing the training facilities, also awarded 5 fellowships in 1980 and 4 fellowships in 1981 to the trainees selected by the Organization.

The United States of America, through its agency for International Development (AID) continued to provide financial supports to the Malaria Programs in Haiti and in Bolivia (PL-480 Financing Program). The Government of Japan donated 240 tons of fenitrothion to the Haiti Malaria Program in 1980.

For the better coordination of antimalarial activities and exchange of information and experience, the following border meetings were held during 1980.

Countries	Meeting Places	Dates
Dominican Republic - Haiti	Santo Domingo, Dom. Rep.	3-16 January
French Guiana - Suriname	St. Laurent, Fr. Guiana	14-15 March
Argentina - Paraguay	Buenos Aires, Argentina	23 April
Guatemala - Mexico	Tapachula, Mexico	28-29 April
	Guatemala, Guatemala	30 May
	Tapachula, Mexico	9-11 June
	Guatemala, Gua.	15-16 Dec.
Colombia - Venezuela	San Antonio, Venezuela	18-19 Sept.
Belize-Mexico	Campeche, Mexico	14 November
Costa Rica - Panama		
Sector Level	Paso Canoas, Costa Rica	weekly
Zone Level	Sixaola, Costa Rica	bi-weekly

TABLE 1

MALARIA CASES REGISTERED, 1977 - 1980

	GROUP	Population 1980 in originally malarious areas (in thousands)	Cases registered 1977	1978	1979	1980
GROUP 1	12 countries or territories in which malaria eradication has been certified	72 844 a)	531	718	1 162	2 249
GROUP II	Argentina	3 342	463	325	936	341
	Belize	158 a)	894	1 218	1 391	1 529
	Costa Rica	642	217	313	307	376
	Dominican Rep.	5 397	745	1 531	3 080	4 780
	French Guiana	65	488	266	604	831
	Guyana	900	1 563	927	2 294	3 202
	Panama	1 882	674	263	316	304
	Canal Zone	45	4	5	0	6
	Paraguay	2 571	156	156	116	140
	Sub-total	15 002	5 204	5 004	9 044	11 509
GROUP III	Brazil	49 757	104 436	121 577	147 630	176 237
	Ecuador	4 890	11 275	9 815	8 207	8 748
	Mexico	36 360	18 851	19 080	20 983	25 734
	Suriname	284	993	876	903	4 445
	Venezuela	10 365	5 304	5 065	4 705	3 884
	Sub-total	101 656	140 859	156 413	182 428	219 048
GROUP IV	Bolivia	2 002	10 106	10 897	14 712	16 619
	Colombia	16 659	63 888	53 412	60 957	57 346
	El Salvador	4 228	32 243	52 521	75 657	95 835
	Guatemala	2 730	34 907	59 755	69 039	62 657
	Haiti	4 378	27 679	60 472	41 252	53 478
	Honduras	3 267	39 414	34 554	25 297	43 009
	Nicaragua	2 733	11 584	10 633	18 418	25 465
	Peru	5 867	32 410	20 376	17 127	11 379b)
	Sub-total	41 864	252 231	302 620	322 459	365 788
	TOTAL	231 366	398 825	464 755	515 093	598 594

a) Mid-year 1979 last available population figure. b) Information up to August.

Table 2

POPULATION IN THE MALARIOUS AREAS
IN THE AMERICAS, 1958-1980

(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
1978	105 611	59 734	54 808	-	220 153	587 704
1979	113 092	57 280	55 989	-	226 361	600 263
1980	114 620	58 087	58 659	-	231 366	610 021

Table 3

STATUS OF THE MALARIA PROGRAMS IN THE AMERICAS, BY POPULATION, 1980
(Population in thousands)

Country or other political or administrative unit	Population of originally malarious areas								
	Total population	Total malarious areas		Maintenance phase		Consolidation phase		Attack phase	
		Total	%	Total	%	Total	%	Total	%
Antigua	75a)	-	-	-	-	-	-	-	-
Argentina	27 863	3 342	12.0	3 191	95.5	70	2.1	81	2.4
Bahamas	224a)	-	-	-	-	-	-	-	-
Barbados	251a)	-	-	-	-	-	-	-	-
Belize	158a)	158	100.0	-	-	84	53.2	74	46.8
Bermuda	59a)	-	-	-	-	-	-	-	-
Bolivia	5 071	2 002	39.5	-	-	-	-	2 002	100.0
Brazil	123 032	49 757	40.4	14 799	29.7	16 748	33.7	18 210	36.6
British Virgin Island	13a)	-	-	-	-	-	-	-	-
Canada	23 690	-	-	-	-	-	-	-	-
Cayman Islands	17	-	-	-	-	-	-	-	-
Chile	11 104	240	2.2	240	100.0	-	-	-	-
Colombia	28 000	16 659	59.5	-	-	12 127	72.8	4 532	27.2
Costa Rica	2 202	642	29.2	-	-	453	70.6	189	29.4
Cuba	9 734	3 277b)	33.7	3 277c)	100.0	-	-	-	-
Dominica	79a)	17b)	21.5	17c)	100.0	-	-	-	-
Dominican Republic	5 431	5 397	99.4	5 255	97.4	46	0.8	96	1.8
Ecuador	8 354	4 890	58.5	-	-	2 070	42.3	2 820	57.7
El Salvador	4 797	4 228	88.1	-	-	-	-	4 228	100.0
Falkland Islands	2a)	-	-	-	-	-	-	-	-
French Guiana	65	65	100.0	35	54.0	20	30.7	10	15.3
Grenada	110a)	41b)	37.3	41c)	100.0	-	-	-	-
Guadeloupe	320	284b)	88.7	284c)	100.0	-	-	-	-
Guatemala	7 258	2 730	37.6	-	-	-	-	2 730	100.0
Guyana	900	900	100.0	841	93.4	17	2.0	42	4.6
Haiti	5 125	4 378	85.4	-	-	-	-	4 378	100.0
Honduras	3 691	3 267	88.5	-	-	-	-	3 267	100.0
Jamaica	2 162a)	1 610b)	74.5	1 610c)	100.0	-	-	-	-
Martinique	315a)	197b)	62.5	197c)	100.0	-	-	-	-
Mexico	71 911	36 360	50.6	5 422	15.0	20 830	57.2	10 108	27.8
Monserrat	11a)	-	-	-	-	-	-	-	-
Netherland Antillas	260a)	-	-	-	-	-	-	-	-
Nicaragua	2 733	2 733	100.0	-	-	-	-	2 733	100.0
Panama	1 954	1 882	96.3	-	-	1 534	81.5	348	18.5
Canal Zone	45	45	100.0	-	-	45	100.0	-	-
Paraguay	3 062	2 571	84.0	625	24.3	1 219	47.4	727	28.3
Peru	17 779	5 867	33.0	1 641	28.0	2 790	47.5	1 436	24.5
Puerto Rico	3 410a)	3 410	100.0	3 410c)	100.0	-	-	-	-
St. Kitts, Nevis, Anguilla	67	-	-	-	-	-	-	-	-
Saint Lucia	128	108	84.4	108c)	100.0	-	-	-	-
St. Pierre & Miquelon	6	-	-	-	-	-	-	-	-
St. Vicent	97	-	-	-	-	-	-	-	-
Suriname	352	284	80.7	218	76.7	34	12.0	32	11.3
Trinidad & Tobago	1 100	1 044	95.0	1 044	100.0	-	-	-	-
Turks and Caicos	6	-	-	-	-	-	-	-	-
United States of America	220 099d)	62 508	28.4	62 508c)	100.0	-	-	-	-
Uruguay	2 878	-	-	-	-	-	-	-	-
Venezuela	13 913	10 365	74.5	9 749	94.1	-	-	616	5.9
Virgin Islands (USA)	108	108	100.0	108c)	100.0	-	-	-	-
T o t a l	610 021	231 366	38.0	114 620	49.5	58 087	25.1	58 659	25.4

a) Mid-year 1979 estimated (Population and Vital Statistics Report, October 1980.) b) 1979 Estimated. c) Population living in areas where malaria eradication has been registered by PAHO/WHO. d) Mid-year 1979, Bureau of Census Current Population Report, Series P.25 No. 875.

