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STATUS OF MALARIA PROGRAMS IN THE AMERICAS

XXVIII REPORT

## TABLE OF CONTENTS

	<u>Page</u>
Introduction .....	1
I. PRESENT STATUS OF THE MALARIA PROGRAMS.....	2
A. General information .....	2
B. Field Operations .....	4
C. Budget .....	5
D. Country information .....	5
II. PROBLEMS AFFECTING THE PROGRESS OF THE PROGRAM.....	10
III. RESEARCH .....	12
A. Field insecticide trials .....	12
B. Immunological studies .....	12
C. Malaria chemotherapy .....	12
D. Serological studies .....	13
IV. TRAINING .....	13
V. INTERNATIONAL COOPERATION AND COORDINATION .....	13

TABLES, MAPS AND GRAPHS

	<u>Page</u>
<u>Tables</u>	
1 Malaria cases registered, 1976-1979 .....	15
2 Population in the malarious areas in the Americas, 1958-1979 .....	16
3 Status of the malaria program in the Americas, by population, 1979 .....	17
4 Status of the malaria program in the Americas, by area, 1979 .....	18
5 Malaria morbidity in the Americas, 1958-1979 .....	21
6 Case detection by country and phase of program, 1979 .....	22
7 Slides examined and positives, by specie and classification, Maintenance phase, 1979 .....	23
8 Slides examined and positives, by specie and classification, Consolidation phase, 1979 .....	24
9 Slides examined and positives by specie, Attack phase, 1979 .....	25
10 Slides examined and positives by specie, Non-malarious areas, 1979 .....	26
11 Spraying with residual insecticides applied in 1978 and 1979 in the malaria programs of the Americas .....	27
12 Insecticides used in the malaria programs, 1979 and estimated 1980 .....	28
13 Comparative results of active and passive case detection in malaria programs in the Americas, 1979	29
14 Personnel employed in the malaria programs in the Americas, 31 December 1978 and 1979 .....	30
15 Means of transport in the malaria programs in the Americas, 1979 .....	31
16 National and International contributions to the Malaria programs of the Americas, expenditures 1978-1979 and budget 1980 .....	32
17 Estimated requirements for malaria programs in the Americas.....	33
18 Geographical distribution of areas with technical problems, 1979 .....	36

Tables (Cont.)

19	PAHO/WHO Technical staff assigned to malaria programs in the Americas, 1977 to 1980 .....	42
20	Drugs provided by PAHO/WHO to the Malaria programs in the Americas, 1958-1979 .....	43

Maps

1	Status of the Malaria Programs in the Americas, December 1978 .....	19
2	Status of the Malaria Programs in the Americas, December 1979 .....	20
3	Geographical distribution of areas with technical problems, 1979 .....	38
4	Distribution of <u>A. (N) Albimanus</u> and resistance to DDT and Propoxur (December 1979) .....	39
5	Distribution of <u>A. (A) pseudopunctipennis</u> and resistance to DDT (December 1979) .....	40
6	Response of <u>P. falciparum</u> to chloroquine, 1961-1980 .	41

Graphs

1	Funds invested in the Malaria Programs in the Americas, 1957-1979 .....	34
2	International funds invested in the Malaria Programs in the Americas, 1957-1979 .....	35

REPORT ON THE STATUS OF MALARIA ERADICATION IN  
THE AMERICAS

XXVIII REPORT

Introduction

The III Meeting of Directors of National Malaria Eradication Services in the Americas (NMES) was held in Oaxtepec, State of Morelos, Mexico, in March 1979. This meeting reviewed the progress and strategy of the malaria program in all the countries of the Region and prepared the "Bases for the development of a Hemispheric Plan of Action against Malaria" in the Americas.

The XXVI Meeting of the Directing Council of the Pan American Health Organization held in September-October 1979, considered these bases and resolved:

(1) To request the Director to promote, and to collaborate with the Governments in the formulation and strengthening of national plans fitted to the specific situation in each country, (2) to request the Director to draw up, on the basis of the above-mentioned resolutions and recommendations, a plan for the promotion and support of malaria programs in the Hemisphere, (3) to urge the Governments to give highest priority to the financing and implementation of those plans, (4) to request the Director and the Governments to explore all possible sources of funds for the support of malaria activities on the national and hemispheric scale, (5) to request the Director to report to the XXVII Meeting of the Directing Council in 1980 on the progress of this hemispheric plan, translated into specific components for individual countries.

In compliance with the above resolutions, the following activities have been carried out or are being programmed for 1980:

1. The Continental Antimalarial Plan was presented and discussed at the Disease Prevention and Control Subregional Planning Meeting held in Guatemala, Buenos Aires, Lima and Port-of-Spain, Trinidad, during February-May 1980. These meetings were attended by the Directors of Health Services and Epidemiologists of all the countries in the Americas and the PAHO regional and country professional staff members in disease control programs.

2. Malaria advisers, epidemiologists and other PAHO staff have maintained continuous efforts to promote and collaborate with the Governments in the formulation of national plans fitted to the local situation in each country. Many countries have requested PAHO's collaboration to appoint international teams for their strategy reviews. As of 31 August 1980, the programs of Belize, Bolivia, Colombia, Dominican Republic, Ecuador, Guyana, Haiti and Nicaragua have been reviewed by such international teams with the participation of PAHO technical staff. Requests for PAHO collaboration have been received from Brazil, Guatemala, Honduras, and Suriname for similar program review before the end of 1980.

3. Two meetings were held (November 1979 and February 1980) between the Inter-American Development Bank (IDB) and PAHO to discuss the possibility and priority areas for IDB financial support in the health field, including the malaria program.

A study group has been organized by PAHO to visit some selected countries to estimate the needs for external collaboration of the malaria programs in the Hemisphere. The report of the study group will serve as the base to explore possible external financial supports for the malaria programs where needed.

4. A WHO informal consultation on "Primary Health Care and Malaria Control" was held in Washington, D.C. during 8-10 July to study ways to include antimalaria activities in the primary health care and to promote community participation in the malaria program. The workshop was sponsored by WHO with participation of PAHO staff members and invited experts in malaria and health services.

5. A Study group is being organized by PAHO to evaluate the existing training programs and to estimate the continental needs for training in malaria. The study will begin in November 1980 with visits to the existing training centers and some selected countries by the study group. The results of the observation

of the group will be presented at a Seminar to be held in February 1981, with participation of the representatives from the training centers and other experts in teaching activities for the development of a hemispheric training plan. Special contributions to finance these activities have been received from WHO and USAID.

6. PAHO has been promoting applied field research at country level to develop adequate methodologies for effective malaria control under local conditions. The PAHO Advisory Committee on Medical Research considered, in their meeting in June 1980, the needs for promoting at national level malaria research and gave their support for the development of a continental program of malaria research.

During 1979, a malaria field research project (AMRO-0901) was established in Tapachula, Mexico, for studying the problem of vector resistance to insecticides, developing methodologies for stratification of the malaria problem and testing and evaluating new methods of malaria control or eradication.

A PAHO field research team was also assigned to Brazil to collaborate with the Government in the study of the malaria problem and to develop control strategies for the Amazon River Basin.

Resources for malaria research have been considerably increased since the creation of the UNDP/World Bank/WHO Special Program for Research and Training in Tropical Diseases (TDR) which considers malaria the most important among its six priority diseases. The Scientific Working Group on Applied Field Research of the TDR has a continuous participation from the AMRO Region. To intensify promotional and coordination efforts in research activities with the financial support of the TDR, a research officer was assigned to the HQs/PAHO in August 1980.

This report describes the present status of the malaria programs in the Region as of the end of August 1980 and summarizes the statistical information available up to the end of 1979. To maintain the continuity of information and to facilitate evaluation of progress achieved during the report period, the contents of the report follow the same order of the Chapters appeared in the previous report; that is (I) present status of malaria eradication programs, (II) problems affecting the progress of the program, (III) Research, (IV) personnel training and (V) international cooperation and coordination.

## I. PRESENT STATUS OF THE MALARIA ERADICATION PROGRAM

### A. General Information:

There was some increase in the number of malaria cases registered for the entire Region in 1979 as compared with 1978, following the same trend which has been observed for the last five years. In the XXVII Report (1978), the 33 political units of the originally malarious areas were classified into 4 groups on the basis of the extent of progress, the magnitude of the problems and availability of resources. This classification was still valid in 1979. (Table 1).

Group I: Comprised 12 countries or territories in which the disease had been eradicated in the whole country (Chile, Cuba, Dominica, Grenada Guadeloupe, Jamaica, Martinique, Saint Lucia, Trinidad and Tobago and the United States of America including Puerto Rico and the Virgin Islands). This group had a population of 72.8 million in their originally malarious areas (32.2% of the total in the Americas). During the year, no major problems were encountered in maintaining the status of malaria eradication, although 1,162 imported cases were recorded.

Group II: Consisted of eight countries or territories in which malaria transmission was once interrupted or practically eliminated (Argentina, Belize, Costa Rica, the Dominican Republic, French Guiana, Guyana, Panama including Canal Zone and Paraguay). This group had a population of 14.6 million in their originally malarious areas (6.4%) and recorded 9,044 cases of malaria in 1979.

Many of these countries reported an increase of cases in 1979 as compared with 1978. In some countries, the number of imported cases increased due to more migratory movements of inhabitants with their neighboring countries, while in the others, transport and funds provided for surveillance activities were insufficient or untimely, causing reduction or delay in applying remedial measures. The epidemiological situation showed a certain deterioration in Argentina, Belize, Dominican Republic and Guyana in 1979, but the status of the program was still considered to be in an advanced stage in malaria eradication.

Group III: Comprised five countries in which full efforts are dedicated to pursue malaria eradication with adequate administrative and financial support (Brazil, Ecuador, Mexico, Suriname and Venezuela). This group had a population of 98.3 million in their originally malarious area (43.4%) and registered 182,428 cases of malaria in 1979 (35.5% of the total recorded in the Region). During the year, Mexico transferred an area of 190,952 Km<sup>2</sup> with 5.3 million inhabitants from consolidation to maintenance phase and an area of 178,873 Km<sup>2</sup> with 2.5 million inhabitants from attack to consolidation phase. Ecuador, Suriname and Venezuela maintained the same status of progress as that of 1978. The increase of the number of malaria cases in Brazil was due to the outbreaks observed in the colonization areas in the Federal Territory of Rondonia and the State of Para; however, the rest of the country continued to make progress.

Group IV: Embraced the remaining countries (Bolivia, Colombia, El Salvador, Guatemala, Haiti, Honduras, Nicaragua and Peru), having a total population of 40.6 million in their originally malarious areas (8.0%). Although the ultimate goal of their program is malaria eradication, the immediate objectives of most of these programs are to reduce malaria mortality and morbidity in areas with persistent malaria transmission and to prevent resurgence of malaria in areas where malaria transmission has been interrupted. The programs of Bolivia, Colombia, Haiti, Honduras and Nicaragua, were reviewed and a respective plan of operation, fitted to the local epidemiologic conditions, was elaborated with technical cooperation of the Organization. Honduras and Peru determined to carry out their malaria control activities as part of the general health services, while in the others, malaria control was pursued as a separate program maintaining the structure of the National Malaria Eradication Service. In Honduras and Peru, as a result of administrative problems derived from the structural changes, case finding activities and control operations were reduced and thus a proper evaluation of the malaria situation became difficult. During 1979, the countries in this group reported 324,778 cases or 62.8 percent of the total registered in the Region.

The estimated population of the Americas at 31 December 1979 was 600,263,000 inhabitants, of which 226,361,000 (37.7%) are living in originally malarious areas. Of the latter figure, 113,092,000 (50.0%) live in areas in which the disease has been eradicated (maintenance phase); 57,280,000 (25.3%) in areas in which transmission at large has been interrupted, although the reservoir of parasites has not yet been exhausted and focal transmission may occur (consolidation phase); and 55,989,000 (24.7%) live in areas in which transmission has not yet been interrupted (attack phase). Table 2 shows the population in the malarious areas of the Americas by program phase and by year since 1958. Tables 3 and 4 summarize the population and the area in square kilometers by country and by program phase at the end of 1979 and Maps 1 and 2 indicate the geographical extent of the areas in the various phases at December 1978 and 1979. The maps give the impression that almost the entire South America is in the attack phase but it must be borne in mind that the large extension of the Amazon Basin is either noninhabited or very sparsely populated.

Transfer of program phase was observed in two countries during 1979. Due to deterioration in the malaria situation, Bolivia decided to return the area in consolidation phase to attack phase with an extension of 367,940 square kilometers and 1.2 million inhabitants. On the other hand, Mexico transferred an area of 178,873 Km<sup>2</sup> with a population of 2.5 million from attack to consolidation phase and another area of 190,952 Km<sup>2</sup> with 5.3 million inhabitants from consolidation to maintenance phase. In the Region as a whole, there was a slight

decrease in the areas in the consolidation and maintenance phases, from 41.3% in 1978 to 40% of the originally malarious area in 1979. However, in terms of population there is a slight increase from 75.1% in 1978 to 75.3% of the total living in originally malarious areas.

In 1979, a total of 8,633,717 blood slides were examined and 517,412 were diagnosed as positive, the annual blood examination rate (ABER) being 3.80% and the annual parasite incidence (API) being 2.29 per 1,000 population calculated on the basis of the population of the originally malarious areas. Table 5 summarizes the number of slides examined, the number found positive since 1958, and Table 6 shows the results of the examinations of blood slides in 1979 by country and by phase of the program. Tables 7, 8, 9 and 10 show the results of the examinations, positive blood slides, parasite species, and classification of cases by origin of infection in each phase of the program.

#### B. Field Operations

The total residual house spraying carried out in 1979 amounted to 9,905,315, of which 8,681,894 or 87.6% were with DDT, 392,295 (4%) with fenitrothion, 61,359 (0.6%) with propoxur, 10,089 (0.1%) with malathion, 11,952 (0.1%) with other insecticides such as chlorfoxim and HCH and 747,726 (7.6%) with mixtures of insecticides (propoxur plus DDT, propoxur plus fenitrothion and fenitrothion plus DDT).

In the countries where vectors are still susceptible to DDT, this insecticide was used exclusively with the exception of Colombia where propoxur was added in 54,231 sprayings and malathion was substituted in 5,859 sprayings out of a total of 714,348 sprayings carried out in the country in 1979. The addition or substitution of insecticide in Colombia was not due to resistance of the vector, but for the purpose of reducing refusals to sprayings.