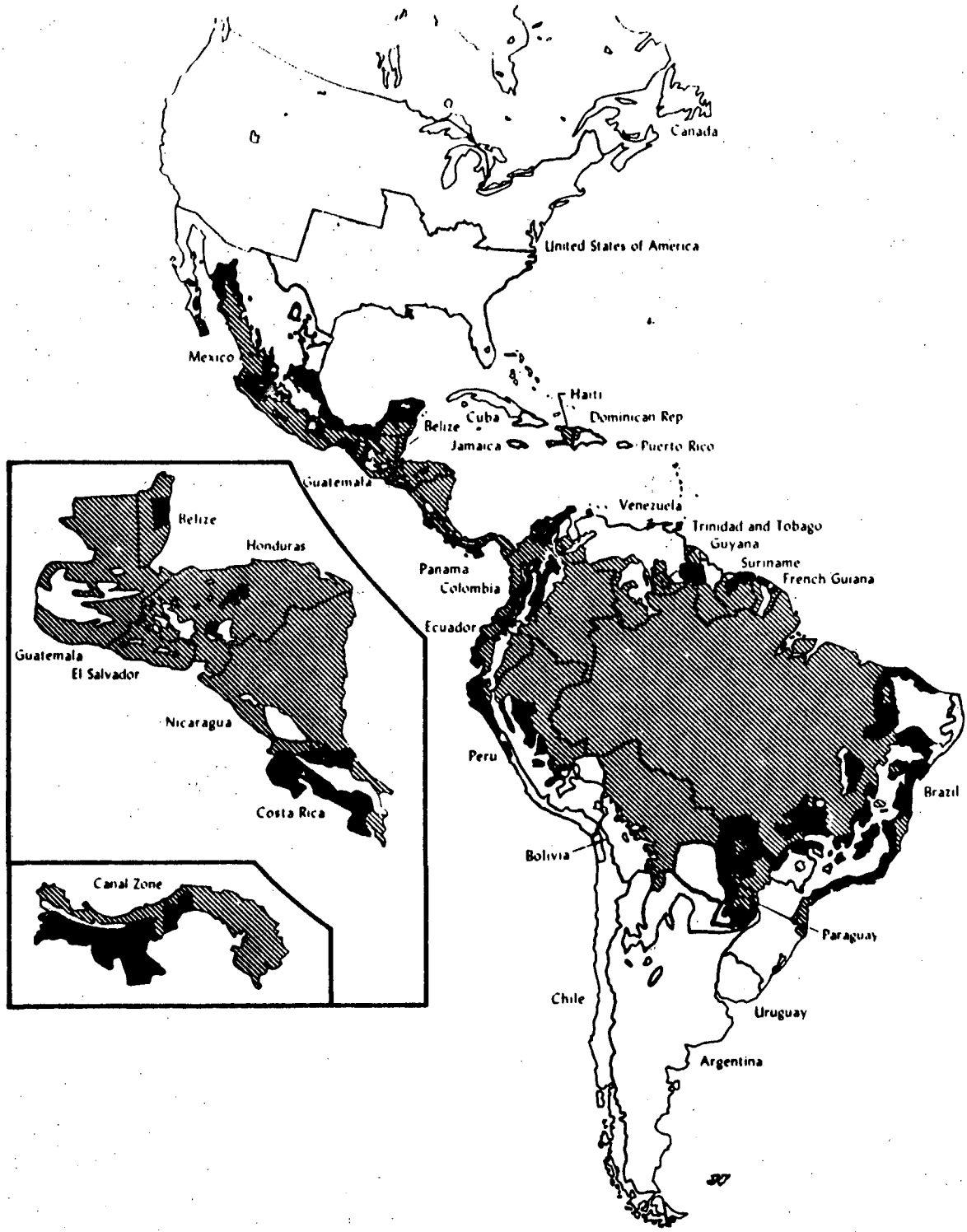
Table 4

STATUS OF THE MALARIA PROGRAMS IN THE AMERICAS, BY AREA, 1980

(Area in Km^2)

Country or other political o administrative unit	Total Area	Originally malarious areas							
		Total Malarious Area		Maintenance phase		Consolidation phase		Attack phase	
		Total	%	Total	%	Total	%	Total	%
Antigua	280	-	-	-	-	-	-	-	-
Argentina	4 024 458	349 051	8.7	334 527	95.9	3 249	0.9	11 275	3.2
Bahamas	11 396	-	-	-	-	-	-	-	-
Barbados	430	-	-	-	-	-	-	-	-
Belize	22 965	22 965	100.0	-	-	7 161	31.2	15 804	68.8
Bermuda	53	-	-	-	-	-	-	-	-
Bolivia	1 098 581	821 346	75.0	-	-	-	-	821 346	100.0
Brazil	8 511 965	6 898 045	81.0	190 469	2.8	814 874	11.8	5 892 702	85.4
British Virgin Islands	174	-	-	-	-	-	-	-	-
Canada	9 221 016	-	-	-	-	-	-	-	-
Cayman Islands	183	-	-	-	-	-	-	-	-
Chile	756 626	58 073	7.7	58 073	100.0	-	-	-	-
Colombia	1 138 914	970 849	85.2	-	-	156 863	16.2	813 986	83.8
Costa Rica	50 900	35 446	69.6	-	-	22 653	64.0	12 793	36.0
Cuba	110 922	37 502	33.8	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	18 507	87.5	-	-	-	-	18 507	100.0
Falkland Islands	11 961	-	-	-	-	-	-	-	-
French Guiana	90 000	90 000	100.0	50	0.1	82 300	91.4	7 650	8.5
Grenada	344	103	30.0	103a)	100.0	-	-	-	-
Guadeloupe	1 950	1 244	63.8	1 244a)	100.0	-	-	-	-
Guatemala	108 889	80 350	73.8	-	-	-	-	80 350	100.0
Guyana	215 025	215 025	100.0	39 437	18.3	84 114	39.1	91 474	42.6
Haiti	27 750	19 100	65.2	-	-	-	-	19 100	100.0
Honduras	112 088	101 351	90.4	-	-	-	-	101 351	100.0
Jamaica	11 428	10 028	87.7	10 028a)	100.0	-	-	-	-
Martinique	1 080	300	27.8	300	100.0	-	-	-	-
Mexico	1 967 183	1 150 000	58.5	190 952	16.6	546 433	47.5	412 615	36.0
Monserrat	84	-	-	-	-	-	-	-	-
Netherland Antillas	961	-	-	-	-	-	-	-	-
Nicaragua	127 358	118 358	93.0	-	-	-	-	118 358	100.0
Panama	76 512	70 702	92.4	-	-	30 145	42.6	40 557	57.4
Canal Zone	1 675	1 432	85.5	-	-	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	-	-	-	-	-	-	-	-
Saint Lucia	620	510	82.3	510	100.0	-	-	-	-
St. Pierre & Miquelon	240	-	-	-	-	-	-	-	-
St. Vicent	389	-	-	-	-	-	-	-	-
Suriname	163 820	163 750	100.0	8 955	5.5	55 345	33.8	99 450	60.7
Trinidad & Tobago	5 630	5 449	96.3	5 449	100.0	-	-	-	-
Turks and Caicos	522	-	-	-	-	-	-	-	-
United States of America	9 365 604	2 309 876	24.7	2 309 876	100.0	-	-	-	-
Uruguay	186 926	-	-	-	-	-	-	-	-
Venezuela	915 741	600 000	65.5	460 054	76.7	-	-	139 946	23.3
Virgin Islands (USA)	345	345	100.0	345	100.0	-	-	-	-
T o t a l	40 406 498	15 749 505	39.0	4 167 634	26.4	2 136 541	13.6	9 445 330	60.0

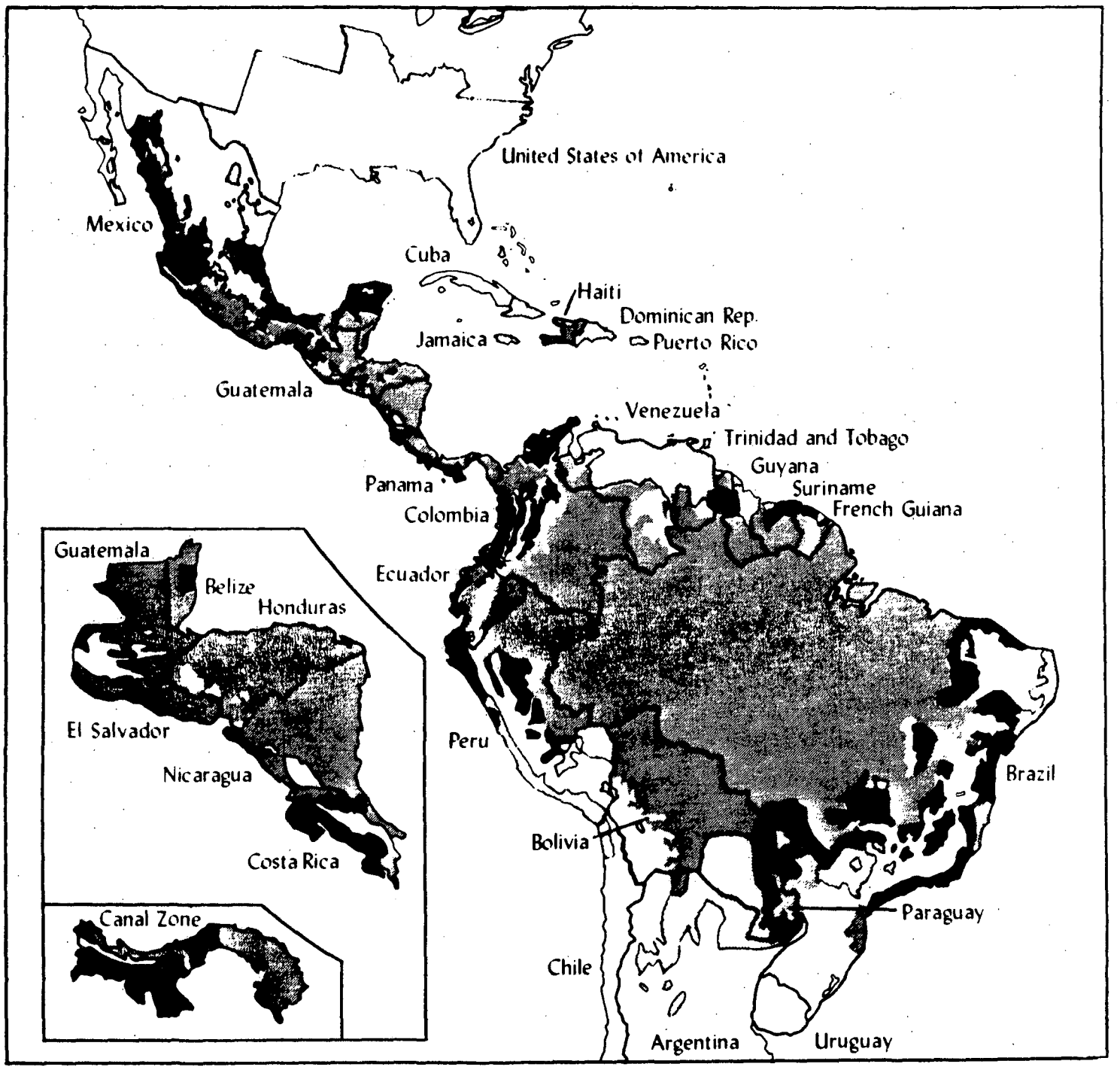
Status of the Malaria Program in the Americas, 31 December 1979