In countries where vectors are resistant to DDT in part of their respective territories, other insecticides are used. In El Salvador, because of the wide-spread resistance problems, no DDT was applied in 1978 and 1979; a total of 88,092 sprayings were carried out in 1979 with the mixture of propoxur and fenitrothion, but no report has been received as to its efficacy. In Guatemala, sprayings were carried out with the mixture of DDT and fenitrothion. In Honduras, the use of DDT was reduced from 239,454 sprayings in 1978 to 90,500 in 1979, because the antimalaria activities were integrated into the health services early in 1979 and the work plan was not yet fully developed under the new structure. In Nicaragua, spraying operations were greatly reduced because of the civil war during the first half of the year and the subsequent reorganization of the health services in the country. In Haiti, the use of DDT was discontinued in 1979 and fenitrothion was substituted, but without an adequate plan to evaluate its efficacy; field trials were initiated early in 1980 to compare the effectiveness of fenitrothion, malathion and DDT.

Table 11 summarizes the sprayings carried out in 1978 and 1979 by country and type of insecticide used and Table 12 shows the amount of insecticides used in 1979 and they estimated for 1980 by country and type of insecticide.

The use of antimalarial drugs continue to be a major activity in the malaria program. The drugs are used in presumptive treatments through the collaboration of 187,329 existing information posts and 7,154 evaluators in the Region, in radical cure treatments of confirmed cases and sometimes in mass drug administration in localities where indicated, because of epidemic outbreaks or because of the need to protect certain selected populations, such as immigrants in land settlement areas or workers in temporary encampments for construction of roads, dams, etc. Antimalarial drugs are widely used especially in areas where the efficacy of insecticides in interrupting malaria transmission has been reduced. In Nicaragua, antimalarial drugs are being distributed in presumptive and radical cure treatments through the personnel of the National Alphabetization Campaign which was initiated in March 1980.



The antilarval activities in Nicaragua were interrupted in 1979 due to the civil war but they have been resumed in 1980. In Haiti, new antilarval activities were suspended in 1979, but the drainage canals constructed in 1977 and 1978 were maintained.

Table 13 summarizes the results of active and passive case detection and table 14, the personnel of the malaria programs by category. Table 15 shows the means of transportation used in the malaria programs, country by country.

#### C. Budget

Table 16 summarizes by country the expenditures for the malaria programs in 1978 and in 1979 and the estimated budget for 1980. In 1979, the Governments in the Americas invested in their malaria programs a total of \$112,957,881, which represents an increase of 27.4% compared with 1978. The PAHO/WHO contribution to the malaria programs remained at the same level. Table 17 shows the expenditures made by PAHO/WHO in 1978 and in 1979 and the biennial budget for the periods 1980/1981 and 1982/1983. Bolivia received financial supports from USAID through PL-480 Financing for 5 years starting 1979. A sum of 20 million Bolivian pesos (equivalent to US\$815,994) was allocated for 1979 and the same amount will be received in 1980.

The total investments made in the malaria programs in the Americas from 1957 through 1979 amount to \$1,284,765,275, of which \$1,083,143,278 or 84.3% were provided by national governments and \$201,621,997 or 15.7% by international cooperation. Graphs 1 and 2 show the funds invested by the governments and the contributions of international agencies in the same years.

#### D. Country Information

##### ARGENTINA

During 1979, a considerable increase of malaria cases was observed in the Provinces of Salta (attack), Jujuy (consolidation) and Tucuman (maintenance). A total of 936 cases was registered as compared with 325 in 1978. The migratory movements in the frontier region with Bolivia and new settlements of population were considered to be a normal phenomenon in the northwestern part of Argentina with continuous importation of malaria cases into the country. The rise in malaria incidence in 1979 was principally due to delay in the application of preventive or control measures because of administrative and operational problems. To intensify the antimalaria activities, a plan to refrain the existing field workers and supervisors was elaborated in June 1980 with the collaboration of the Organization.

##### BELIZE

Further deterioration of the malaria situation was observed in 1979 and more localities were registered to be positive for malaria cases, as compared with 1978. Although the number of malaria cases did not increase in 1979, transmission seemed to be spread more widely than in the previous year. During 1979, the Organization contracted short-term consultants to collaborate with the Government in the elaboration of a plan of malaria surveillance operations, but its implementation is being delayed due to shortage of financial resources and trained field personnel and shortage in transport.

## BOLIVIA

Due to a serious deterioration of the malaria situation, it was decided in 1978 to revert the entire area previously in the consolidation phase to the attack phase. A new plan was elaborated to apply attack measures in the entire malarious area, requesting financial assistance from USAID/PL-480. Financing the plan was approved in 1979 and additional funds (6 million US dollars for 5 years) were made available since October 1979. However, administrative problems still exist, causing difficulties for a full implementation of the plan. In May 1980, upon the request of the Government, PAHO organized an Evaluation Team to review the program. The Team concluded that with the financial assistance of USAID, malaria eradication could be achieved if the funds were allocated regularly on schedule. There has been no evidence of technical problems which would seriously interfere with the interruption of malaria transmission in the area which was previously in the consolidation phase. The Team further recommended to conduct epidemiological investigations in the area where a low transmission has persisted since the initiation of the program and to apply complementary measures where needed.

## BRAZIL

The malarious area of the country is divided into two: a short-term eradication area (STEA) and a long-term eradication area (LTEA). The STEA has an extension of 1.8 million Km<sup>2</sup> with 38.3 million inhabitants, of whom 34.6 million (90.0%) are already free of malaria transmission. The LTEA has 5.1 million Km<sup>2</sup> in extension with 10.1 million inhabitants, of whom 3.1 million are in areas in which transmission has been interrupted. During the year of 1979, a total of 147,630 cases of malaria was registered in the country; of which 8,400 were from the STEA and the rest from the LTEA. Furthermore, of the 8,400 cases registered in the STEA, at least 4,300 cases were directly imported from the LTEA. Malaria transmission in Brazil today mainly occurred in the LTEA (Amazon Region) especially in 60 municipalities (with 2 million inhabitants) where intensive economic development projects are being undertaken. These development projects have motivated new settlements of immigrants and great movement of population, creating conditions favorable for malaria transmission. During 1979 and early 1980, serious malaria outbreaks were observed in many agricultural colonization areas and mining camps, especially in the Federal Territory of Rondonia and the State of Para, giving a total of 80,000 malaria cases in 1979.

## COLOMBIA

Malaria incidence has been maintained at a high level since 1977, the year considered to have the worst epidemics with 63,579 cases registered. In 1978 the number of cases dropped to 53,116, but it again rose to 60,738 in 1979. Generally speaking, the malaria situation remained the same in the last three years and the control efforts were merely sufficient to halt further deterioration. Many factors were accounted for the persistence of transmission, but the principal causes are unorganized agricultural colonization, evasive behaviour, with resulting insecticide avoidance, of one of the vectors, *A. nuneztovari*, resistance of *P. falciparum* to chloroquine, difficult accessibility in certain areas and administrative and financial problems. The Ministry of Health has given a high priority to the program and has approved a considerable increase of budget since 1979; from 327 million colombian pesos in 1979 to 600,800 and 1,000 million pesos for 1980, 1981 and 1982, respectively. Extrasectorial supports were also obtained from "Plan de Cerromatoso" (one million US dollars in 3 years), "Plan del Valle del Patia" (2.5 million USA dollars in 3 years) and "Plan del Sarare" (800,000 USA dollars in 3 years). With additional financial supports, it is planned to intensify training activities to assure sufficient number of technical staff, applied field research activities to improve antimalaria measures, epidemiological studies to stratify the malarious areas and selection and application of effective attack measures to each epidemiological area.

COSTA RICA

Malaria transmission was practically interrupted in 1974 and since then the principal antimalaria activities have been directed towards prevention of reestablishment of transmission originated from imported cases. In 1979, the political situation in Nicaragua motivated a large movement of population in the frontier regions and as a result the number of imported cases increased. During 1979 a total of 307 cases was registered in the country, of which 178 were classified as imported. During the year, 2 small outbreaks of *P. vivax* were observed in the consolidation phase area, one being in El Roble de Puntarenas with 16 cases and the other in Rio Claro with 19 cases. These foci were originated from imported cases and were brought under control by intensive chemotherapy programs and residual house spraying with propoxur.

DOMINICAN REPUBLIC

In the last four years, the number of malaria cases increased considerably and several foci of transmission were reestablished in the maintenance phase areas. Importation of malaria cases through migratory laborers from the neighboring country still constitutes the major problem in malaria vigilance. This problem has been aggravated in the last two years, due to the fact that these laborers, previously working only in sugar cane fields, are now spreading over the country, engaging in other types of work. The financial resources available for the program have not been sufficient to increase manpower and transportation to cover the wider area for vigilance activities and to eliminate the new foci of transmission. The health authorities are aware of the danger of resurgence of malaria and have taken action to increase the financial support to the program, although the additional funds have not yet been made available. In January 1980, the First Meeting of Directors of Malaria Programs of Haiti and Dominican Republic was held in Santo Domingo to discuss the coordination of antimalaria activities of the two countries.

ECUADOR

The malaria transmission has been focalized in the two northern provinces, Esmeraldas and Napo and during the last four years the greater efforts of the National Malaria Eradication Service were devoted to the elimination of these foci. In 1978 and 1979, much progress was made in the Napo Province, having reduced malaria incidence from 2,520 cases in 1977 to 827 in 1979. This improvement was largely attributed to a better organization of field work and a better coverage with insecticide. However, in the Esmeraldas Province the malaria situation remained unchanged in the last 3 years. In 1979, this province reported 5,106 cases or 62.2% of the total registered in the country. Further analysis indicates that the majority of these cases were from three sectors with 30,000 houses and 130,000 inhabitants, dispersedly located along small rivers where accessibility is difficult. Poor quality of work, inadequate coverage with insecticides and above all the serious problems related to field personnel were considered to be the principal factors for the persistence of malaria transmission.

EL SALVADOR

The multiple resistance of the vector to the insecticides commonly in use in the malaria program continues to be the major problem for malaria control. Other methods, such as antilarval measures, use of antimalarial drugs and biological control measures, are applied, but they are of limited coverage. Efforts are continued to use diversified control methods in different ecological areas on the basis of careful epidemiological studies. A total of 77,976 cases was registered for 1979 (52,521 cases for 1978).

FRENCH GUIANA

There was a considerable increase in the number of malaria cases in 1979 in comparison with that in 1978. Of the 604 cases registered in 1979, 43 were classified as imported, most of them being from Brazil. The cases were distributed in all malarious areas of different phases; i.e. 255 cases in the

attack phase area, 123 in consolidation and 226 in maintenance. As control measures, DDT house sprayings were continued in the attack phase area and medicated salt was distributed to the population in all areas, i.e. attack, consolidation and maintenance. A total of 99,778 Kg. of the medicated salt was distributed in 1979, as compared to 16,425 Kgs. in 1978.

#### GUATEMALA

The appearance of the resistance of the vector, *A. albimanus*, to the insecticides in use caused a considerable deterioration in the malaria situation since 1975. The number of cases registered increased more than 10 times in the last 5 years, from 4,979 in 1975 to 69,039 in 1979. In the last few years experiments were made with various new insecticides, including fenitrothion, chlorfoxim and propoxur. These insecticides are found to be effective in certain parts of the country, but not in others. On the Pacific Coast, these insecticides do not show promising results. Recently, Decamethrin (OMS 1998) was tested and it was found to be effective in areas with multiple resistance of the vector. A plan of operations was drafted to use diversified methods in different areas, according to the epidemiological situation and to the susceptibility of the vector to various insecticides available.

#### GUYANA

The malaria situation in Guyana has shown a serious drawback in the last five years, and especially in 1979 and early in 1980, it became very critical as the transmission spread closer to the heavily populated coastland which has been in the maintenance phase since 1961. Upon the request of the Government, PAHO collaborated in a thorough review of the program in March-April 1980 and as a result a series of remedial measures was suggested to improve the current antimalaria activities. The major difficulties are administrative and operational and their solutions depend on an efficient operational structure of the Malaria Service with adequate administrative and financial support. To ensure uninterrupted field operations, it was recommended that a long-term plan be elaborated with a projection of budgetary requirements, which may be readjusted annually according to the progress and the epidemiological situation. The principal vector, *A. darlingi*, is susceptible to DDT: residual spraying with this insecticide is still very effective to interrupt malaria transmission when it is applied correctly and with adequate coverage. In the North-West District and Pomeroon River area, chloroquinized salt is being distributed as a complementary measure.

#### HAITI

The malaria program was reviewed in April-May 1979 by a multidisciplinary group of experts organized by USAID. Among other recommendations, the group suggested to carry out a comparative field trial with DDT, malathion and fenitrothion to determine which insecticide would give the best results in interrupting malaria transmission. In November 1979, upon the request of the Government, a second group of technical staff of PAHO and CDC/USPHS, visited the program and collaborated with the Malaria Service to elaborate a protocol for the field trial recommended by the first group. In August 1979, a new Director of the Malaria Service was appointed. Large scale applications of insecticides were suspended in 1979 and antimalarial drugs were distributed to control outbreaks occasionally observed.

#### HONDURAS

As of 1 January 1979, the National Malaria Service has been integrated into the general health services. Except for a small group of professionals retained at the Ministry of Health, all other field personnel were reassigned to local health services or dismissed. The program was reviewed in February and a plan of action was drafted on the basis of the policy of integration established by the Government. However, the plan was not fully implemented due to a series of administrative and operational problems. A follow-up program review was planned for October 1980 to analyze the problems encountered in 1980 and to recommend possible solutions.

MEXICO

On the basis of the recommendations made by the Evaluation Team who visited the program in April 1978, the originally malarious area was reviewed and reclassified in 1979. During 1979, an area with 5.3 million inhabitants was transferred from the consolidation phase to the maintenance phase and another area with 2.5 million inhabitants from the attack phase to consolidation, thus leaving only 9.7 million inhabitants in the attack phase area. Of the latter, 5 million inhabitants were in pre-consolidation. This change indicates a significant progress and a further focalization of transmission. The problems of vector resistance to DDT on the southern Pacific Coast continue to be the main obstacles for further progress. During the year, PAHO has established a project, AMRO 0901 - Technical Cooperation for a Research Program on New Methods of Malaria Control or Eradication - in Tapachula, Southern Mexico, with the objective to collaborate with the Governments of Mexico and of the Central American countries in search for possible solutions to the technical problems which have interfered with normal progress.

NICARAGUA

The spread of propoxur resistance since 1975-76 forced the program to introduce diversified antimalaria measures applied according to local conditions. These measures have shown satisfactory results. However, in 1979, because of the fighting for the national revolution, antimalaria activities were practically suspended and as a result, an increase of malaria incidence was observed. The new government has given a high priority to the program and a new plan of operation was elaborated early in 1980 with the technical cooperation of the Organization. The program received a special financial assistance of \$51,000 from WHO to purchase antimalarial drugs and to replace microscopes which were lost during the revolution. Early in 1980, UN/CDF approved an assistance of two million dollars for the malaria program to provide equipment, insecticides, vehicles and engineering machines for source reduction activities.

PANAMA

With the exception of some localities in the Provinces of Darien and Bocas del Toro, malaria transmission has been interrupted in the country. The problem in the Province of Bocas del Toro is related to the difficulties in accessibility and the great movement of indigenous population. Antimalaria activities have been intensified in this area, but the progress has been slow. In the Province of Darien, the migratory movement along the frontier region and the difficulties in accessibility have been the major obstacles to interrupt transmission. The Government continues to give a high priority to the program which has maintained its advanced status of malaria eradication.

PARAGUAY

Malaria transmission was interrupted early in the 1970's and there has been no evidence of any reestablishment of malaria endemicity in the entire country, although imported cases were registered every year with some introduced cases now and then. The entire originally malarious area has met the criteria for consolidation phase, but for safeguard reasons, a part of the territory with high receptivity and vulnerability is still placed under the attack phase and DDT residual house spraying has been continued as a preventive measure. During 1979, a total of 116 cases was registered, of which 91 were classified as imported, 18 introduced, 6 relapses and 1 sporadic. The major problems in the vigilance program are the great movements of population with Brazil where malaria transmission still exists the nomadism of indigenous population and new settlements in the area of agricultural colonization. The Government gives a high priority in the vigilance program, which has been successful to maintain the malaria-free status. It must be mentioned that the former endemic area of malaria is now becoming the most prosperous area of the Nation's economy and numerous development projects are being undertaken.

SURINAME

No major changes in the epidemiologic situation were observed in 1979, the malaria transmission continued to be focalized along Marowijne, Tapanahony and Lawa Rivers. The small outbreak that occurred on the Upper Marowijne River in 1978 was brought under control in 1979. However, the situation on Tapanahony River did not show any improvement. Malaria transmission on Tapanahony River has been very persistent and in the last few years more than 50% of the malaria cases in the country were detected among the population on this river. Difficult accessibility, shortage of fluvial transportation and little cooperation from the inhabitants resulted in a very inadequate coverage with antimalarial measures, e. g. 23% coverage in DDT house spraying and 30% acceptance in mass drug administration. On the Upper Suriname River, the epidemiological situation was much improved in 1976, (3 cases), 1977 (9 cases) and 1978 (1 case), but in 1979 a small outbreak was occurred in October with 30 cases. It was suspected that the outbreak was originated from an infected person among a group of workers who were in French Guiana (place unknown). House spraying with DDT and mass drug administration were initiated immediately in the villages and planting grounds in the affected areas.

II. PROBLEMS AFFECTING THE PROGRESS OF THE PROGRAM

A coordinated campaign to eradicate malaria from the Americas was initiated during 1956-1959 in all countries where this disease was endemic at that time. The progress achieved during the decade of the sixties was remarkable, but it became slower in the seventies. At the end of 1969, the population in the consolidation and maintenance phase areas reached 67.9% of the total in the originally malarious area. This figure rose to 75.3% at the end of 1979; i.e., a gain of only 7.4% in the last 10 years.

The problems affecting the progress are multiple and they are often interrelated, forming a complex of counteracting elements which slows or annuls the effect on antimalaria measures. The magnitudes and nature of the problems differ from one country to another, but among the countries in the same group shown in Table 1, the following aspects are in common:

Group I

The vulnerability is low and the vigilance activities have been effective to maintain the malaria-free status. No serious problems have been encountered as of this date.

Group II

The common problem in this group is the importation of cases from abroad. Both receptivity and vulnerability are high, requiring an efficient surveillance program to prevent reestablishment of malaria endemicity. Whenever surveillance activities are reduced, local transmission tends to occur. Difficulties have been observed in maintaining an adequate support for effective malaria surveillance with the necessary financial supports.

Group III

The common problems are related to internal movements of population to and from areas with socio-economic development projects, such as agricultural colonization, mining, construction of highways, hydroelectric plants, irrigation systems etc. These projects bring laborers and new settlers into newly opened lands creating conditions favorable for transmission and often unfavorable for effective control work.

Three countries in this group have serious labor problems within NMES which considerably affect the work capacity and the implementation of work plans.

Group IV

In the 4 countries in Central America, El Salvador, Guatemala, Honduras and Nicaragua, the physiologic resistance of the vectors to insecticides is by far the most serious technical problem with no easy solution. The resistance appeared in the areas along the Pacific Coast where all known insecticides are being applied in large quantity and in great extension for Cotton cultivation. In these areas, the vector, *A. albimanus*, was found to be resistant not only to DDT, but also to other insecticides such as propoxur, finitrothion, malathion, and chlorfoxim. Other alternative antimalaria measures are being applied, but they are more expensive and of limited coverage. In Haiti, the vector is resistant to DDT and a field trial with fenitrothion and malathion is being conducted to compare the efficacy of these insecticides. In Bolivia, Colombia, and Peru, the vectors are still susceptible to DDT, but for some years the administrative and financial difficulties have been persistent and have limited the effective application of antimalaria measures.

Generally speaking, three major types of problems are considered to be the main obstacles to further progress of the malaria program, especially in those countries in the Group IV. These are:

- a) Technical problems: Physiologic resistance of the vector to insecticides as observed in the Central American countries and Haiti, evasive behavior of vectors (intradomiciliary spraying of insecticides is not completely effective because of avoidance of contact with the insecticide) as seen in western Venezuela and eastern Colombia with *A. nuneztovari*; *P. falciparum* resistance to chloroquine as observed in Brazil, Colombia, Ecuador, French Guiana, Guyana, Panama, Suriname and Venezuela.

- b) Problems related to economics

Development projects: In all countries in the Americas, economic development projects are being actively promoted. Agricultural colonization in the newly opened land and construction of highways, hydroelectric plants, reservoirs etc. always bring migrants and laborers into the new areas under precarious living conditions. In the last 20 years, the geographical extension of the malarious area has been increased, as more and more lands are opened for economic developments. For example, the localities where malaria is highly endemic today in the countries sharing the Amazon Basin were not even in existence some 10 or 15 years ago. This problem adds a tremendous strain to the already under-financed malaria program.

- c) Problems related to malaria budgets: It is true that the funds allocated by the governments of the Americas for the malaria program have been progressively increased in the last 20 years, as can be seen in Graph I. However, this increase has been off-set by the increasing costs of personnel, supplies, equipment and transportation. Furthermore, in some countries, the appearance of technical problems, such as vector resistance to DDT and other insecticides and parasite resistance to antimalarial drugs makes it necessary for the program to apply more expensive complementary or alternative measures. In addition, the increase of the malarious areas, new population settlements and frequent malaria outbreaks among the migrants require considerable resources which, in general, are not adequately provided. 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. Because of the financial limitation, many countries plan their malaria activities on a priority basis or use their resources only to prevent epidemic outbreaks or to attend emergencies.

Table 18 and Map 3 show areas with technical problems and their geographical distribution. In addition to the areas shown in Table 18, Map 4

shows the distribution of A. (N) albimanus and resistance to DDT and propoxur and Map 5, the distribution of A. (A) pseudopunctipennis and DDT resistance. The areas with confirmed cases of P. falciparum resistant to chloroquine are shown Map 6.

### III. RESEARCH

#### A) Field insecticide trials

Decamethrin (OMS-1998) was tested in Guatemala in residual house spraying in 4 houses at different doses, 0.025 grams, 0.05 grams, 0.075 grams and 0.1 grams per square meter of surface. This insecticide was sprayed, using the same technique as with propoxur, i.e. without spraying furnitures, hanging objects and other small household articles. The biological tests carried out seven months after the spraying showed very satisfactory results, a mortality of 98.3% of A. albimanus on wood surfaces and 85.9% on block surfaces (cement or brick). In view of the good results obtained, a village scale trial was initiated in May 1979, having sprayed 902 houses at 0.025 grams per square meter. A preliminary report indicates that this insecticide has shown a high efficacy in killing mosquitoes and low toxicity to mammals and that it does not cause irritability nor has it repellent effects on local A. albimanus. However, further observations would be needed before this insecticide could be recommended for further use as elsewhere in Central America susceptibility tests are showing less satisfactory results.

#### B) Immunological Studies

The malaria unit in Colombia started the studies of malaria antigens to test their immunogenic response, efficacy and side effects in Aotus monkeys with or without adjuvants. Experimental infection of A(N) albimanus from Aotus infected with P. falciparum has been achieved, and the whole experimental transmission cycle is now feasible in Bogota for the evaluation of immunizing agents. Efforts have been made to start colonization of Aotus monkeys in Armero, Colombia. Several trials with techniques for continuous in-vitro cultivation of P. falciparum from Colombia have been initiated and studies on gamete cytotogenesis and cryo-preservation began.

The ELISA and IFA tests have been implemented at the Malaria Unit as well as the techniques for the study of immune complexes in kidney tissues.

#### C) Malaria Chemotherapy

In vitro assessment of the sensitivity of P. falciparum to 4 aminoquinolines has shown that the majority (80%) of the studied isolates from Brazil, Colombia, Ecuador and Panama are resistant to  $> 480 \mu\text{g}$ . of chloroquine base per liter of blood (1.5nMol/ml).

The isolates studied in Haiti in 1980 showed full sensitivity to chloroquine as previously observed in 1971.

In Honduras and El Salvador, P. falciparum seems highly susceptible to chloroquine. In Nicaragua, the results in 1980 are somehow different to those observed in 1976, since 1.25nMol/chloroquine per ml. of blood are required in vitro to inhibit maturation of schizonts after incubation. Non properly documented observations suggest an increasing number of recrudescences after the administration of the alternate treatment of chloroquine resistant falciparum malaria with pyrimethamine-sulphadoxine. Close surveillance and epidemiological studies on resistance to antimalarial agents should be extensively carried out, and clinical and field trials with possible alternate treatments must be implemented.

The Government of Brazil, with the collaboration of PAHO/WHO and the TDR Special Program started a double blind clinical trial with an alternate drug: a quinolinomethanol called mefloquine in Belem, Para, Brazil, Stage 1 of phase I for efficacy tolerance and pharmacodynamics of the drug has been completed.



Analysis of the results are in process together with similar trials in Thailand and Zambia.

#### D) Serological Studies

Several serological surveys have been carried out in Brazil, Colombia, Costa Rica, Guyana, Mexico, Panama, Paraguay, Suriname and Venezuela, to study the age distribution of positivity and titres of specific malaria antibodies in areas with different malaria situations.

The multiple variables that contribute to determine a serological profile in a community, demand the development of more elaborated methods for the analysis of serological data and for the application of the results. A mathematical model, which tries to define a transmission function from seroepidemiological data, is being studied.

### IV TRAINING

The School of Malariology and Environmental Sanitation in Maracay, Venezuela held its XXXV International Course for Malaria and Environmental Sanitation from 15 January to 26 October, 1979. In addition to national trainees, the course received 3 trainees from other countries (2 from Bolivia and 1 from Costa Rica). The same school, on 15 January 1980, initiated its XXXVI course which is expected to be completed on 31 October 1980. Five fellowships were arranged by PAHO for this course (1-Haitian, 2-Colombian, 1-Bolivian and 1-Cuban). The stipends for all the foreign trainees for these two courses were paid by the Government of Venezuela, and their transportation costs were paid by PAHO.

The School of Public Health of the Department of Health and Welfare of Mexico held its fourth "Master's Degree course in Public Health with emphasis on Malaria and other Parasitic Diseases" from 12 Feb. to 14 Dec. 1979. The course was attended by 18 students (6-Mexican, 2 each from Cuba and Honduras, 1 each from Argentina, Bolivia, Brazil, Dominican Republic, Haiti, Nicaragua, Peru and OPS staff).

Brazil and Mexico have conducted their national malaria training courses both for professionals and field supervisors. Colombia plans to have a national course to train medical officers in malariology during September-December 1980. The courses in Mexico and Colombia are open to participants from other countries.

With the collaboration of MAP/WHO and support of USAID, a plan has been drafted to strengthen training activities in order to ensure that the malaria programs will be able to acquire sufficient numbers of needed technical personnel. A study group will visit training institutions and selected malaria programs to prepare an inventory of resources, to review training objectives and curricula of courses, and to identify additional support needed for developing a regional training program. This study will serve as a basis for a meeting of a working group, consisting of the directors of participating training institutions, specialists, and representatives of collaborating agencies in the program. This working group will develop a medium-term training program for the development of technical resources, including the establishment of a coordinating mechanism.

### V. INTERNATIONAL COOPERATION AND COORDINATION

Table 19 shows the distribution of PAHO/WHO technical personnel assigned to the malaria programs in the Americas from 1977 to 1980, by country and by categories (medical officers, sanitary engineers, sanitary inspectors, entomologists and others). These staff members continue to collaborate with the malaria programs within the framework of technical cooperation. Technical collaboration was also provided by contracting short-term consultants. Upon the request of the Governments, PAHO technical staff participated in the program evaluation and reformulation of the national plans of Belize, Bolivia, Colombia, Dominican Republic, Ecuador, Guyana, Haiti and Nicaragua during January 1979 - August 1980. Within the available funds budgeted in each country project, some

equipment, antimalarial drugs and entomological test material were supplied by PAHO to the malaria programs. Table 20 summarizes the amounts of antimalarial drugs supplied by PAHO/WHO in 1979.

The Special Program for Research and Training in Tropical Diseases of WHO/UNDP/World Bank TDR supported a research project for "Continental Studies on Susceptibility of *P. falciparum* to Anti-malarial Drugs". In 1978, 4 training courses were held and 33 technical personnel from 18 countries were trained in the techniques of in-vitro susceptibility tests. In 1979, TDR distributed the necessary test kits and other materials to all the 18 countries to initiate the study. TDR also supported a research project of "Clinical Trial of Mefloquine" in Belem, Brazil and all the necessary laboratory installations were completed and the work initiated in 1979.

PAHO collaborated with the Gorgas Memorial Institute of Tropical and Preventive Medicine, Inc. (GMI) from January 1977 to December 1979, in the support of research on malaria and other parasitic diseases in the Americas. During this period links were established for the use of GMI as a reference laboratory and this function will continue to be made available to the countries in the future.

The Government of Venezuela awarded 3 fellowships in 1979 and 5 fellowships in 1980 to candidates selected by the Organization to participate in the training courses of the School of Malariology and Environmental Sanitation in Maracay.

The United States of America, through its Agency for International Development (AID), continued to provide financial support to the Malaria Program in Haiti. Through the PL-480 Financing Program, AID also provides assistance to the malaria program in Bolivia.