Including

- Areas in which malaria has disappeared or never existed — Antigua, Bahamas, Barbados, Barbuda, Bermuda, St. Kitts-Nevis-Anguilla, St. Vincent, Turks and Caicos Islands, Virgin Islands (UK)
- Areas where malaria has been eradicated (Maintenance phase) — Dominica, Grenada, Guadeloupe, Martinique, St. Lucia, Trinidad and Tobago, Virgin Islands (US)
- In consolidation phase
- In attack phase

STATUS OF THE MALARIA PROGRAM IN THE AMERICAS DEC. 1980



Areas in which malaria has disappeared or never existed

Including: Antigua, Bahamas, Barbados, Barbuda, Bermuda, St. Kitts-Nevis-Anguilla, St. Vincent, Turks and Caicos Islands, Virgin Islands (UK)

Areas where malaria has been eradicated (Maintenance phase)

Including: Dominica, Grenada, Guadeloupe, Martinique, St. Lucia, Trinidad and Tobago, Virgin Islands (US)

In consolidation phase

In attack phase

Table 5

MALARIA MORBIDITY IN THE AMERICAS

1958- 1980

Year	Population		Blood Slides			Morbidity per 100,000 inhabitants	
	Total Countries	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	11 797 983	333 280	2.8	71.88	200.21
1967	474 868	169 901	11 609 228	369 388	3.2	77.79	217.41
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	9 352 775	379 364	4.1	67.11	179.72
1977	576 942	215 550	9 274 480	398 925	4.3	69.14	185.07
1978	587 319	220 153	9 493 751	468 923	4.9	79.84	213.00
1979	600 263	226 361	8 630 653	515 271	6.0	85.84	227.63
1980	610 021	231 366	8 900 046	599 216	6.7	98.93	258.99

Table 6

CASE DETECTION BY COUNTRY AND PHASE OF PROGRAM, 1980

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	35 501	341	21 545	45	4 210	6	9 746	290	-	-
Belize	23 925	1 529	-	-	8 926	104	14 999	1 425	-	-
Bolivia	143 648	16 619	-	-	-	-	142 960	16 343	688	276
Brazil	2 838 643	176 237	147 299	1 161	693 344	2 891	1 943 520	169 045	54 480	3 140
Cayman Islands	8	8	-	-	-	-	-	-	8	8
Canada	613	613	-	-	-	-	-	-	613	613
Colombia	436 275	57 346	-	-	173 529	7 339	261 341	49 787	1 405	220
Chile	0	0	-	-	-	-	-	-	-	-
Costa Rica	167 039	376	-	-	62 595	121	102 574	147	1 870	108
Cuba	359 994	307	359 994	307	-	-	-	-	-	-
Dominica	...	...	...	...	-	-	-	-	-	-
Dominican Republic	390 770	4 780	343 651	3 646	8 756	92	38 304	1 042	59	0
Ecuador	367 129	8 748	-	-	105 644	343	260 147	8 382	1 338	23
El Salvador	425 264	95 835	-	-	-	-	425 264	95 835	-	-
French Guiana	15 462	831	3 819	339	4 969	155	6 674	337	-	-
Grenada	...	...	...	...	-	-	-	-	-	-
Guadeloupe	1	1	1	1	-	-	-	-	-	-
Guatemala	456 784	62 657	-	-	-	-	445 128	61 058	11 656	1 599
Guyana	139 433	3 202	32 479	53	-	-	106 954	3 149	-	-
Haiti	333 157	53 478	-	-	-	-	333 157	53 478	-	-
Honduras	175 623	43 009	-	-	-	-	175 623	43 009	-	-
Jamaica	...	...	...	...	...	...	...	...	...	...
Mexico	1 467 695	25 734	51 231	20	605 400	2 252	790 134	23 176	20 930	286
Nicaragua	222 236	25 465	-	-	-	-	222 236	25 465	-	-
Panama	360 172	304	-	-	190 068	26	170 104	278	-	-
Canal Zone	234	6	-	-	234	6	-	-	-	-
Paraguay	93 899	140	7 191	20	43 530	8	42 736	111	442	1
Peru a)	107 662	11 379	16 814	126	4 275	46	86 573	11 207	-	-
Puerto Rico	5	5	5	5	-	-	-	-	-	-
St.Kitts,Nevis, Ang.	1	1	-	-	-	-	-	-	1	1
Saint Lucia	4	0	4	0	-	-	-	-	-	-
Suriname	91 141	4 445	2 880	17	22 138	69	63 242	4 195	2 881	164
Trinidad & Tobago	4 514	3	4 514	3	-	-	-	-	-	-
United States	1 839	1 933	1 839	1 933	-	-	-	-	-	-
Venezuela	241 375	3 884	140 904	543	-	-	99 540	3 163	931	178
Total	8 900 046	599 216	1 134 170	8 219	1 927 618	13 458	5 740 956	570 922	97 302	6 617

a) Information up to August.

Table 7

SLIDES EXAMINED AND POSITIVES, BY SPECIES AND CLASSIFICATION,

MAINTENANCE PHASE, 1980

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 investigate
									from abroad	from areas within country				
Argentina	21 545	45	-	45	-	-	4	6	21	13	-	1	-	-
Brazil	147 299	1 161	411	696	1	53	175	4	6	659a)	2	2	3	310
Cuba	359 994	307b)	77	197	22	1	-	-	299	-	-	8	-	-
Dominica	...	...	-	-	-	-	-	-	-	-	-	-	-	-
Dominican Republic	343 651	3 646	3 643	1	2	-	500	-	819	-	2	1 649	-	676
French Guiana	3 819	339	321	18	-	-	231	-	15	79a)	-	-	14	-
Grenada	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Guadeloupe	1	1c)	...	...	...	...	...	...	...	...	...	...	...	...
Guyana	32 479	53	1	52	-	-	-	-	-	47a)	-	-	-	6
Jamaica	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mexico	51 231	20	3	16	1	-	3	1	4	9a)	1	1	1	-
Paraguay	7 191	20	-	20	-	-	16	-	-	4	-	-	-	-
Peru d)	16 814	126	1	125	-	-	26	-	2	90a)	-	-	-	8
Puerto Rico	5	5e)	...	...	...	...	-	-	1	-	-	-	-	4
Saint Lucia	4	0	-	-	-	-	-	-	-	-	-	-	-	-
Suriname	2 880	17	17	-	-	-	-	-	-	17	-	-	-	-
Trinidad & Tobago	4 514	3e)	2	-	-	-	-	-	-	-	3	-	-	-
United States	1 839	1 933	42	168	4	(f)	-	-	1 925	-	7g)	1	-	-
Venezuela	140 904	543	41	502	-	-	47	7	118	226	1	144	-	-
T o t a l ...	1 134 170	8 219	4 559	1 840	30	54	1 002	18	3 210	1 144	16	1 806	18	1004

a) Includes cases imported from Attack and Consolidation phases. b) Includes 10 P. ovale cases. c) Unknown specie and origin. d) Information up to August. e) One case without diagnosed specie. g) Nine cases P. ovale, 12 without diagnosed specie and from 1,698 cases the specie of parasite was not reported. g) Includes 5 congenital cases.

Table 8

SLIDES EXAMINED AND POSITIVES, BY SPECIES AND CLASSIFICATION, CONSOLIDATION PHASE, 1980

Country or other political or administrative unit	Population (thousands)	Blood slides examined	Total cases	API*	Specie of parasite				Origin of infections							
					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	70	4 210	6	0.1	-	6	-	-	-	-	2	4	-	-	-	-
Belize	84	8 926	104	1.2	16	88	-	-	9	-	16	43	-	-	31	5
Brazil	16 748	693 344	2 891	0.2	712	2 152	-	27	974	5	13	1 148	2	26	6	717
Colombia	12 127	173 529	7 339	0.4	2 795	4 500	-	44	2 339	10	34	3 645	10	9	380	912
Costa Rica	453	62 595	121	0.3	18	103	-	-	81		33	4	-	-	-	3
Dominican Republic	46	8 756	92	2.0	92	-	-	-	35	-	-	-	-	29	-	28
Ecuador	2 070	105 644	343	0.2	73	269	-	1	120	-	-	190	-	1	-	32
French Guiana	20	4 969	155	7.7	134	18	-	3	128	-	9	10	-	-	-	8
Guyana	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mexico	20 830	605 400	2 252	0.1	30	2 219	1	2	889	78	35	300	8	48	149	745
Panama	1 534	190 068	26	0.02	7	18	-	1	3	-	20	3	-	-	-	-
Canal Zone	45	234	6	0.1	1	5	-	-	...	...	...	...	...	...	...	...
Paraguay	1 219	43 530	8	0.01	1	7	-	-	1	-	2	-	-	2	2	1
Peru	2 790	4 275	46	0 02	-	46	-	-	38	8	-	-	-	-	-	-
Suriname	34	22 138	69	2.0	63	3	-	-	17	-	4	43	-	2	-	3
Total	58 087	1 927 618	13 458	0.2	3 942	9 434	1	78	4 634	101	168	5 390	20	117	568	2 454

* Annual Parasite Incidence per 1,000 inhabitants.

... No information available.

TABLE 9

SLIDES EXAMINED AND POSITIVES BY SPECIES
ATTACK PHASE, 1980

Country or other political or administrative unit	Slides examined			Species found			
	Total	Positive		P. falciparum	P. vivax	P. malariae	Mixed Infections
		Number	Percentage				
Argentina	9 746	290	3.0	-	290	-	-
Belize	14 999	1 425	9.5	18	1 407	-	-
Bolivia	142 960	16 343	11.4	415	15 911	-	17
Brazil	1 943 520	169 045	9.0	71 094	95 606	11	2 334
Colombia	261 341	49 787	19.0	22 493	27 023	25	246
Costa Rica	102 574	147	0.1	43	102	-	2
Dominican Republic	38 304	1 042	2.7	1 042	-	-	-
Ecuador	260 147	8 382	3.2	2 674	5 701	-	7
El Salvador	425 264	95 835	22.5	15 236	80 053	-	546
French Guiana	6 674	337	1.6	240	95	-	2
Guatemala	445 128	61 058	14.0	4 129	56 758	-	171
Guyana	106 954	3 149	3.0	360	2 770	-	19
Haiti	333 157	53 478	16.0	53 478	-	-	-
Honduras	175 623	43 009	24.5	6 448	36 220	-	341
Mexico	790 134	23 176	3.0	999	22 157	1	19
Nicaragua.....	222 236	25 465	11.5	3 284	22 043	-	138
Panama	170 104	278	0.2	87	189	-	2
Paraguay	42 736	111	0.3	16	89	-	6
Peru	86 573	11 207	13.0	131	11 037	39	-
Suriname.....	63 241	4 195	4.2	4 010	185	-	-
Venezuela	99 540	3 163	3.2	760	2 371	3	29
Total	5 740 955	570 922	10.0	186 957	380 007	79	3 879

Table 10

SLIDES EXAMINED AND POSITIVES BY SPECIES,

NON-MALARIOUS AREAS, 1980

Country or other political or administrative unit	Slides examined			Species found			
	Total	Positive		P. falciparum	P. vivax	P. malariae	Mixed Infections
		Number	Percentage				
Bolivia	688	276	40.1	-	276	-	-
Brazil	54 480	140	6.0	1 243	1 848	3	46
Canada	613	613	...	...	...	...	...
Cayman Islands ...	8	8	-	...	...	...	...
Colombia	1 405	220	16.0	79	140	-	1
Costa Rica	1 870	108	6.0	6	102	-	-
Dominican Republic	59	0	-	-	-	-	-
Ecuador	1 338	23	1.7	-	23	-	-
Guatemala	11 656	1 599	14.0	57	1 538	-	4
Mexico	20 930	286	1.4	-	276	10	-
Paraguay	442	1	0.2	-	1	-	-
St. Kitts, Nevis, Anguilla	1	1	-	...	...	...	...
Suriname	2 881	164	5.7	157	7	-	-
Venezuela	931	178	19.1	18	160	-	-
Total	97 302	6 617	6.8	1 560	4 371	13	51

TABLE 11

COMPARATIVE RESULTS OF ACTIVE AND PASSIVE CASE DETECTION IN MALARIA PROGRAMS IN THE AMERICAS, 1980

Country or other political or administrative unit	Active case detection				Pasive 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	85	27 150	236	1.0	588	75	8 351	105	1.3	9.3	35 501	341
Belize	10	14 931	286	2.0	188	154	8 994	1 243	14.0	5.0	23 925	1 529
Bolivia	94	111 042	5 903	5.3	3 228	1 271	32 606	10 716	33.0	2.1	143 648	16 619
Brazil	3 927	1 844 039	31 770	1.7	32 289	14 047	994 604	144 467	14.5	6.0	2 838 643	176 237
Canada	-	-	-	-	-	-	613	613	-	-	613	613
Cayman Islands	-	-	-	-	-	-	8	8	-	-	8	8
Colombia	247	162 420	12 785	8.0	7 556	4 399	273 855	44 561	16.3	5.2	436 275	57 346
Costa Rica	94	165 336	252	0.2	848	277	1 703	124	7.3	0.5	167 039	376
Cuba	...	7 151	307	4.3	-	-	352 843	0	-	-	359 994	307
Dominican Republic	170	298 044	3 339	1.2	3 857	1 537	92 726	1 441	1.5	5.0	390 770	4 780
Ecuador	114	157 168	1 359	1.0	6 436	3 209	209 961	7 389	3.5	5.4	367 129	8 748
El Salvador	101	60 245	11 624	19.3	2 728	2 721	365 019	84 211	23.1	11.2	425 264	95 835
French Guiana	...	11 554	117	1.0	34	...	3 908	714	18.3	-	15 462	831
Guadeloupe	-	-	-	-	-	-	1	1			1	1
Guatemala	87	80 505	4 161	5.2	8 453	4 187	376 279	58 496	15.5	7.5	456 784	62 657
Guyana	88	118 068	2 215	2.0	32	32	21 365	987	4.6	55.6	139 433	3 202
Haiti a)	...	...	...	...	6 700	2 650	333 157	53 478	15.7	10.5	333 157	53 478
Honduras	...	23 141	2 101	9.1	3 116	...	152 482	40 908	27.0	-	175 623	43 009
Jamaica	...	...	...	...	...	...	...	...	...	...	...	...
Mexico	1 234	1 002 681	11 207	1.1	86 356	36 678	465 014	14 527	3.1	1.1	1 467 695	25 734
Nicaragua	99	13 616	544	4.0	5 017	2 125	208 620	24 921	12.0	8.2	222 236	25 465
Panama	284	325 503	241	0.1	721	249	34 669	63	0.2	11.6	360 172	304
Canal Zone	-	-	-	-	-	-	234	6	2.6	-	234	6
Paraguay	-	45 713	82	0.2	4 278	752	48 186	58	0.1	5.3	93 899	140
Peru b)	...	69 241	5 266	9.0	...	966	38 421	6 113	7.6	6.0	107 662	11 379
Puerto Rico	-	-	-	-	-	-	5	5	-	-	5	5
Saint Lucia	-	-	-	-	-	-	4	0	-	-	4	0
St. Kitts, Nevis, Anguilla	-	-	-	-	-	-	1	1	-	-	1	1
Suriname	42	81 789	3 114	4.0	82	75	9 352	1 331	14.2	10.4	91 141	4 445
Trinidad & Tobago	-	325	0	-	-	-	4 189	3	0.07	-	4 514	3
United States of America	-	-	-	-	-	-	1 839	1 933	-	-	1 839	1 933
Venezuela	476	165 068	1 516	1.0	2 820	451	76 307	2 368	3.1	14.1	241 375	3 884
Total	-	4 784 730	98 425	2.1	-	-	4 115 316	500 791	12.2	-	8 900 046	599 216

a) No information available on active case detection.
b) Information up to August.

SPRAYINGS WITH RESIDUAL INSECTICIDES APPLIED IN 1979 AND 1980 IN THE MALARIA PROGRAMS OF THE AMERICAS

Country or other political or administrative unit	Sprayings applied in 1979				Sprayings applied in 1980			
	DDT	Propoxur	Fenitrothion	Others	DDT	Propoxur	Fenitrothion	Others
Argentina	15 440	-	-	-	11 960	-	-	
Belize	11 399	-	-	-	16 835 a)	-	-	
Bolivia	98 409	-	-	-	122 013 b)	-	-	-
Brazil	4 180 295	-	-	-	4 016 014	-	-	-
Colombia	654 258	54 231 c)	-	5 859 d)	729 905 e)	-	-	8 633 d)
Costa Rica	50 208	11 592	-	-	43 527	9 678	-	-
Dominican Republic	28 647	-	-	-	84 501	-	-	-
Ecuador	488 113	-	-	-	222 997	-	-	-
El Salvador	-	88 092 f)	-	-	...	...	...	...
French Guiana	1 876	-	-	-	3 315	-	-	-
Guatemala	605 403g)	-	-	-	840 518 g)	-	-	-
Guyana	6 934	-	-	-	8 602	-	-	-
Haiti	-	-	392 295	4 230 e)	-	-	80 244	-
Honduras	90 500	-	-	-	146 092	8 270	-	-
Mexico	2 609 171	-	-	-	2 298 366	-	-	-
Nicaragua	4 993h)	27 823	-	5 071 i)	10 591	-	-	68 971 h)
Panama	42 306	21 944	-	-	48 279	21 675	-	-
Paraguay	86 845	-	-	-	78 576	-	-	-
Peru	37 997h)	-	-	-	117 684 h)	-	-	-
Suriname	2 198	-	-	-	3 611	-	-	-
Venezuela	386 868	-	-	8 970 j)	349 566	-	-	27 514 j)
T o t a l	9 401 860	203 682	392 295	24 130	9 122 992	39 623	80 244	105 118

a) Information up to October, last cycle not yet finished. b) Information up to November. c) Spraying with DDT and Propoxur
d) Malathion. e) Includes spraying with DDT, Propoxur, Malathion and Carbaril. f) Sprayings with DDT, Propoxur and Fenitrothion.
g) Fenitrothion and DDT. h) Incomplete information. i) Sprayings with Chlorphoxim. j) Sprayings with HCH.