The III Meeting of Directors of the National Malaria Eradication Services was held in Oaxtepec, State of Morelos, Mexico during 26-31 March 1979. In addition to exchange of experiences and review of the progress of the programs, the meeting prepared the "Bases for the development of a Hemispheric Plan of Action against Malaria" in the Americas. Border meetings were held between Costa Rica and Panama on 4 December 1979, between Dominican Republic and Haiti during 14-16 January 1978 and between Guatemala and Mexico during 9-11 June 1980.

Table 1

## MALARIA CASES REGISTERED, 1976 - 1979

GROUP	Population 1979 in originally malarious areas (in thousands)	Cases registered			
		1976	1977	1978	1979
<u>GROUP I</u> 12 countries or territories in which malaria eradication has been certified	72 843	424	531	718	1 162
<u>GROUP II</u>					
Argentina	3 276	70	463	325	936
Belize	158	199	894	1 218	1 391
Costa Rica	624	473	217	313	307
Dominican Republic	5 241	586	745	1 531	3 080
French Guiana	58	394	488	266	604
Guyana	899	4 642	1 563	927	2 294
Panama	1 811	727	674	263	316
Canal Zone	45	7	4	5	0
Paraguay	2 487	140	156	156	116
Sub-total	14 599	7 238	5 204	5 004	9 044
<u>GROUP III</u>					
Brazil	48 427	89 959	104 436	121 577	147 630
Ecuador	4 712	10 974	11 275	9 815	8 207
Mexico	34 809	18 153	18 851	19 080	20 983
Suriname	287	537	993	876	903
Venezuela	10 076	4 768	5 304	5 065	4 705
SUB-total	98 311	124 391	140 859	156 413	182 428
<u>GROUP IV</u>					
Bolivia	1 961	6 714	10 106	10 897	14 712
Colombia	16 212	39 022	63 888	53 412	60 957
El Salvador	4 020	83 290	32 243	52 521	77 976
Guatemala	2 644	9 616	34 907	59 755	69 039
Haiti	4 271	15 087	27 679	60 472	41 252
Honduras	3 267	48 804	39 414	34 554	25 297
Nicaragua	2 518	26 228	11 584	10 633	18 418
Peru	5 715	18 462	32 410	20 376	17 127
Sub-total	40 608	247 223	252 231	302 620	324 778
TOTAL	226 361	379 276	398 825	464 755	517 412

Table 2

POPULATION IN THE MALARIOUS AREAS  
IN THE AMERICAS, 1958-1979

(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

Table 3

STATUS OF THE MALARIA PROGRAMS IN THE AMERICAS, BY POPULATION, 1979  
(Population in thousands)

Country or other political or administrative unit	Total population	Population of originally malarious areas							
		Total malarious areas		Maintenance phase		Consolidation phase		Attack phase	
		Total	%	Total	%	Total	%	Total	%
Antigua	75a)	-	-	-	-	-	-	-	-
Argentina	26 900	3 276	12.8	3 128	95.5	69	2.1	79	2.4
Bahamas	232a)	-	-	-	-	-	-	-	-
Barbados	267a)	-	-	-	-	-	-	-	-
Belize	158a)	158	-	-	-	84	53.2	74	46.8
Bermuda	60a)	-	-	-	-	-	-	-	-
Bolivia	5 425b)	1 961	36.1	-	-	-	-	1 961	100.0
Brazil	119 649	48 427	40.5	13 914	28.7	16 806	34.7	17 707	36.6
British Virgin Islands	12a)	-	-	-	-	-	-	-	-
Canada	23 691b)	-	-	-	-	-	-	-	-
Cayman Islands	12a)	-	-	-	-	-	-	-	-
Chile	10 917b)	240c)	2.2	240	100.0	-	-	-	-
Colombia	27 438	16 212	59.1	-	-	11 802	72.8	4 410	27.2
Costa Rica	2 162	624	29.0	-	-	441	70.7	183	29.3
Cuba	9 811	3 277c)	33.4	3 277d)	100.0	-	-	-	-
Dominica	83a)	17c)	20.5	17d)	100.0	-	-	-	-
Dominican Republic	5 275	5 241	99.4	5 103	97.4	45	1.0	93	1.7
Ecuador	7 682	4 712	61.3	-	-	1 998	42.4	2 714	57.6
El Salvador	4 653	4 020	86.4	-	-	-	-	4 020	100.0
Falkland Islands	2a)	-	-	-	-	-	-	-	-
French Guiana	68a)	58	85.3	31	53.5	18	31.0	9	15.5
Grenada	110	41c)	37.3	41d)	100.0	-	-	-	-
Guadeloupe	325	284c)	87.4	284d)	100.0	-	-	-	-
Guatemala	7 046	2 644	37.5	-	-	-	-	2 644	100.0
Guyana	899	899	100.0	844	93.9	16	1.8	39	4.3
Haiti	5 000	4 271	85.4	-	-	-	-	4 271	100.0
Honduras	3 564	3 267	91.7	-	-	602	18.4	2 665	81.6
Jamaica	2 200	1 610	73.2	1 610c)	100.0	-	-	-	-
Martinique	315b)	197c)	62.5	197d)	100.0	-	-	-	-
Mexico	69 381	34 809	50.2	5 302	15.2	19 764	56.8	9 743	28.0
Montserrat	11a)	-	-	-	-	-	-	-	-
Netherland Antilles	260e)	-	-	-	-	-	-	-	-
Nicaragua	2 518	2 518	100.0	-	-	-	-	2 518	100.0
Panama	1 881	1 811	96.3	-	-	1 481	81.8	330	18.2
Canal Zone	45	45	100.0	-	-	45	100.0	-	-
Paraguay	2 973	2 487	83.6	669	26.9	1 313	52.8	505	20.3
Peru	17 293	5 715	33.0	1 563	27.3	2 752	48.2	1 400	24.5
Puerto Rico	3 410b)	3 410	100.0	3 410d)	100.0	-	-	-	-
St. Kitts, Nevis, Anguilla	67a)	-	-	-	-	-	-	-	-
Saint Lucia	127	107	84.2	107d)	100.0	-	-	-	-
St. Pierre & Miquelon	6a)	-	-	-	-	-	-	-	-
St. Vincent	97a)	-	-	-	-	-	-	-	-
Suriname	395	287	72.6	219	76.3	44	15.3	24	8.4
Trinidad & Tobago	1 160	1 044	90.0	1 044	100.0	-	-	-	-
Turks & Caicos Islands	6a)	-	-	-	-	-	-	-	-
United States of America	220 099f)	62 508c)	28.4	62 508d)	100.0	-	-	-	-
Uruguay	2 880e)	-	-	-	-	-	-	-	-
Venezuela	13 515	10 076	74.5	9 476	94.1	-	-	600	5.9
Virgin Islands (USA)	108a)	108	100.0	108	100.0	-	-	-	-
<b>TOTAL</b>	<b>600 263</b>	<b>226 361</b>	<b>37.7</b>	<b>113 092</b>	<b>50.0</b>	<b>57 280</b>	<b>25.3</b>	<b>55 989</b>	<b>24.7</b>

a) PAHO Provisional estimates. b) Latest Official figure estimated by country, United Nations Population and Vital Statistics Report. c) Estimated. d) Population living in areas where malaria eradication has been registered by PAHO/WHO. e) United Nations, monthly Bulletin of Statistics. f) Population estimated and projected by the U.S.A. Bureau of Census.

Table 4

## STATUS OF THE MALARIA PROGRAM IN THE AMERICAS, BY AREA, 1979

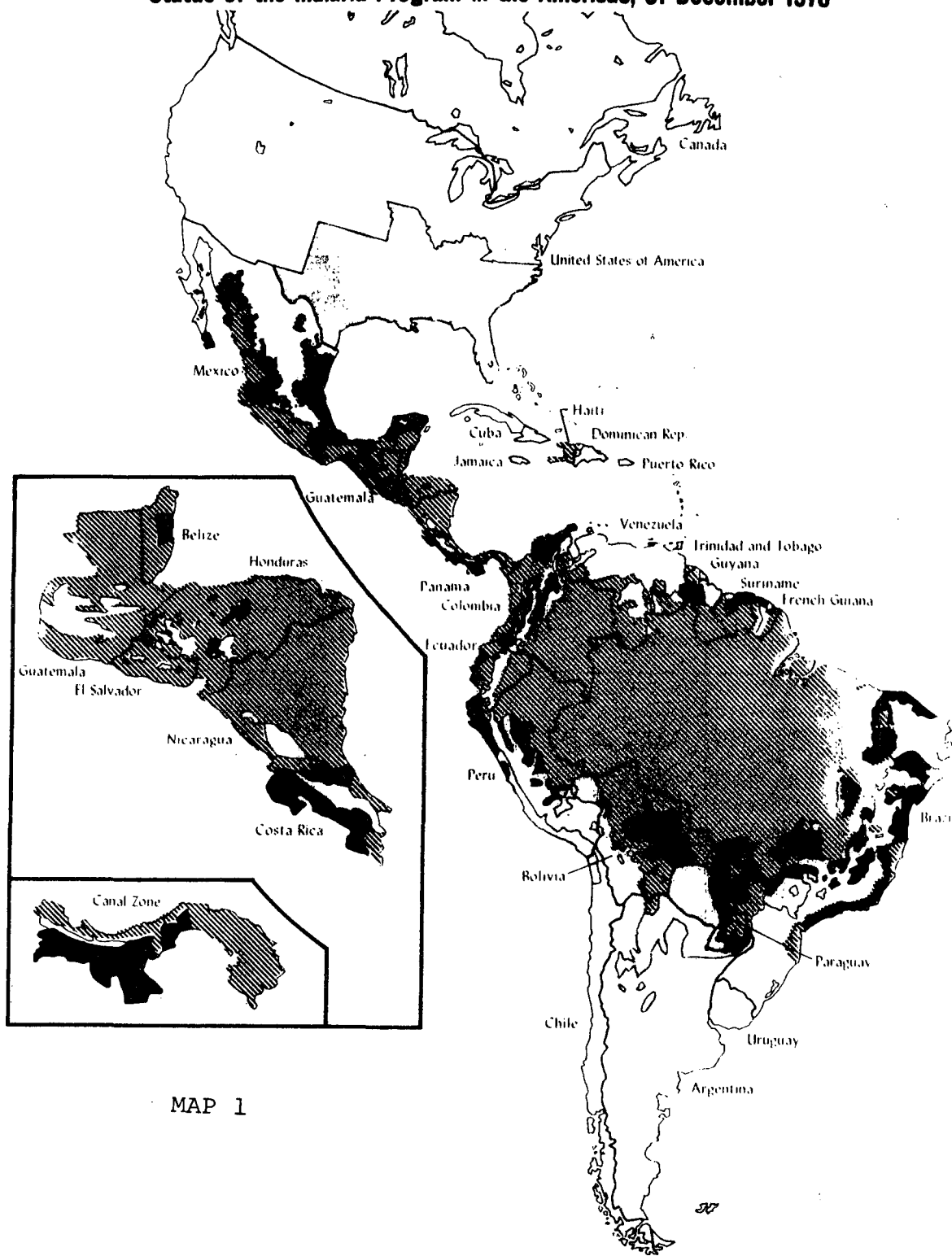
(Area in Km<sup>2</sup>)

Country or other political or administrative unit	Total area	Originally malarious areas							
		Total Malarious areas		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	178 828	2.6	826 515	12.0	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	147 605	84.2
El Salvador	21 149	18 656	88.2	-	-	-	-	18 656	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	1 780	1 136	63.8	1 136a)	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	-	-	6 869	6.8	94 482	93.2
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	190 953	16.6	544 564	47.4	414 483	36.0
Montserrat	84	-	-	-	-	-	-	-	-
Netherlands Antilles	961	-	-	-	-	-	-	-	-
Nicaragua	127 358	118 358	93.0	-	-	-	-	118 358	100.0
Panama	75 650	69 880	92.3	-	-	29 705	42.5	40 175	57.5
Canal Zone	1 675	1 432	85.5	-	-	1 432	100.0	-	-
Paraguay	406 752	406 552	100.0	271 010	66.1	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	510a)	100.0	-	-	-	-
St. Pierre & Miquelon	240	-	-	-	-	-	-	-	-
St. Vincent	389	-	-	-	-	-	-	-	-
Suriname	163 820	163 750	100.0	8 955	5.5	55 345	33.8	99 450	60.7
Trinidad & Tobago	5 650	5 449	96.3	5 449	100.0	-	-	-	-
Turks & Caicos Islands	522	-	-	-	-	-	-	-	-
United States of America	9 365 604	2 309 876	24.7	2 309 876a)	100.0	-	-	-	-
Uruguay	186 926	-	-	-	-	-	-	-	-
Venezuela	915 715	600 000	65.5	460 054b)	76.7	-	-	139 946	23.3
Virgin Islands (USA)	345	345	100.0	345a)	100.0	-	-	-	-
Total	40 405 460	15 748 724	39.0	4 155 886	26.4	2 152 742	13.6	9 440 096	60.0

a) Area where eradication of Malaria has been certified by PAHO/WHO.

b) Includes an area of 407,945 Km<sup>2</sup>, where eradication of Malaria has been certified by PAHO/WHO.