TABLE 13

INSECTICIDES USED IN THE MALARIA PROGRAMS

1980 AND ESTIMATED 1981

Country or other political or administrative unit	D D T (Kg.)				DDT (Liters)		Propoxur 50%(Kg.)		Malation 50%(Kg.)		Other	
	1980		1981 (Est.)		1980	1981 (Est.)	1980	1981 (Est.)	1980	1981 (Est.)	1980	1981 (Est.)
	100%	75%	100%	75%								
Argentina	149	2 737	400	10 000	4 874	-	-	-	-	-	-	-
Belize	2 451	3 164	3 300	17 800	2 565	-	-	-	-	-	-	-
Bolivia	-	90 867	-	128 000		-	-	-	-	-	-	-
Brazil	177 319	2 158 997	250 000	2 160 000	56 680	70 000	-	-	-	8 500a)	-	-
Colombia	5 451	394 223	5 500	600 000	-	-	7 753	8 500	14 180	10 000	4 368b)	-
Costa Rica	1 780	18 795	1 800	20 000	-	-	5 220	3 000	-	-	-	-
Dominican Republic	1 908	34 009	6 000	35 000	-	-	-	-	-	9 000	-	-
Ecuador	7 019	148 432	10 000	200 000	-	-	-	-	-	-	6 000c)	13 000c)
El Salvador	-	-	-	-	-	-	10 000	15 000	-	-	1 500	2 000d)
French Guiana	1 660	253	1 992	303	-	-	675	810	10 670a)	12 806a)	2 785f)	3 342f)
Guatemala	-	36 000	-	15 000	-	-	-	-	-	-	273 095e)	300 000e)
Guyana	735	2 000	3 267	8 000	-	-	-	-	-	-	-	-
Haiti	124	17 300	-	-	-	-	-	-	25 926	-	104 000e)	185 439e)
Honduras	2 990	48 982	6 000	100 000	-	-	4 319	45 000	-	-	-	-
Mexico	32 590	1 381 210	19 450	692 896	-	-	-	-	-	-	656g)	36h)
Nicaragua	341	5 269	-	60 000	-	-	16 313	45 000	169 750	-	76 661i)	100 000j)
Panama	1 993	25 378	2 000	35 000	-	-	18 146	13 200	-	-	-	-
Paraguay	-	42 516	-	100 557	-	-	-	-	-	-	-	-
Peru	-	85 800	-	404 800	-	-	-	-	-	-	-	-
Suriname	500	411	1 500	1 500	-	-	-	-	-	-	-	-
Venezuela	-	185 252	-	207 500	67 300	96 300	2 614	4 560	3 431	21 000	(K)	(K)
Total	237 010	4 681 595	311 209	4 796 356	131 419	166 300	65 040	135 070	-	-	-	-

a) Liters of malathion. b) Carbar 1. c) 6,000 Lt. Fenitrothion were used in 1980 and 10,000 Lt. and 3,000 Kg. Fenitrothion in 1981. d) Liters Pyrethrum. e) Kg. Fenitrothion also there were used 290 Lt. Fenthion; and in 1981 there will be used 500 Lt. Fenthion and 9,100 Kg. Decametrin. f) Includes Dibron 14, Abate in granules and emulsion. g) Kg. H.C.H. 25%. h) 48.1 Lt. Abate 50% in 1980 and 36.5 Lt. in 1981. i) Fenthion WP and CE; also 47,794 Kg. chlorphoxim were used in 1980. k) 6,558.8 Kg. H.C.H.; 17,612.6 Lt. Pencothion 94% and 2,410.8 Lt. Lindane 25% were used in 1980 and the same insecticides will be used in 1981.

TABLE 14

PERSONNEL EMPLOYED IN THE MALARIA PROGRAMS IN THE AMERICAS

31 DECEMBER 1979 AND 1980

(PART - TIME PERSONNEL IN PARENTHESIS)

Title	1979	1980
Engineers	100	102
Spraying Chiefs	354	384
Sector Chiefs	563	630
Squad Chiefs	2 134	2 142
Spraymen	8 877	8 485
Draftsmen	118	120
Medical Officers	185 (8)	186 (5)
Entomologists	48 (10)	63
Assistant Entomologists	224 (4)	270
Statisticians and Statisticians Assistants	383 (28)	365 (19)
Evaluation Inspectors	2 120 (b)	1 648 (b)
Evaluators	7 142	7 783
Microscopists	883	938 (62)
Administrators	67	61
Administrative Assistants	585	647
Accountants	49	42
Disbursing Officers	43	41
Storekeepers	65	59
Storekeepers Assistants	72	122
Secretaries	275	276
Others	1 067	959
Transport Chiefs, Mechanics and Assistant Mechanics	444	453
Drivers	961	1 015
Motorboat Operators	375	333
Boatmen	62	94
TOTAL	27 196 (50)	27 218 (86)

a) The administration of some of the malaria programs is under the national health services.
b) In some programs this personnel performs spraying operations' activities.

TABLE 15

MEANS OF TRANSPORT IN MALARIA PROGRAMS IN THE AMERICAS, 1980

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	Others	
	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b		a	b
Argentina	1	-	52	17	16	8	1	-	-	-	7	6	-	-	-	-	-	-	-
Belize	-	-	4	3	2	1	-	-	6	-	2	-	3	-	-	-	-	-	-
Bolivia	-	-	33	4	15	8	-	2	8	-	-	-	14	11	-	-	60	7	20
Brazil	28	-	350	-	557	-	10	-	214	-	2 257	-	364	-	7	-	631	-	-
Colombia	12	2	26	69	37	131	2	25	18	15	68	50	145	95	17	15	731	1	1
Costa Rica	-	-	15	-	16	8	-	11	20	44	5	5	-	18	-	-	44	-	-
Dominican Republic .	-	1	8	48	-	2	1	5	150	-	1	-	-	-	-	-	56	-	-
Ecuador	-	2	22	17	9	18	2	3	17	33	13	5	30	25	-	-	245	45c)	3c)
El Salvador	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
French Guiana	1	-	3	-	3	-	2	5	-	-	-	-	4	1	-	-	-	-	-
Guatemala	-	2	37	19	43	11	23	4	28	46	11	-	9	26	-	-	-	-	-
Guyana	1	-	-	-	4	7	-	-	1	6	2	-	6	3	4	-	5	-	-
Haiti	2	-	23	39	8	35	7	7	10	-	-	-	-	-	-	1	-	-	-
Honduras	-	2	46	23	15	16	-	8	60	44	-	-	-	2	-	-	-	-	-
Mexico	21	9	232	180	379	165	30	14	-	-	-	-	-	-	42	3	1 686	-	-
Nicaragua	-	1	6	7	-	11	-	-	-	25	-	-	-	-	5	8	-	12c	-
Panama	-	-	9	11	15	13	-	1	20	25	17	2	-	-	60	12	-	62c	35c)
Paraguay	1	1	21	9	3	2	14	2	128	20	24	16	16	2	-	-	-	25c	14c)
Peru d)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Suriname	-	-	-	1	-	1	-	1	-	4	-	-	24	-	-	-	-	-	-
Venezuela	-	12	68	80	83	45	36	23	12	7	153	97	116	30	-	-	593	90	-
Total	67	32	955	527	1 205	482	128	111	692	269	2 560	181	731	213	135	39	4 051	242	73

... No information available

a) In good condition. b) In bad condition. c) Out-board motors. d) The Malaria Program of Peru has been integrated with the National Health Services.

TABLE 16

NATIONAL AND INTERNATIONAL CONTRIBUTIONS TO THE MALARIA PROGRAMS OF THE AMERICAS, EXPENDITURES 1979-1980 AND BUDGET 1981

(U.S.A. dollars)

	National Expenditures			PAHO/WHO Contributions			Grants & Loans			Total		
	1979	1980	1981 a)	1979	1980	1981 b)	1979	1980	1981 a)	1979	1980	1981
Argentina	1 226 102	2 341 895	...	31 241	10 527	26 273	-	-	-	1 257 343	2 352 422	26 273 c)
Belize	165 687	178 981	...	28 323	25 317	28 583	-	-	-	194 010	204 298	28 583 c)
Bolivia	736 000	1 012 459	...	128 650a)	108 653a)	251 047	815 993d)	815 993d)	775 193d)	1 680 643	1 937 105	1 026 240
Brazil	18 367 737	27 762 665	24 232 811	286 493	322 487	318 013	-	-	-	18 654 230	28 085 152	24 550 824
Colombia	6 336 296	10 740 363	7 916 421	155 956	186 329	221 171	1 981 559	925 642	6 258 544e)	8 473 811	11 852 334	14 396 136
Costa Rica	999 738	1 168 375	1 239 370	64 307	13 307	112 493	-	-	-	1 064 045	1 181 682	1 351 863
Dominican Republic	1 151 391	1 411 088	1 188 612	51 126	46 077	0	-	-	-	1 202 517	1 457 165	1 188 612
Ecuador	3 427 931	4 893 666	7 758 621	63 152a)	77 949a)	80 000a)	-	-	-	3 491 083	4 971 615	7 838 621
El Salvador	2 556 695	2 346 480	1 928 012	44 460	50 602	50 498	-	-	-	2 601 155	2 397 082	1 978 510
French Guiana	1 594 452	2 180 332	2 002 443	2 911	0	0	-	-	-	1 597 363	2 180 332	2 002 443
Guatemala	2 969 766	3 758 957	4 240 044	58 795a)	52 089	55 000	-	-	-	3 028 561	3 811 046	4 295 044
Guyana	745 098	412 698	496 032	60 998	21 985	114 015	-	-	-	806 096	434 683	610 047
Haiti	1 020 000	1 200 000	1 220 000	204 159	211 929	276 171	1 481 000	1 351 000d)	1 200 000d)	2 705 159	2 762 929	2 696 171
Honduras	2 106 277	2 106 277	...	35 000a)	37 000a)	40 000a)	-	16 896f)	-	2 141 277	2 160 173	40 000c)
Mexico	47 130 625	47 130 625	...	127 134	122 366	161 634	-	-	-	47 257 759	47 252 991	161 634c)
Nicaragua	2 078 965	4 675 600	...	146 982	118 493	110 707	-	156 230f)	23 770f)	2 225 947	4 950 323	134 477
Panama	1 695 639	2 147 000	2 400 000	95 663	40 957	0	-	-	-	1 791 302	2 187 957	2 400 000
Paraguay	1 765 425	2 090 034	2 803 047	74 947	77 790	39 310	-	-	-	1 840 372	2 167 824	2 842 357
Peru	720 000	...	...	26 870	26 340	36 260	331 435g)	...	...	1 078 305	26 340	36 260
Suriname	777 778	820 000	886 667	58 450	66 166	33 034	-	-	-	836 228	886 166	919 701
Venezuela	13 725 287	13 048 764	13 162 790	-	-	-	-	-	-	13 725 287	13 048 764	13 162 790
Intercountry Projects	-	-	-	661 246	610 865	534 070	-	30 000d)	-	661 246	640 865	534 070
Total	111 296 889	131 426 259	71 474 870	2 406 863	2 227 228	2 488 279	4 609 987	3 295 761	8 257 507	118 313 739	136 949 248	82 220 656

a) Estimated. b) Estimated based on the Operating Budget, Doc. ABU-1300-79. c) PAHO/WHO only. c) AID Grant. e) Includes $ 5,277,575 approved loan and $ 980,696 in negotiation. f) UNEO Grant. g) World Bank loan.

TABLE 17

ESTIMATED REQUIREMENTS FOR MALARIA PROGRAMS

IN THE AMERICAS

	1980	1981 a)	1982/1983 b)	1984/1985 b)
TOTAL COST	136 949 248	82 220 656	-	-
GOV. AND OTHER SOURCES	134 722 020	79 732 377	...	...
PAHO/WHO PORTIONS:				
Personnel costs and travel	1 678 101	1 684 675	3 633 700	4 865 600
Supplies and materials....	382 451	248 267	122 200	159 600
Fellowships	83 665	302 048	373 000	436 200
Courses, seminars and other	83 011	253 289	57 100	67 100
TOTAL	2 227 228	2 488 279	4 186 000	4 865 600

SOURCES OF PAHO/WHO FUNDINGS

SOURCE	1980	1981	1982/1983 b)	1984/1985 b)
PAHO-Reg	1 101 555	1 250 122	2 716 100	3 392 900
PG	40 103	270	1 469 900	1 472 700
WHO-Reg, WA, WN	1 085 570	1 237 887	-	-
TOTAL	2 227 228	2 488 279	4 186 000	4 865 600

PAHO/WHO PERSONNEL

CATEGORY	1980	1981	1982/1983 c)	1984/1985 c)
Medical Officers	11	10	18	18
Sanitary Engineers	2	2	4	4
Entomologists	2	2	6	6
Parasitologists	1	1	2	2
Sanitary Inspectors	9	9	14	14
Other	4	4	8	8
TOTAL	29	28	52	52

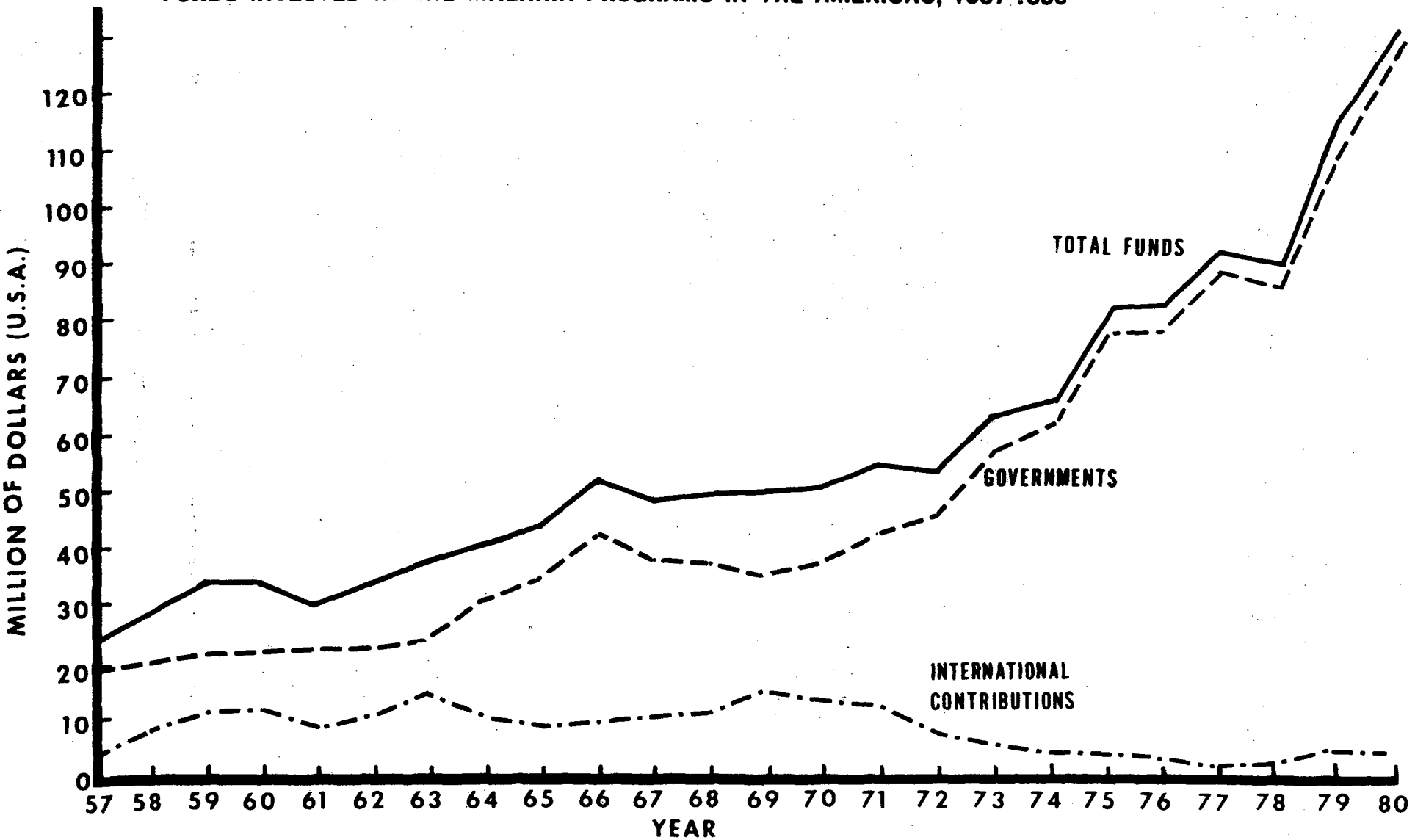
a) Estimated on the basis of the Operating Budget, Doc. ABU-1300-79.

b) According to Official Document No. 165.

c) Personnel for two years.