Status of the Malaria Program in the Americas, 31 December 1978

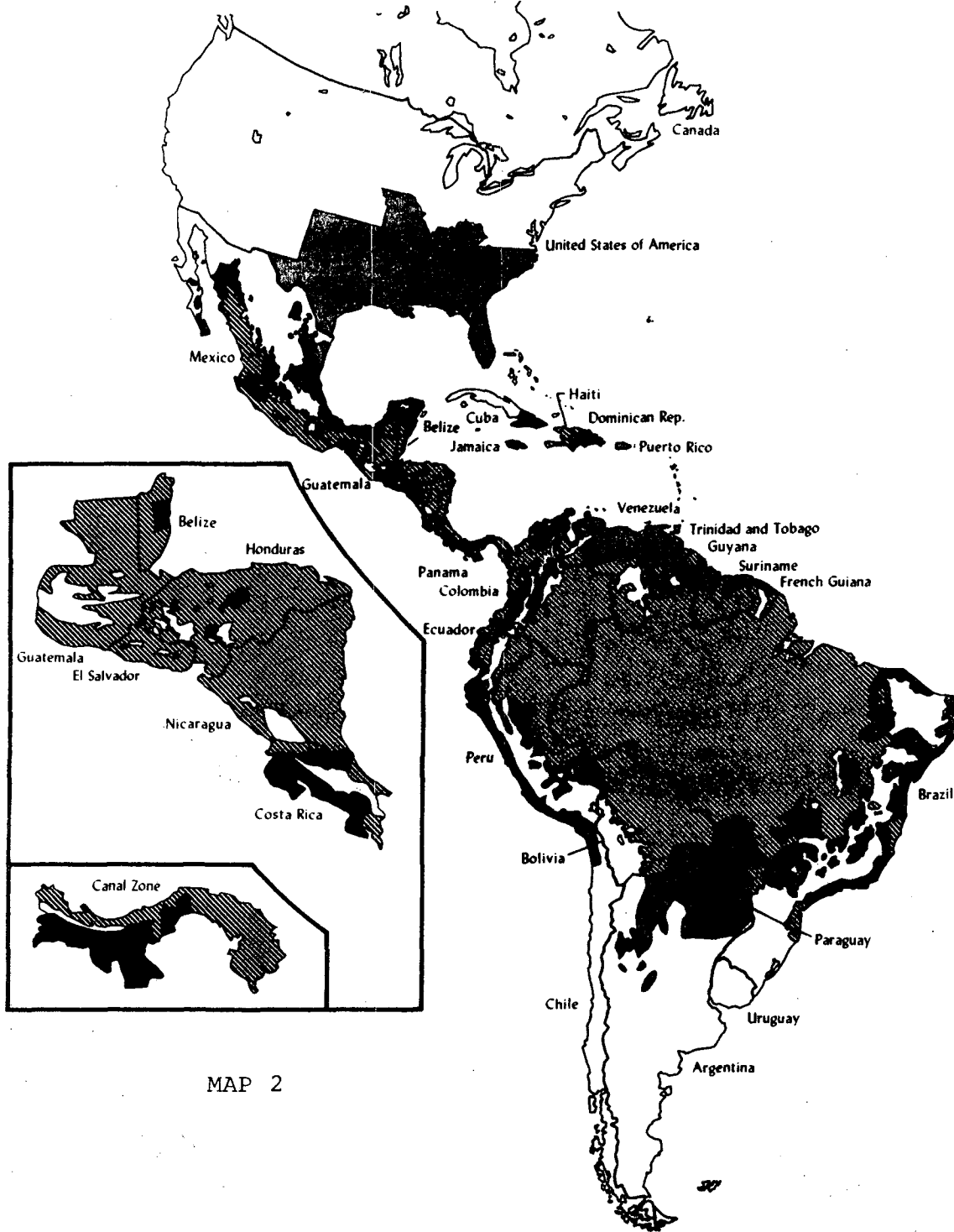


MAP 1

Including:

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

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



MAP 2

Including:

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li> Areas in which malaria has disappeared or never existed</li> <li> Areas where malaria has been eradicated (Maintenance phase)</li> <li> In consolidation phase</li> <li> In attack phase</li> </ul> | <ul style="list-style-type: none"> <li>{ Antigua, Bahamas, Barbados, Barbuda, Bermuda, St. Kitts-Nevis-Anguilla, St. Vincent, Turks and Caicos Islands, Virgin Islands (UK)</li> <li>{ Dominica, Grenada, Guadeloupe, Martinique, St. Lucia, Trinidad and Tobago, Virgin Islands (US)</li> </ul> |
|---|--|



Table 5  
 MALARIA MORBIDITY IN THE AMERICAS  
 1958-1979

Year	Population		Blood Slides			Morbidity per 100,000 inhabitants	
	Total Country	Total malarious area	Examined	Positive	%	Total Country	Malarious area
1958	387 276	135 409	1 716 103	56 705	3.3	14.64	41.88
1959	394 606	145 920	2 749 117	75 612	2.8	19.16	51.82
1960	400 500	143 586	3 955 149	79 998	2.0	19.88	55.71
1961	416 008	147 292	5 341 004	99 539	1.9	23.93	67.58
1962	427 919	153 742	7 221 367	177 089	2.5	41.38	115.19
1963	434 950	152 021	7 903 156	227 026	2.9	52.20	149.34
1964	447 666	158 642	8 156 290	254 572	3.1	56.87	160.47
1965	455 527	146 389	9 069 950	241 462	2.7	53.01	164.95
1966	463 649	166 469	11 731 451	333 245	2.8	71.87	200.18
1967	474 868	169 901	11 609 226	369 341	3.2	77.78	217.39
1968	484 664	174 704	12 522 696	282 773	2.3	58.34	161.86
1969	491 483	176 325	12 179 190	323 782	2.7	65.88	183.63
1970	505 819	181 257	9 925 162	344 170	3.5	68.04	189.88
1971	513 544	185 492	10 134 212	338 416	3.3	65.90	182.44
1972	524 774	190 448	9 695 953	284 813	2.9	54.23	149.55
1973	535 109	195 528	9 400 682	280 276	3.0	52.38	143.34
1974	544 865	200 755	8 997 318	269 003	3.0	49.37	134.00
1975	555 676	205 872	9 276 878	356 692	3.8	64.19	173.26
1976	565 249	211 086	9 351 875	379 364	4.1	67.11	179.72
1977	576 942	215 550	9 261 874	398 598	4.3	69.09	184.92
1978	587 319	220 153	9 446 911	464 911	4.9	79.16	211.18
1979	600 263	226 361	8 633 717	517 417	6.0	86.20	228.58

Table 6  
CASE DETECTION BY COUNTRY AND PHASE OF PROGRAM, 1979

Country or other political or adminis- trative 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 .....	48 945	936	30 862	292	6 539	40	11 544	600	0	4
BELIZE .....	20 952	1 391	-	-	5 506	223	15 446	1 168	-	-
BOLIVIA .....	109 402	14 712	-	-	-	-	109 178	14 612	224	100
BRAZIL .....	2 691 966	147 630	118 603	726	687 526	2 085	1 841 623	142 349	44 214	2 470
CANADA .....	...	...	-	-	-	-	-	-	-	-
COLOMBIA .....	401 005	60 957	-	-	155 026	9 707	244 452	51 031	1 527	219
CHILE .....	0	0	-	-	-	-	-	-	-	-
COSTA RICA .....	176 784	307	-	-	116 834	136	58 550	93	1 400	78
CUBA .....	334 507	295	334 507	295	-	-	-	-	-	-
DOMINICA .....	...	...	-	-	-	-	-	-	-	-
DOMINICAN REPUBLIC.	478 832	3 080	420 920	2 432	9 151	29	48 677	619	84	0
ECUADOR .....	285 597	8 207	-	-	94 269	433	189 911	7 748	1 417	26
EL SALVADOR .....	438 716	77 976	-	-	-	-	424 267	77 467	14 449	509
FRENCH GUIANA .....	15 114	604	4 336	226	4 128	123	6 650	255	-	-
GRENADA .....	1 558	1	974	0	-	-	-	-	584	1
GUADELOUPE .....	0	0	-	-	-	-	-	-	-	-
GUATEMALA .....	440 712	69 039	-	-	-	-	434 159	67 952	6 553	1 087
GUYANA .....	107 232	2 294	14 881	51	-	-	92 351	2 243	-	-
HAITI .....	321 456	41 252	-	-	-	-	321 456	41 252	-	-
HONDURAS .....	143 485	25 297	-	-	2 248	201	140 885	25 034	352	62
JAMAICA .....	8 407	5	8 407	5	-	-	-	-	-	-
MEXICO .....	1 446 946	20 983	66 731	17	605 436	1 416	757 357	19 449	17 422	101
NICARAGUA .....	203 475	18 418	-	-	-	-	203 475	18 418	-	-
PANAMA .....	369 775	316	-	-	203 258	55	166 517	261	-	-
CANAL ZONE .....	421	0	-	-	421	0	-	-	-	-
PARAGUAY .....	57 225	116	3 577	2	25 655	3	27 017	111	976	0
PERU .....	174 565	17 127	34 417	119	11 382	216	128 766	16 792	-	-
PUERTO RICO .....	1	2	1	2	-	-	-	-	-	-
SAINT LUCIA .....	8	1	8	1	-	-	-	-	-	-
SURINAME .....	80 060	903	4 032	4	15 863	13	58 518	833	1 647	53
TRINIDAD & TOBAGO ..	4 276	8	4 276	8	-	-	-	-	-	-
UNITED STATES .....	230	850	230	850	-	-	-	-	-	-
VENEZUELA .....	272 065	4 705	168 284	921	-	-	102 505	3 524	1 276	260
TOTAL .....	8 633 717	517 412	1 215 046	5 951	1 943 242	14 680	5 383 304	491 811	92 125	4 970

Table 7  
SLIDES EXAMINED AND POSITIVES, BY SPECIES AND CLASSIFICATION,  
MAINTENANCE AREAS, 1979

Country or other political or administrative unit	Blood slides examined	Total positive	Specie of parasite				Classification of cases							
			<u>P. falci-</u> <u>parum</u>	<u>P. vivax</u>	<u>P. malar-</u> <u>iae</u>	Mixed infections	Autochthous	Relapsing	Imported		Induced	Intro-duced	Criptic and Unclas-sified	No inves-tigate
									from abroad	from areas within country				
Argentina .....	30 862	292	-	292	-	-	276	6	8	1	-	1	-	-
Brazil .....	118 603	726	211	504	-	11	5	1	3	584a)	4	1	-	128
Cuba .....	334 507	295	132	139	13	(b)	-	-	295	-	-	-	-	-
Dominica .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dom. Republic .....	420 920	2 432	2 432	-	-	-	252	-	500	-	-	1 510	-	170
French Guiana .....	4 336	226	192	32	1	1	146	-	18	45c)	-	-	4	13
Grenada .....	974	0	-	-	-	-	-	-	-	-	-	-	-	-
Guadeloupe .....	0	0	-	-	-	-	-	-	-	-	-	-	-	-
Guyana .....	14 881	51	11	40	-	-	-	-	4	15	1	-	-	31
Jamaica .....	8 407	5	4	1	-	-	-	-	5	-	-	-	-	-
Mexico .....	66 731	17	-	16	1	-	13	-	-	2	1	-	-	1
Paraguay .....	3 577	2	-	2	-	-	2	-	-	-	-	-	-	-
Peru .....	34 417	119	-	119	-	-	-	3	19	95	1	-	-	-
Puerto Rico .....	1	2 <sup>d)</sup>	1	-	-	-	-	-	1	-	-	-	-	1
Saint Lucia .....	8	1	1	-	-	-	-	-	1	-	-	-	-	-
Suriname .....	4 032	4	4	-	-	-	-	-	-	4e)	-	-	-	-
Trinidad & Tobago .....	4 276	8	3	5	-	-	-	-	8	-	-	-	-	-
United States .....	230	850 <sup>f)</sup>	180	563	30	15	-	-	850	-	-	-	-	-
Venezuela .....	168 284	921	125	791	-	5	128	1	222	274	4	292	-	-
<b>Total.....</b>	<b>1 215 046</b>	<b>5 951</b>	<b>3 296</b>	<b>2 504</b>	<b>45</b>	<b>32</b>	<b>822</b>	<b>11</b>	<b>1 934</b>	<b>1 020</b>	<b>12</b>	<b>1 804</b>	<b>4</b>	<b>344</b>

a) Eleven cases imported from consolidation phase. b) Two cases P. ovale and 9 with unknown specie. c) 36 Cases from consolidation phase. d) One case with unknown specie. e) Three cases from consolidation phase. f) Seven cases P. ovale and 55 unknown origin.

Table 8

SLIDES EXAMINED AND POSITIVES, BY SPECIES AND CLASSIFICATION,  
CONSOLIDATION AREAS, 1979

Country or other political or adminis- trative unit	Population (thousands)	Blood slides examined	Total cases	API*	Specie of parasite				Origin of infections							
					P. faldi- parum	P. vivax	P. malar- iae	Mixed infec- tion	autoch- tho- nous	Relap- sing	Imported		In- duced	Intro- duced	Cryp- tic	Unclas- sified or not investi- gated
											from abroad	from areas within country				
Argentina .....	69	6 539	40	0.6	-	40	-	-	21	-	4	13	1	1	-	-
Belize .....	84	5 506	223	2.6	2	221	-	-	4	7	15	32	-	2	-	163
Brazil .....	16 805	687 526	2 085	0.1	490	1 577	1	17	645	3	24	952	3	13	2	443
Colombia .....	11 802	155 026	9 707	0.8	2 855	6 802	-	50	2 075	9	56	4 348	5	18	422	2 774
Costa Rica .....	441	116 834	136	0.3	6	130	-	-	96	-	35	5	-	-	-	-
Dominican Republic	45	9 151	29	0.6	29	-	-	-	28	-	-	-	-	-	-	1
Ecuador .....	1 998	94 269	433	0.2	59	374	-	-	86	-	-	90	-	-	-	257
French Guiana ....	18	4 128	123	6.8	90	32	-	1	105	-	14	4	-	-	-	-
Guyana .....	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Honduras .....	602	2 248	201	0.3	25	176	-	-	...	...	...	...	...	...	...	...
Mexico .....	19 754	605 436	1 416	0.07	10	1 404	2	-	667	72	21	254	3	9	52	338
Panama .....	1 481	203 258	55	0.04	14	41	-	-	20	-	29	6	-	-	-	-
Canal Zone .....	45	421	0	-	-	-	-	-	-	-	-	-	-	-	-	-
Paraguay .....	1 313	25 655	3	0.00	-	3	-	-	-	-	3	-	-	-	-	-
Peru .....	2 752	11 382	216	0.08	-	216	-	-	-	6	3	207	-	-	-	-
Suriname .....	44	15 863	13	0.3	-	13	-	-	-	-	-	6	-	7	-	-
<b>Total .....</b>	<b>58 280</b>	<b>1 943 242</b>	<b>14 680</b>	<b>0.2</b>	<b>3 580</b>	<b>11 029</b>	<b>3</b>	<b>68</b>	<b>3 747</b>	<b>97</b>	<b>204</b>	<b>5 917</b>	<b>12</b>	<b>50</b>	<b>476</b>	<b>3 976</b>

... = No information available.