Graph 1

FUNDS INVESTED IN THE MALARIA PROGRAMS IN THE AMERICAS, 1957-1980



GRAPH 2

INTERNATIONAL FUNDS INVESTED IN THE MALARIA PROGRAMS IN THE AMERICAS, 1957-1980

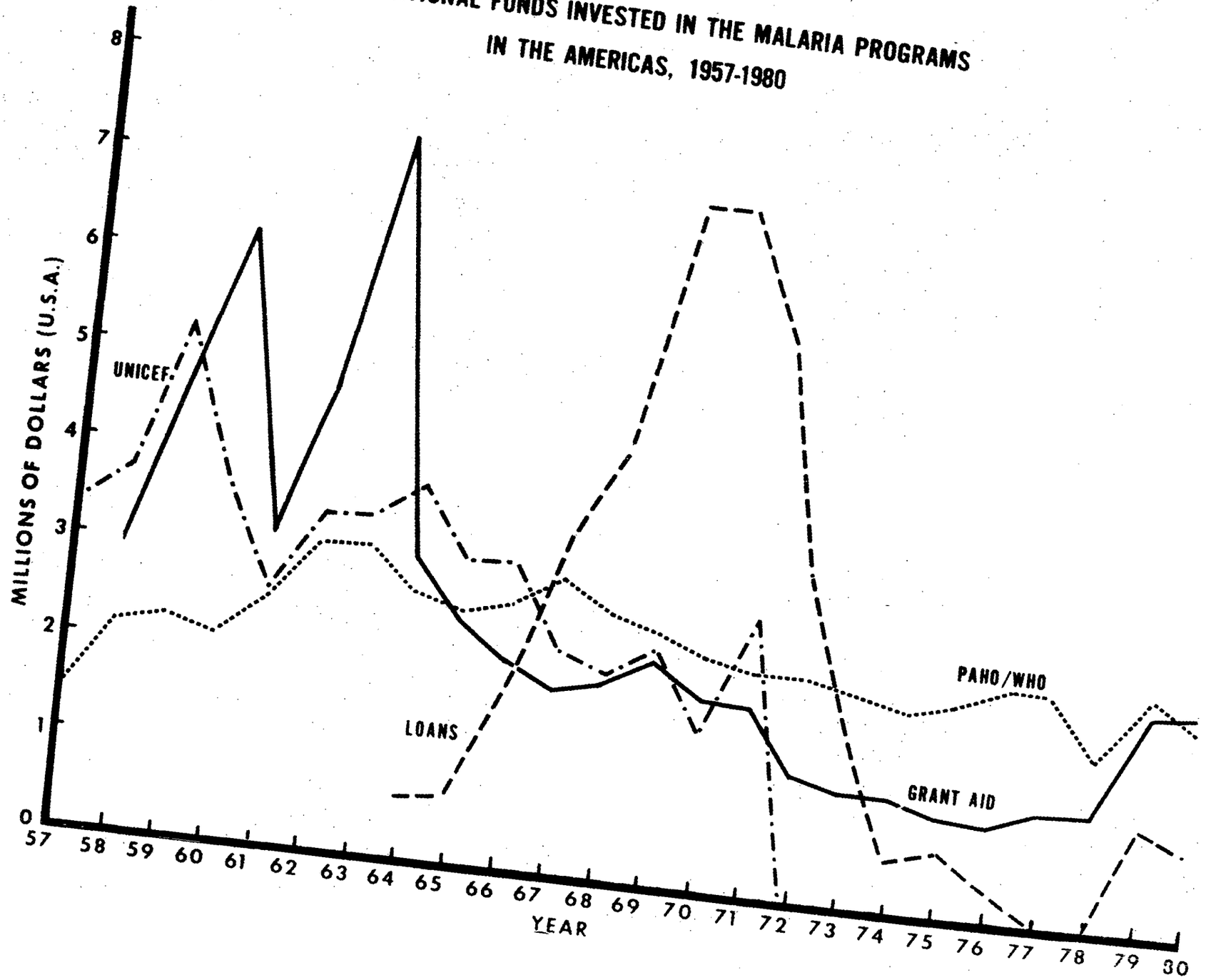


TABLE 18

GEOGRAPHICAL DISTRIBUTION OF AREAS WITH TECHNICAL PROBLEMS, 1980

Countries and Areas	Population of affected areas	Area Involved Km^2	Insecticides Used		No. of cases in this area	Principal Vectors	Causes of the Problem
			Type used	Years of coverage			
Bolivia							
1. Department Beni		27 639	DDT	21	1 265	A. darlingi A. pseudopun.	Poor housing colonization; parasite resistance to chloroquine; population movements.
Department Tarija	94 383						
Colombia							
2. Caribbean Coastal Zone; Magdalena River, Pacific Coastal Zone, Catatumbo Eastern and South Slope of Eastern Mountains, Alto Caqueta, Sarare; Meta River (Alto Vaupes)	1 794 588	192 962	DDT Propoxur	13-20	24 612	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							
3. Esmeraldas Napo	371 035	69 605	DDT Fenitrotion	12 1	4 983	A. punctimac A. albimanus A. pseudopun	Colonization; poor housing; parasite resistance to Chloroquine.
El Salvador							
4. Coastal Area	441 307	5 333	DDT	10 7	...	A. albimanus	Vector resistance to DDT and Propoxur
Guatemala							
5. Pacific Coastal Zone	877 767	11 456	Clorfoxim	...	32 732	A. albimanus	Vector resistance to insecticide.
Haiti							
6. Cite Simone O. Duvalier; Jacmel; Valle de la Coma; Gross-Morne; Southeast area; Petit-Goave; Bois Neuf	1 332 863	...	DDT	De 4 a 17	26 717	A. albimanus	Vector resistance to DDT; population movements.
Honduras							
7. South area; Jamastran Valley; Talanga and Cedros Valleys	237 635a)	5 436a)	Malation DDT	9	...	A. albimanus A. pseudopun	Vector resistance to chlorinated, organophosphorus & Carbamate insecticides.

... No information available.

a) Information of 1979.

TABLE 18 (Cont.)

GEOGRAPHICAL DISTRIBUTION OF AREAS WITH TECHNICAL PROBLEMS, 1980

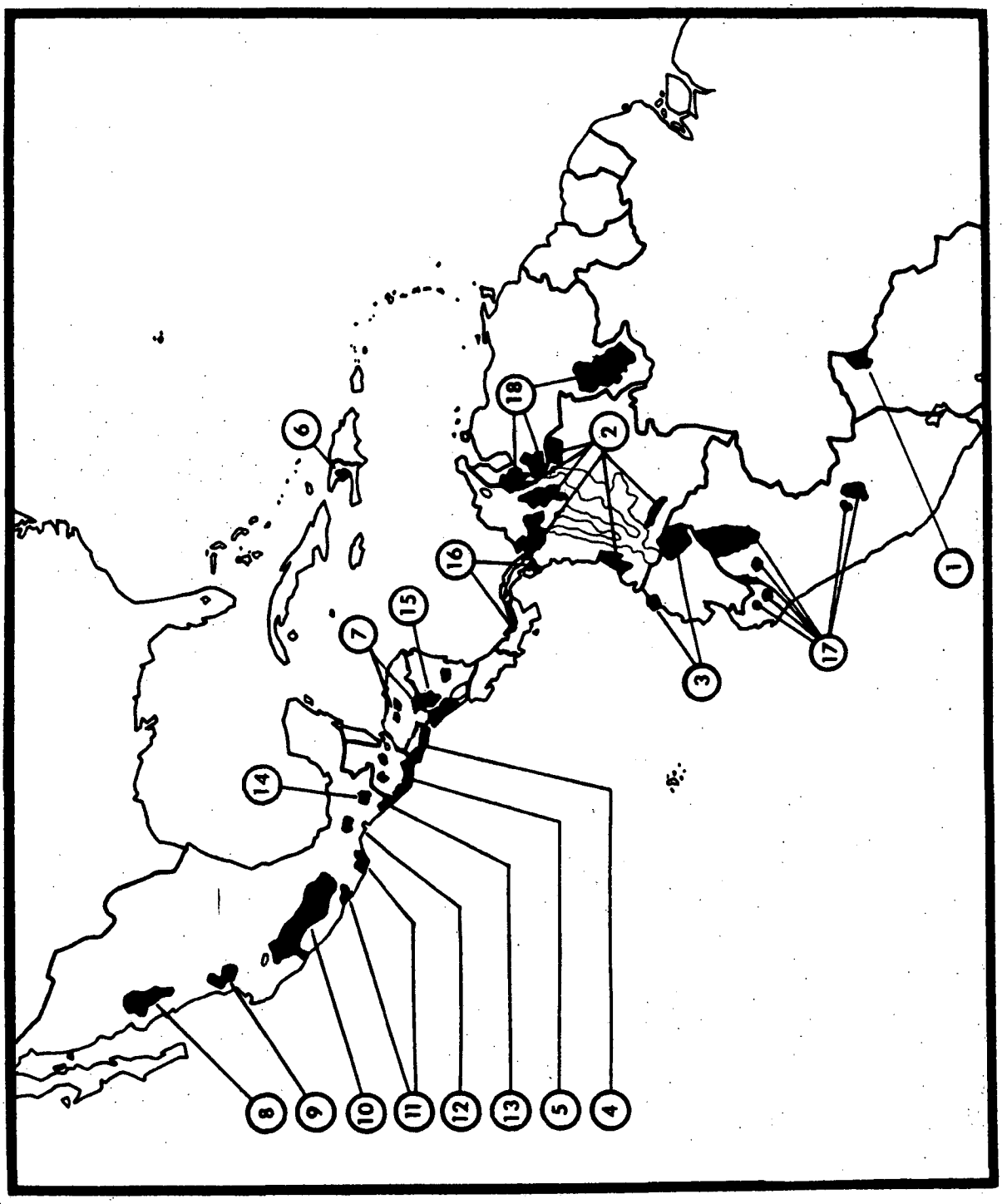
Countries and Areas	Population of affected areas	Area Involved Km^2	Insecticides Used		No. of cases in this area	Principals Vectors	Causes of the Problem
			Type used	Years of coverage			
Mexico							
8. Basins of Rivers Fuerte Sinaloa, Humaya and Tamazula; 9. Huicot 10. Basin of Balsas River 11. Costa Chica of Guerrero and Oaxaca Coastal Zone 12. "El Istmo" Northeastern Slope of the Golf of Mexico, Oaxaca State 13. Tapachula-Suchiate 14. Central part of Chiapas	2 768 833	161 316	DDT	23	12 057	A. pseudopun A. albimanus	Internal migration; poor housing; temporary shelters; modification of houses; vector resistance to DDT; actions that remove insecticides from surfaces.
Nicaragua							
15. Dpto. Chimandega, Leon & Managua Dpto. Granada and Rivas	1 195 573	16 644	DDT Malation Propoxur	16 5 7	19 144	A. albimanus	Vector resistance to DDT, Malathion and Propoxur.
Panama							
16. Jaqué Calovebora St. Catalina, Tobobe	7 822	4 871	DDT	21	90	A. albimanus	Migration; poor housing; parasite resistance, population movement
Peru							
17. Col. San Lorenzo; Bigote, Chinchipe, Bagua Santiago, Ene-Satipo Bajo Marañon	206 723	142 950	DDT	16-22	4 241	A. pseudopun 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	616 587	139 946	DDT	32	2 652	A. nuñeztovari A. darlingi	Vector exophily; population movement anthropological problems.
TOTAL	9 981 116	778 158b)	-	-	128 493	-	-

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 Brasil; 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 colonisation makes it necessary that anti-malarial campaign be carried out as a long term program.

b) Does not includes Haiti's area in km^2.

Map 3

GEOGRAPHICAL DISTRIBUTION OF AREAS OF TECHNICAL PROBLEMS, 1980



Map 4

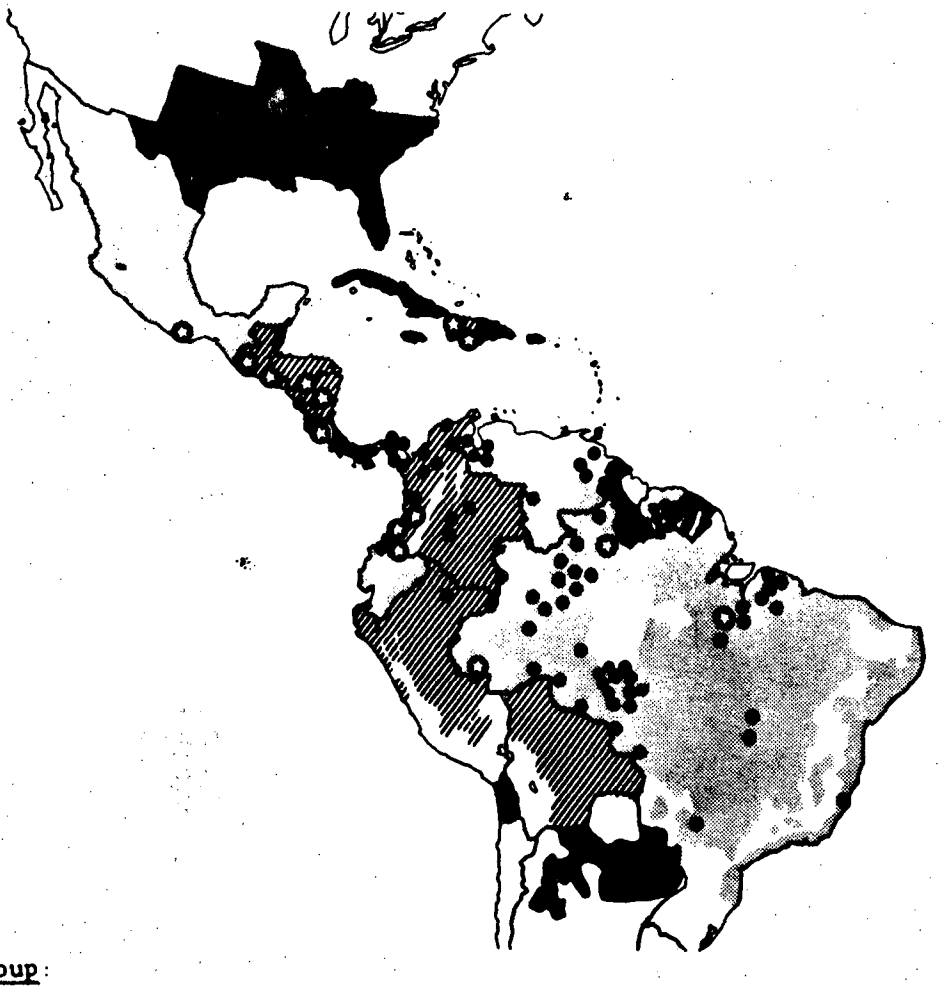
DISTRIBUTION OF A. (N) albimanus AND RESISTANCE TO DDT AND PROPOXUR (DECEMBER 1980)

Map 5

DISTRIBUTION OF A. (A) pseudopunctipennis AND RESISTANCE TO DDT (DECEMBER 1980)

MAP 6

CLASSIFICATION OF MALARIOUS AREAS IN THE AMERICAN REGION AND RESPONSE OF P. falciparum TO CHLOROQUINE



Group:

I - Chile, Cuba, Dominica, Grenada, Guadeloupe, Jamaica, Martinique, Saint Lucia, Trinidad and Tobago, United States of America (Puerto Rico and Virgin Islands)

II - Argentina, Belize, Costa Rica, Dominican Republic, French Guiana, Panama and Paraguay

III - Brazil, Ecuador, Mexico, Suriname and Venezuela

IV - Bolivia, Colombia, El Salvador, Guatemala, Haiti, Honduras, Nicaragua and Peru

P. falciparum response to chloroquine:

- Sensitive
- Resistant

TABLE 19

PAHO/WHO TECHNICAL STAFF ASSIGNED TO MALARIA PROGRAMS IN THE AMERICAS
BY COUNTRY, 1960, 1970, 1980 AND 1981

Country or other political or administrative unit	Medical Officers				Sanitary Engineers				Sanitary Inspectors				Entomologists				Others			
	1960	1970	1980	1981*	1960	1970	1980	1981*	1960	1970	1980	1981*	1960	1970	1980	1981*	1960	1970	1980	1981*
Belize	1	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-
Bolivia	1	1	-	-	1	-	-	-	4	1	1	1	-	-	-	-	-	-	-	-
Brazil	-	5	1	1	2	1	1	1	3	3	-	-	-	2	1	1	-	2a)	1b)	1
Colombia	2	2	1	1	1	-	-	-	6	1	2	2	-	1	-	-	1c)	-	-	-
Costa Rica	1	1	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-
Cuba	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dominican Rep.	1	1	-	-	1	-	-	-	3	-	1	-	-	-	-	-	-	-	-	-
Ecuador	1	1	-	-	1	-	-	-	4	2	1	1	-	-	-	-	-	-	-	-
El Salvador	1	2	-	-	1	1	-	-	2	1	1	1	-	-	-	-	-	-	-	-
Guatemala	1	2	-	-	1	1	-	-	2	1	-	1d)	-	-	-	-	-	-	-	-
Guyana	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Haiti	-	1	1	1	-	1	1	1	2	2	2	2	-	-	1	1	1e)	-	-	-
Honduras	1	1	-	-	1	-	-	-	2	1	-	-	-	-	-	-	-	-	-	-
Jamaica	1	-	-	-	1	-	-	-	2	-	-	-	-	-	-	-	1f)	-	-	-
Mexico	1	2	1	1	1	1	-	-	1	-	-	-	1	1	-	-	1g)	-	-	-
Nicaragua	1	2	1	-	1	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-
Panama	1	1	-	-	1	1	-	-	2	1	-	-	-	-	-	-	-	-	-	-
Paraguay	1	1	1	1	1	1	-	-	2	2	-	-	-	-	-	-	-	-	-	-
Peru	1	1	-	-	1	1	-	-	5	1	-	-	-	-	-	-	-	-	-	-
Suriname	1	-	-	-	-	-	-	-	2	1	1	1	-	-	-	-	-	-	-	-
Win. Islands	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2h)	-	-	-
AMRO Projects	9	10	5	5	3	1	-	-	1	2	-	-	6	2	-	-	14i)	4j)	-	-
Total	27	34	11	10	18	9	2	2	47	24	9	9	7	6	2	2	20	6	1	1

a) Administrative officers. b) Parasitologist. c) Malaria statistician. d) Vacant post. e) Entomological assistant. f) Health educator. g) Assistant engineer. h) One assistant engineer and one health educator. i) Six administrative officers, two parasitologists and six assistant entomologists. j) One economist, two administrative officers and one laboratory technician.

* Estimated

TABLE 20

PAHO/WHO PROFESSIONAL AND TECHNICAL STAFF

ASSIGNED TO MALARIA PROGRAMS IN THE AMERICAS, 1957 - 1981

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Medical Officer	14	24	25	27	31	33	32	31	27	32	33	32	33	34	33	32	31	21	20	19	16	14	14	11	10
Sanitary Engineers	8	16	19	18	18	19	19	16	14	12	10	10	9	9	9	8	9	6	6	7	6	4	4	2	2
Sanitary Inspectors	3	35	52	49	51	50	49	46	45	46	47	46	30	24	20	18	14	12	14	11	9	9	7	9	9
Entomologists	2	4	5	7	10	13	11	7	8	7	7	7	4	6	5	6	6	5	5	3	3	5	6	2	2
Parasitologists	-	1	2	2	2	1	1	-	-	-	-	-	-	-	-	-	-	2	2	1	1	1	1	1	1
Administrative Officers	1	3	5	6	6	6	7	6	5	5	5	4	4	4	3	2	2	1	1	-	-	-	-	-	-
Health Education	-	1	-	1	2	3	3	2	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lab. Technicians	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-	-	-	-	-
Entomology Aids	-	-	5	7	5	7	7	4	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Others	-	1	1	1	3	3	3	2	3	3	3	2	2	1	1	1	2	2	1	-	-	-	-	-	-
TOTAL	29	86	115	119	129	136	133	115	108	111	110	102	83	79	72	68	65	50	50	41	35	33	32	25	24