Table 9  
SLIDES EXAMINED AND POSITIVES BY SPECIES  
ATTACK AREAS, 1979

Country or other political or adminis- trative unit	Slides examined			Species found			
	Total	Positive		<u>P. falci- parum</u>	<u>P. vivax</u>	<u>P. malariae</u>	Mixed Infec- tions
		Number	Percentage				
Argentina .....	11 544	600	5.20	-	600	-	-
Belize .....	15 446	1 168	7.56	11	1 157	-	-
Bolivia .....	109 178	14 612	13.38	716	13 888	-	8
Brazil .....	1 841 623	142 349	7.73	58 094	83 074	20	1 161
Colombia .....	244 452	51 031	20.88	20 329	30 271	69	362
Costa Rica .....	58 550	93	0.16	11	82	-	-
Dominican Republic.	48 677	619	1.27	619	-	-	-
Ecuador .....	189 911	7 748	4.08	2 585	5 159	-	4
El Salvador .....	424 267	77 467	18.26	13 950	63 047	-	470
French Guiana .....	6 650	255	3.83	154	93	-	8
Guatemala .....	434 159	67 952	15.65	6 275	61 371	-	306
Guyana .....	92 351	2 243	2.43	539	1 690	-	14
Haití .....	321 456	41 252	12.83	41 252	-	-	-
Honduras .....	140 885	25 034	17.77	4 217	20 555	-	262
Mexico .....	757 357	19 449	2.57	1 183	18 248	3	15
Nicaragua .....	203 475	18 418	9.05	5 573	12 749	-	96
Panama .....	166 517	261	0.16	113	146	-	2
Paraguay .....	27 017	111	0.41	29	65	-	17
Peru .....	128 766	16 792	13.04	4	16 782	6	-
Suriname .....	58 518	833	1.42	727	106	-	-
Venezuela .....	102 505	3 524	3.44	726	2 765	3	30
Total .....	5 383 304	491 811	9.1	157 107	331 848	101	2 755

Table 10  
 SLIDES EXAMINED AND POSITIVES BY SPECIES,  
 NON-MALARIOUS AREAS, 1979

Country or other political or adminis- trative unit	Slides examined			Species found			
	Total	Positive		P. <u>falci-</u> <u>parum</u>	P. <u>vivax</u>	P. <u>malariae</u>	Mixed Infec- tions
		Number	Percentage				
Argentina .....	-	4	-	1	3	-	-
Bolivia .....	224	100	44.64	-	100	-	-
Brazil .....	44 214	2 470	5.59	902	1 538	-	30
Colombia .....	1 527	219	14.34	24	194	-	1
Costa Rica .....	1 400	78	5.57	16	62	-	-
Dominican Republic.	84	0	-	-	-	-	-
Ecuador .....	1 417	26	1.83	-	26	-	-
El Salvador .....	14 449	509	3.52	63	444	-	2
Grenada .....	584	1	0.17	-	-	1	-
Guatemala .....	6 553	1 087	16.59	42	1 037	-	8
Honduras .....	352	62	17.61	-	61	-	1
México .....	17 422	101	0.58	-	92	9	-
Paraguay .....	976	0	-	-	-	-	-
Suriname .....	1 647	53	3.22	42	10	1	-
Venezuela .....	1 276	260	20.38	30	228	-	2
<b>Total .....</b>	<b>92 125</b>	<b>4 970</b>	<b>5.40</b>	<b>1 120</b>	<b>3 795</b>	<b>11</b>	<b>44</b>

Table 11

SPRAYINGS WITH RESIDUAL INSECTICIDES APPLIED IN 1978 AND 1979 IN THE  
MALARIA PROGRAMS OF THE AMERICAS

Country or other political or administrative unit	Sprayings applied in 1978				Sprayings applied in 1979			
	DDT	Propoxur	Fenitrothion	Others	DDT	Propoxur	Fenitrothion	Others
Argentina .....	17 918	-	-	-	15 440	-	-	-
Belize .....	17 768	-	-	-	11 399	-	-	-
Bolivia .....	88 103	-	-	-	98 409	-	-	-
Brazil .....	4 191 780	-	-	-	4 180 295	-	-	-
Colombia .....	618 052	-	-	-	654 258	54 231a)	-	5 859b)
Costa Rica .....	64 545	-	-	-	50 208	11 592	-	-
Dominican Republic ..	29 965	-	-	-	28 647	-	-	-
Ecuador .....	407 719	-	8 827	-	488 113	-	-	-
El Salvador .....	-	10 000	-	-	-	88 092c)	-	-
French Guyana .....	2 000	-	-	-	1 876	-	-	-
Guatemala .....	67 744	-	436 920	-	605 403d)	-	-	-
Guyana .....	13 578	-	-	-	6 934	-	-	-
Haiti .....	232 832	-	14 263	-	-	-	392 295	4 230b)
Honduras .....	239 454	-	-	-	90 500	-	-	-
Mexico .....	2 354 162	-	-	-	2 609 171	-	-	-
Nicaragua .....	38 014	66 091	-	14 363e)	4 993f)	27 823	-	5 071e)
Panama .....	55 866	5 088	-	-	42 306	21 944	-	-
Paraguay .....	68 169	-	-	-	86 845	-	-	-
Peru .....	192 877	-	-	-	37 997g)	-	-	-
Suriname .....	1 243	-	-	-	2 198	-	-	-
Venezuela .....	396 840	-	-	8 876h)	272 305i)	-	-	6 881hi)
Total .....	9 098 629	81 179	460 010	23 239	9 287 297	203 682	392 295	22 041

a) Propoxur & DDT. b) Malathion. c) Propoxur & Sumithion. d) Sumithion & DDT. e) Sprayings with Chlorfoxim. f) Incomplete cycle of DDT. g) Sprayings up to October. h) Sprayings with HCH. i) Information up to September.

Table 12  
INSECTICIDES USED IN THE MALARIA PROGRAMS  
1979 AND ESTIMATED 1980

Country or other litical or adminis- trative unit	D D T (Kg.)				Propoxur 50% (Kg.)		Malation 50% (Kg.)		Other	
	1979		1980 (Est.)		1979	1980 (Est.)	1979	1980 (Est.)	1979	1980 (Est.)
	100%	75%	100%	75%						
Argentina .....	325	11 555	500	9 000	-	-	-	-	-	-
Belize .....	3 400a)	14 400a)	3 700a)	15 800a)	-	-	-	-	-	-
Bolivia .....	-	62 469	-	104 000	-	-	-	-	-	-
Brazil .....	143 134	1 664 621	289 347	2 470 800	-	-	-	-	-	-
Colombia .....	2 990	352 820	3 000	450 000	11 160	16 000	28 258	10 000	17 284b)	10 000b)
Costa Rica .....	4 200	20 000	4 300	20 000	3 200	4 000	-	-	-	-
Dominican Republic .....	1 247	13 361	2 000	20 000	-	-	-	-	-	-
Ecuador .....	1 443	294 248	2 000	280 000	-	-	-	-	-	-
El Salvador .....	-	-	-	-	23 837	35 000	-	-	16 338c)	8 000d)
French Guiana .....	720	295	860	350	105e)	100e)	2 505e)	3 000e)	3 120h)	3 800h)
Guatemala .....	-	39 580	-	43 092	300e)	500e)	-	-	79 693f)	144 545g)
Guyana .....	4 989a)	9 072a)	4 989a)	9 072a)	-	-	-	-	-	-
Haiti .....	-	-	124	17 300	-	-	2 859e)	2 430e)	69 120i)	129 926i)
Honduras .....	107	4 329	5 000	85 000	120	17 000	-	-	-	-
Mexico .....	34 986	1 355 587	44 200	1 730 000	-	-	-	-	-	4 270j)
Nicaragua .....	340	4 536	-	15 740	32 765	152 000	4 023k)	14 650e)	35 060m)	212 370m)
Panama .....	2 158	24 388	2 000	25 000	16 975	18 000	-	-	-	-
Paraguay .....	-	89 000	-	100 557	-	-	-	-	-	-
Peru .....	-	166 472	-	338 839	-	-	-	-	-	-
Suriname .....	800a)	4 200a)	850a)	4 200a)	-	-	-	-	-	-
Venezuela .....	-	329 600a)	-	339 488a)	-	-	-	-	-	-
<b>Total.....</b>	<b>200 839</b>	<b>4 460 533</b>	<b>362 870</b>	<b>6 078 238</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

a) Estimated. b) Carbaril 85%. c) 14,578 Kgs. of Sumithion 40% and 1,760 Gal. of Pyrethrum 5%. d) 5,000 Kgs. Sumithion 40% and 5,000 Gal. Pyrethrum. e) Liters. f) 79,325 Kgs. Sumithion 40% and 3,680 Kgs. Temephos 1%. g) 140,000 Kgs. Sumithion and 4,545 Kgs. Temephos h) Lts. of Dieldrin. i) 66,020 Kgs. Fenitrothion 40% in 1979 and 3,000 Kgs. Malathion powder in 1979. In 1980 will be used, 104,000 Kgs. Fenitrothion and 25,926 Kgs. Malathion powder. j) In 1980 will be used, 70 Lts. Themephos 50%, 4000 Kgs. H.C.H. and 200 Lts. Lindano 100%. Gal. of Malathion 57%. k) 919 Gal. of Malathion 57% and 3,104 Gal. 96%. l) 6,550 Gal. 57% and 8,100 Gal. 96%. m) Kgs. of Chlorfoxim and Propoxur.



Table 13

## COMPARATIVE RESULTS OF ACTIVE AND PASSIVE CASE DETECTION IN MALARIA PROGRAMS IN THE AMERICAS, 1979

Country or other political or administrative unit	Active case detection				Passive case detection						Total	
	Average number of evaluators	Blood slides			number of notification posts existing	Average of notification post producing slides per month	Blood slides			Average of slides per month per productive notification posts	Blood slides	
		examined	Positive	Percent			examined	Positive	Percent		examined	Positives
Argentina .....	87	39 223	702	1.8	752	130	9 722	234	2.4	6.2	48 945	936
Belize .....	7	13 684	512	3.7	139	139	7 268	879	12.1	4.4	20 952	1 391
Bolivia .....	106	27 370	8 969	32.7	3 221	1 153	82 032	5 743	7.0	6.0	109 402	14 712
Brazil .....	3 772	1 841 881	29 407	1.6	36 214	15 309	850 085	118 223	13.9	4.6	2 691 966	147 630
Colombia .....	276	132 784	14 008	10.5	6 959	3 686	268 221	46 949	17.5	6.1	401 005	60 957
Costa Rica .....	88	174 380	191	0.1	900	344	2 404	116	4.8	1.0	176 784	307
Cuba .....	...	332 438	295	0.1	...	...	2 069	0	-	-	334 507	295
Dominican Republic...	158	387 238	2 180	0.6	5 061	2 332	91 594	900	1.0	3.3	478 832	3 080
Ecuador .....	126	189 003	7 104	4.0	6 272	2 688	96 594	1 103	1.1	3.0	285 597	8 207
El Salvador .....	...	361 052	68 234	19.0	2 788	2 762	77 664	9 742	12.5	2.3	438 716	77 976
French Guiana .....	2	11 051	124	1.1	...	...	4 063	480	11.8	-	15 114	604
Grenada .....	-	1 293	-	-	-	-	265	1	0.4	-	1 558	1
Guatemala .....	100	90 945	6 376	7.0	7 441	3 544	349 767	62 663	18.0	8.2	440 712	69 039
Guyana .....	76	89 491	1 923	2.1	15	15	17 741	371	2.1	98.6	107 232	2 294
Haiti .....	50	77 610	4 020	5.2	4 401	4 007	243 846	37 232	15.3	5.1	321 456	41 252
Honduras .....	...	32 489	1 666	5.1	3 147	3 147	110 996	23 631	21.3	3.0	143 485	25 297
Jamaica .....	-	1 946	0	-	-	-	6 461	5	0.1	-	8 407	5
Mexico .....	1 252	1 015 244	9 150	1.0	91 490	32 251	431 702	11 833	3.0	1.1	1 446 946	20 983
Nicaragua .....	99	29 095	1 064	4.0	4 352	3 461	174 380	17 354	10.0	4.2	203 475	18 418
Panama .....	270	339 522	242	0.1	698	208	30 253	74	0.2	12.12	369 775	316
Canal Zone .....	-	-	-	-	-	-	421	0	-	-	421	0
Paraguay .....	141	27 271	95	0.3	4 621	580	29 954	21	0.1	4.3	57 225	116
Peru .....	76	114 677	8 118	7.1	5 935	1 484	59 888	9 009	15.0	3.4	174 565	17 127
Puerto Rico .....	-	1	2	-	-	-	-	-	-	-	1	2
Saint Lucia .....	-	-	-	-	-	-	8	1	12.5	-	8	1
Suriname .....	32	78 915	881	1.1	82	75	1 145	22	2.0	1.8	80 060	903
Trinidad & Tobago ...	-	4 050	4	0.1	-	-	226	4	2.0	-	4 276	8
United States of Am..	-	-	-	-	-	-	230	850	-	-	230	850
Venezuela .....	436	215 866	2 362	1.1	2 841	456	56 199	2 343	4.2	10.3	272 065	4 705
<b>Total .....</b>	<b>7 154</b>	<b>5 628 519</b>	<b>167 629</b>	<b>3.0</b>	<b>187 329</b>	<b>-</b>	<b>3 005 198</b>	<b>349 783</b>	<b>11.6</b>	<b>-</b>	<b>8 633 717</b>	<b>517 412</b>

Table 14

## PERSONNEL EMPLOYED IN THE MALARIA PROGRAMS IN THE AMERICAS

31 DECEMBER 1978 AND 1979 a)

(Part-time personnel in parentheses)

Title	1978	1979
Engineers .....	99 (1)	100
Spraying Chiefs .....	351	354
Sector Chiefs .....	481	563
Squad Chiefs .....	1 930	2 134
Sprayment .....	8 986	8 877
Draftsmen .....	105	118
Medical Officers .....	182 (3)	185 (8)
Entomologists .....	58	48 (10)
Assistant Entomologists .....	234	224 (4)
Statisticians and Statisticians Assistants .....	395	383 (28)
Evaluation Inspectors .....	2 091 (3) b)	2 120 (b)
Evaluators .....	7 607 b)	7 142
Microscopists .....	879 (5)	883
Administrators .....	63	67
Administrative Assistants .....	630	585
Accountants .....	59	49
Disbursing Officers .....	43	43
Storekeepers .....	70	65
Storekeepers' Assistants .....	83	72
Secretaries .....	275	275
Others .....	725 (3)	1 067
Transport Chiefs, Mechanics and Assistant Mechanics .....	464	444
Drivers .....	962	961
Motorboat Operators .....	364	375
Boatmen .....	98	62
TOTAL .....	27 234 (15)	27 196 (50)

a) The administration of some of the malaria programs is under the health services.

b) In some programs this personnel performs spraying operations' activities.

Table 15

## MEANS OF TRANSPORT IN MALARIA PROGRAMS IN THE AMERICAS, 1979

Country or other political or administrative unit	Trucks (3 tons or more)		Trucks and "Pick-up" (less than 3 tons)		Jeeps		Automobiles and station wagons		Motor-cycles		Bicycles		Motor boats		Boats without motor		Saddle and pack animals	Other		
	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b		a	b	
Argentina .....	2	-	26	21	20	27	4	3	-	-	7	6	-	-	-	-	-	-	-	-
Belize .....	-	-	-	6	-	-	-	-	-	-	-	2	-	3	-	-	-	-	-	-
Bolivia .....	-	-	3	4	3	8	-	2	-	-	-	-	12	11	-	-	52	14c)	37c)	
Brazil .....	29	-	340	-	707	-	10	-	215	-	2 105	-	401	-	7	-	712	-	-	
Colombia .....	8	8	49	78	45	69	2	25	15	24	75	57	163	109	20	15	827	-	-	
Costa Rica .....	-	-	13	-	20	4	-	-	50	8	-	-	2	13	-	-	45	-	-	
Dominican Republic ..	1	-	46	10	2	-	5	1	142	-	1	-	-	-	-	-	143	-	-	
Ecuador .....	-	2	17	24	8	26	2	3	28	18	22	4	33	23	-	-	272	30c)	-	
El Salvador .....	-	-	21	9	23	6	-	4	-	14	-	-	-	-	-	-	-	2d)	-	
French Guiana .....	-	1	3	-	2	-	7	-	-	-	-	-	-	-	5	-	-	-	-	
Guatemala .....	-	2	36	7	37	19	1	1	33	36	-	-	10	10	7	6	-	5	-	
Guyana .....	-	-	1	-	6	7	-	-	1	6	1	3	5	4	4	-	4	-	-	
Haiti .....	-	-	14	39	15	33	7	8	-	-	-	-	-	1	1	-	-	-	-	
Honduras .....	-	2	30	20	8	12	2	7	60	44	-	-	2	1	-	-	65	-	-	
Mexico .....	26	3	291	184	473	113	42	1	-	-	-	-	42	3	-	-	1 686	-	-	
Nicaragua .....	-	1	9	13	12	22	7	3	-	-	12	15	-	-	-	-	-	-	-	
Panama .....	1	-	11	10	20	9	1	-	24	7	23	7	-	1	62	11	-	72	25	
Paraguay .....	1	1	23	10	3	2	14	2	127	16	29	11	19	-	-	-	-	27	13	
Peru e).....	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	79	-	
Suriname .....	1	-	1	-	1	-	1	-	4	-	-	-	24	-	-	-	-	-	-	
Venezuela .....	12	-	148	-	125	-	59	-	19	-	247	-	126	-	-	-	595	90	-	
Total .....	81	20	1 082	435	1 530	357	164	60	718	173	2 522	105	839	179	106	32	4 401	319	75	

a) In good condition. b) In bad condition. c) Out-board motors. d) Tractors. e) Number and operative distribution unknown.

Table 16  
 NATIONAL AND INTERNATIONAL CONTRIBUTIONS TO THE MALARIA PROGRAMS  
 OF THE AMERICAS, EXPENDITURES 1978-1979 AND BUDGET 1980  
 (U.S.A.dollars)

Country or other political or adminis- trative unit	Expenditures 1978				Expenditures 1979				Budget 1980			
	National expenses (internal financing)	PAHO/WHO Contribu- tion	AID/USA Grants	Total	National expenses (internal financing)	PAHO/WHO Contribu- tion	AID/USA Grants	Total	National budget (internal financing)	PAHO/WHO Contribu- tion a)	AID/USA Grants	Total
Argentina .....	670 434	5 685	-	676 119	1 701 590	31 241	--	1 732 831	2 061 988	36 800	-	2 098 788
Belize .....	121 221	31 504	-	152 725	165 687	28 323	-	194 010	221 792	53 900	-	275 692
Bolivia .....	665 035	83 044	-	748 079	736 000	-	815 994 <sup>b)</sup>	1 551 994	956 304	-	815 437	1 771 741
Brazil .....	18 372 258	252 333	-	18 624 591	29 496 005	286 493	-	29 782 498	25 243 763	640 500	-	25 884 263
Colombia .....	5 100 000	199 882	-	5 299 882	9 953 488 <sup>c)</sup>	155 956	-	10 109 444	14 813 953	407 500	-	15 221 453
Costa Rica .....	1 361 960	54 704	-	1 416 664	1 618 228	64 307	-	1 682 535	1 575 146	125 800	-	1 700 946
Dominican Republic	873 483	78 367	-	951 850	1 151 392	51 126	-	1 202 518	1 188 612	29 610	-	1 218 222
Ecuador.....	3 251 852	-	-	3 251 852	3 681 852	-	-	3 681 852	4 777 778	-	-	4 777 778
El Salvador .....	3 227 720	45 264	-	3 272 984	2 507 036	44 460	-	2 551 496	...	101 100	-	101 100
French Guiana .....	1 539 575	9 600	-	1 594 175	1 594 452	2 911	-	1 597 363	1 680 938	-	-	1 680 938
Guatemala .....	2 929 068	-	-	2 929 068	3 061 812	-	-	3 061 812	3 745 697	-	-	3 745 697
Guyana.....	319 608	20 777	-	340 385	745 098	60 998	-	806 096	1 019 608	136 000	-	1 155 608
Haiti .....	920 000	170 255	1 200 000	2 290 255	1 020 000	204 159	1 200 000	2 424 159	1 760 000	488 100	1 200 000	3 448 100
Honduras .....	1 827 592	-	-	1 827 592	2 067 775	-	-	2 067 775	...	-	-	-
Mexico.....	26 856 428	91 273	-	26 947 701	32 313 187	127 134	-	32 440 321	36 303 975	284 000	-	36 587 975
Nicaragua .....	2 288 859	110 921	-	2 399 780	2 078 965	146 982	-	2 225 947	5 000 000	299 200	-	5 299 200
Panama .....	1 668 233	84 096	-	1 752 329	1 673 173	95 663	-	1 768 836	2 082 046	37 700	-	2 119 746
Paraguay.....	1 540 750	27 665	-	1 568 415	1 765 425	74 947	-	1 840 372	2 223 681	117 100	-	2 340 781
Peru.....	769 230	59 840	-	829 070	1 051 435	26 870	-	1 078 305	1 852 000	62 600	-	1 914 600
Suriname .....	786 441	62 819	-	849 260	785 857	58 450	-	844 307	833 898	99 200	-	933 098
Venezuela .....	13 544 948	-	-	13 544 948	13 789 424	-	-	13 789 424	13 233 283	-	-	13 233 283
Intercountry Projects & Central Office	-	493 372	-	493 372	-	661 246 <sup>e)</sup>	108 709	769 955	-	879 761	-	879 761
Total	88 634 695	1 881 401	1 200 000	91 716 096	112 957 881	2 121 266	2 124 703	117 203 850	120 574 462	3 798 871	2 015 437	126 388 770

a) Operating budget, 1980-1981. b) Loan of 20,000,000 Bolivian pesos. c) Includes a loan for \$2,348,837. d) Includes a loan for \$331 435 from the World Bank. e) Includes \$270,731 from the TDR for research projects.

Table 17

ESTIMATED REQUIREMENTS FOR MALARIA PROGRAMS  
IN THE AMERICAS

	1978 <sup>a)</sup>	1979 <sup>a)</sup>	1980/1981 <sup>b)</sup>	1982/1983 <sup>b)</sup>
TOTAL COST .....	91 716 096	117 203 850	-	-
GOV. AND OTHER SOURCES .....	89 834 695	114 973 875	...	...
PAHO/WHO PORTIONS:				
Personnel costs and travel	1 419 862	1 521 294	3 098 600	3 431 700
Supplies and Materials ...	378 432	538 350	397 300	455 900
Fellowships .....	49 863	102 069	211 100	341 800
Courses and Others .....	33 244	68 262	85 000	89 100
TOTAL .....	1 881 401	2 229 975	3 792 000	4 318 500

SOURCES OF PAHO/WHO FUNDINGS

SOURCE	1978 <sup>a)</sup>	1979 a)	1980/1981 <sup>b)</sup>	1982/1983 <sup>b)</sup>
PAHO-Reg .....	1 201 476	1 100 942	2 322 300	2 616 800
PAHO-PG .....	83 970	108 709	...	...
WHO-Reg. and WA .....	595 955	1 020 324	1 469 700	1 776 400
TOTAL .....	1 881 401	2 229 975	3 792 000	4 393 200

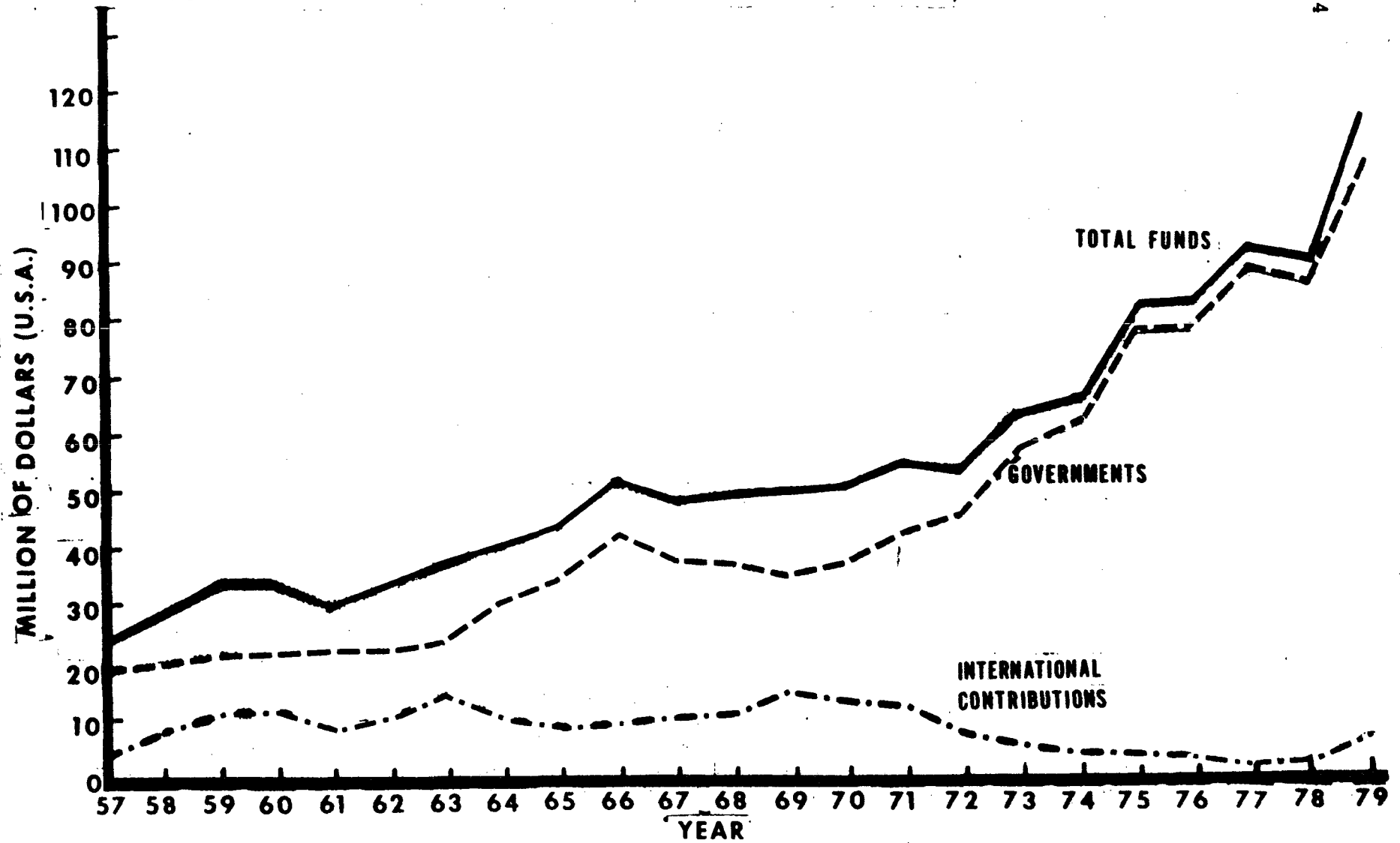
PAHO/WHO PERSONNEL

CATEGORY	1978	1979	1980/1981 <sup>b)</sup>	1982/1983 <sup>b)</sup>
Medical Officers .....	14	14	22	22
Sanitary Engineers .....	4	4	6	6
Entomologists .....	6	6	7	4
Parasitologists .....	1	1	1	1
Sanitary Inspectors .....	8	7	14	14
Other .....	4	4	10	10
TOTAL .....	37	36	60c)	57c)

a) Expenditures. b) Estimated requirements for two years. c) Totals refer to personnel for two years.

Graph 1

### FUNDS INVESTED IN THE MALARIA PROGRAMS IN THE AMERICAS, 1957-1979



GRAPH 2  
 INTERNATIONAL FUNDS INVESTED IN THE MALARIA PROGRAMS  
 IN THE AMERICAS, 1957-1979

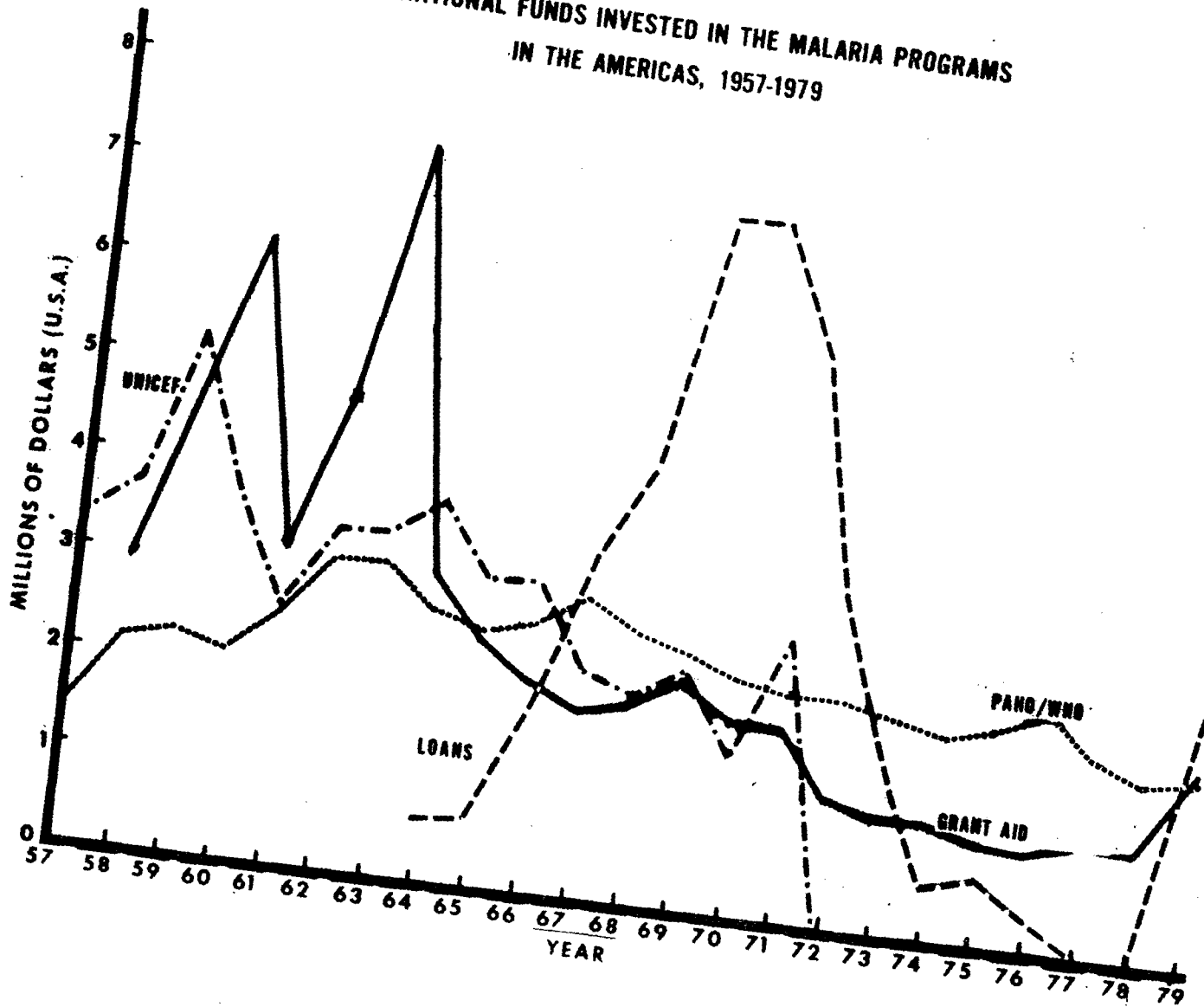


Table 18

## GEOGRAPHICAL DISTRIBUTION OF AREAS WITH TECHNICAL PROBLEMS, 1979

Countries and Areas	Popula- tion of affected areas	Area Involved Km <sup>2</sup>	Insecticides Used		No. of cases in this area	Principal Vectors	Causes of the Problem
			Type used	Years of cover- age			
<u>Bolivia</u>							
1. Department Beni (Guayaramerin) Department Tarija (Bermejo)	84 972	27 639	DDT	21	3 682	A. <u>darlingi</u> A. <u>pseudopun.</u>	Poor housing col- onization; parasite resistance to chlo- roquine; population movements.
<u>Colombia</u>							
2. Caribbean Coastal Zone; Magdalena River, Pacific Coastal Zone, Catatumbo Eastern and South Slope of Eastern Mountains, Alto Caqueta, Sarare; Meta River (Alto Vaupes)	849 280	125 509	DDT MLT Propoxur	13-20	22 269	A. <u>darlingi</u> A. <u>punctimac.</u> A. <u>ruñeztovari</u> A. <u>albimanus</u> A. <u>pseudopun.</u> A. <u>naivae</u> A. <u>albitarsis</u>	Vector behavior; poor housing; col- onization; social problems; parasite resistance to chlo- roquine; refusal to spraying; movement of people.
<u>Ecuador</u>							
3. Esmeraldas Napo	352 601	69 605	DDT Feni- tro- tion	12 1	5 174	A. <u>punctimac</u> A. <u>albimanus</u>	Colonization; poor housing; parasite resistance to Chloroquine.
<u>El Salvador</u>							
4. Coastal Area	...	7 500	DDT	17	...	A. <u>albimanus</u>	Vector resistance to DDT and Propoxur
<u>Guatemala</u>							
5. Pacific Coastal Zone	833 052	11 456	Clor- foxim	...	32 732	A. <u>albimanus</u>	Vector resistance to insecticide.
<u>Haiti</u>							
6. Cite Simone O. Duvalier; Jacmel; Valle de la Coma; Gross-Morne; Southeast area; Petit-Goave; Bois Neuf	1 720 150	3 645	DDT	13	20 529	A. <u>albimanus</u>	Vector resistance to DDT; population movements.
<u>Honduras</u>							
7. South area; Jamastran Valley; Talanga and Cedros Valleys	273 635	5 436	Malat- tion DDT		17 079a)	A. <u>albimanus</u> A. <u>pseudopun</u>	Vector resistance to chlorinated, organophos- phorus & Carbamate in- secticides.

... No information available.

a) Information up to September.

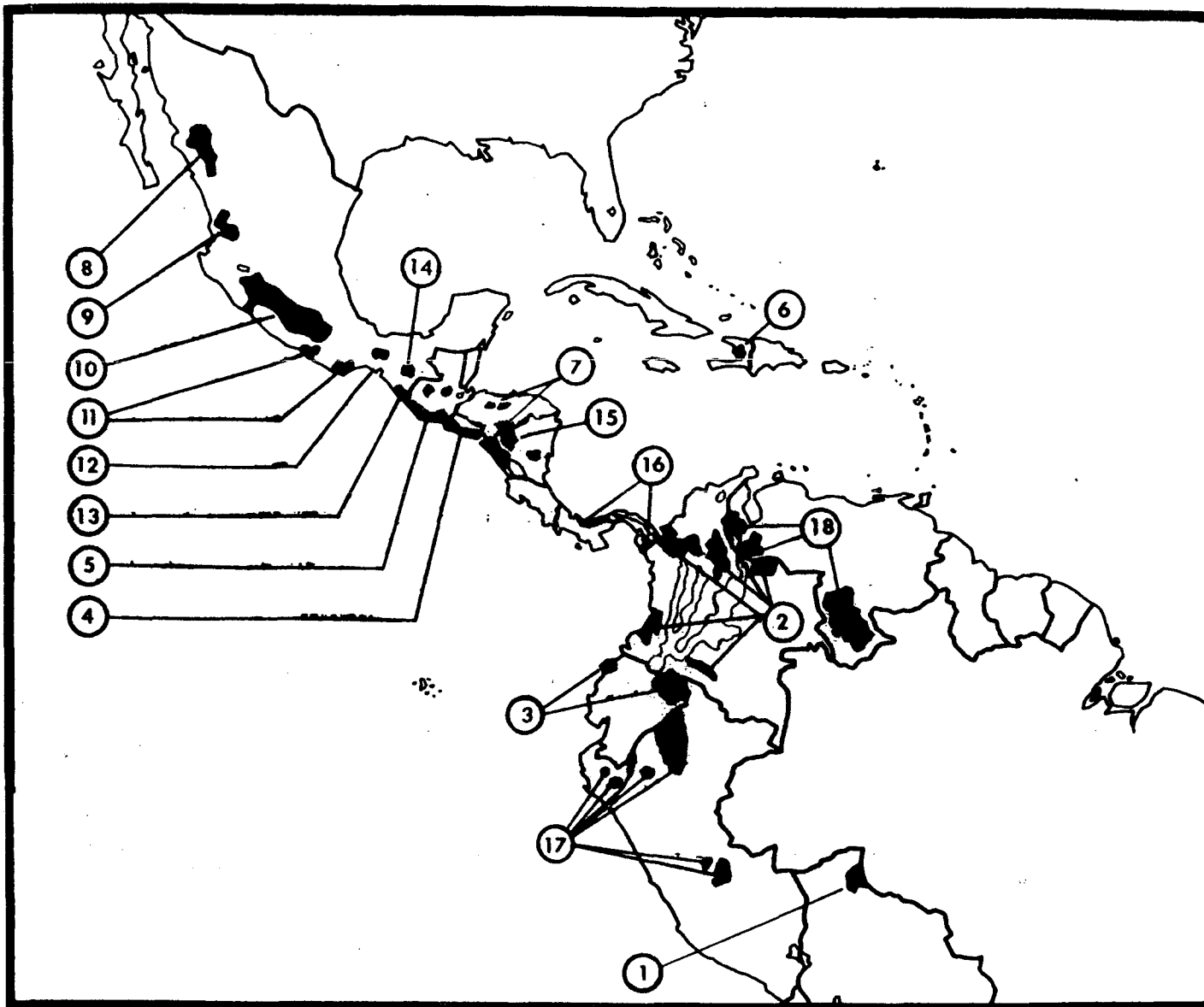


Table 18 (Cont.)  
GEOGRAPHICAL DISTRIBUTION OF AREAS WITH TECHNICAL PROBLEMS, 1979

Countries and Areas	Popula- tion of affected areas	Area Involved Km <sup>2</sup>	Insecticides Used		No. of cases in this area	Principals Vectors	Causes of the Problem
			Type used	Years of cover- age			
<u>Mexico</u>							
8. Basins of Rivers Fuerte Sinaloa, Humaya and Tama- zula;	3 554 580	162 547	DDT	22	7 071	A. <u>pseudopun</u> A. <u>albimanus</u>	Internal migra- tion; poor hous- ing; temporary shelters; modi- fication of houses; vector resistance to DDT; actions that remove insecticides from surfaces.
9. Huicot							
10. Basin of Balsas River							
11. Costa Chica of Guerrero and Oaxaca Coastal Zone							
12. "El Istmo" North- eastern Slope of the Golf of Mexico, Oaxaca State							
13. Tapachula-Suchiate							
14. Central part of Chiapas							
<u>Nicaragua</u>							
15. Pacific Coast; Central Region; Atlantic Region, Zelaya	...	30 138	DDT Mala- tion Pro- posur	16 5 7	...	A. <u>albimanus</u>	Vector resistance to DDT, Malathion and Propoxur.
<u>Panama</u>							
16. Jaqué Calovebora St. Catalina, Tobobe	7 658	4 871	DDT	21	75	A. <u>albimanus</u>	Migration; poor housing; parasite resistance, popula- tion movement
<u>Peru</u>							
17. Col. San Lorenzo; Bigote, Chinchipe, Bagua Santiago, Ene-Satipo Bajo Marañon	214 300	142 950	DDT	16-22	5 895	A. <u>pseudopun</u> A. <u>rangeli</u> A. <u>albimanus</u> A. <u>benarrochi</u>	High vulnerability; poor housing; migra- tion of laborers; temporary shelters; actions that remove insecticides from surfaces.
<u>Venezuela</u>							
18. Western and Southern areas	599 455	139 946	DDT	32	2 666	A. <u>ruñeztovari</u> A. <u>darlingi</u>	Vector exophily; population movement; anthropological problems.
TOTAL	8 493 683	731 242	-	-	117 122	-	-

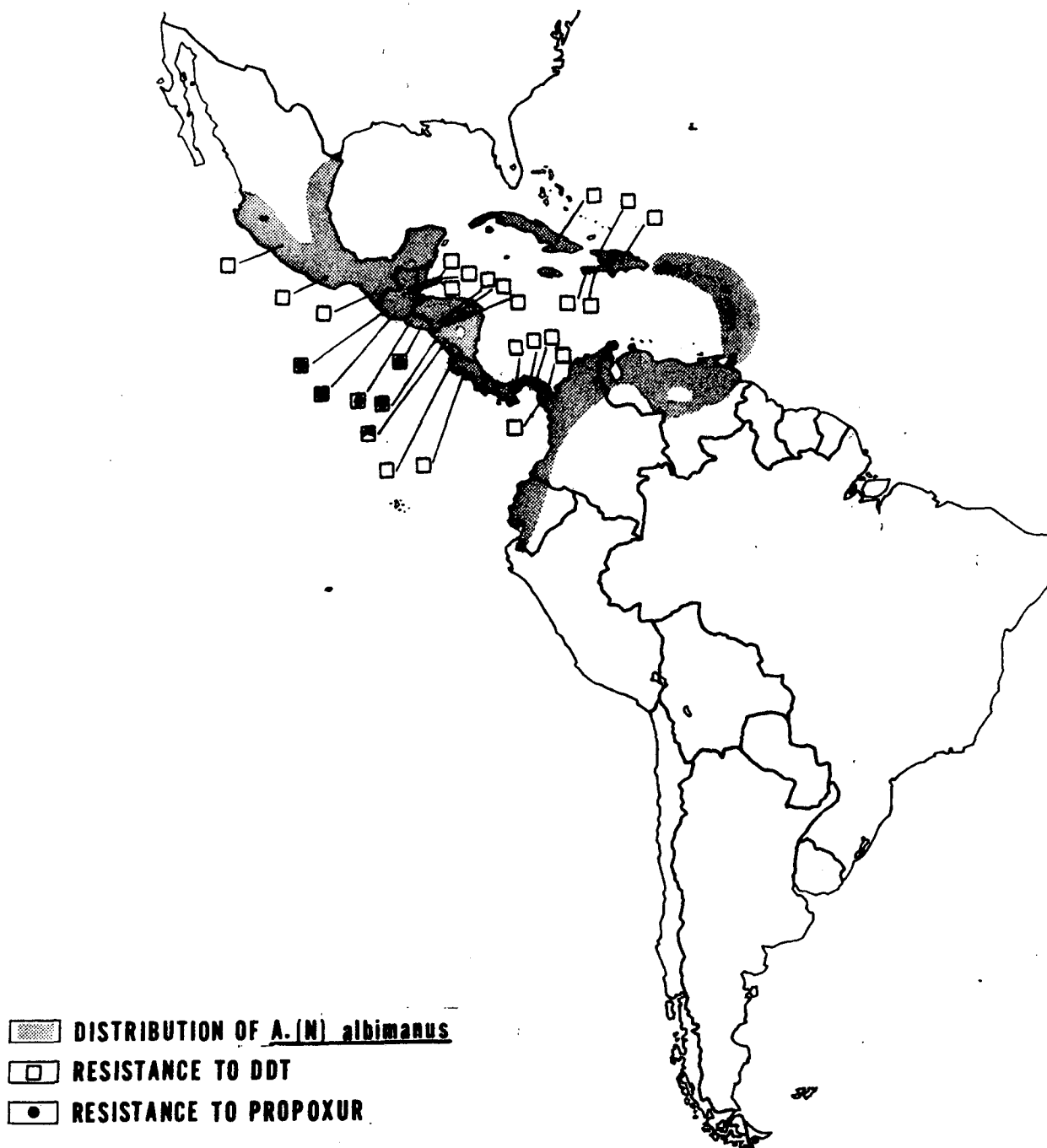
Note: In the Americas, also exist regions with all types of problems of special characteristics, such as the Amazon Basin which includes areas of Bolivia, Colombia, Ecuador, Peru and a large extension of Brazil; in this latter country, for example, a large scale plan for socio-economic development which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

GEOGRAPHICAL DISTRIBUTION OF AREAS OF TECHNICAL PROBLEMS, 1979



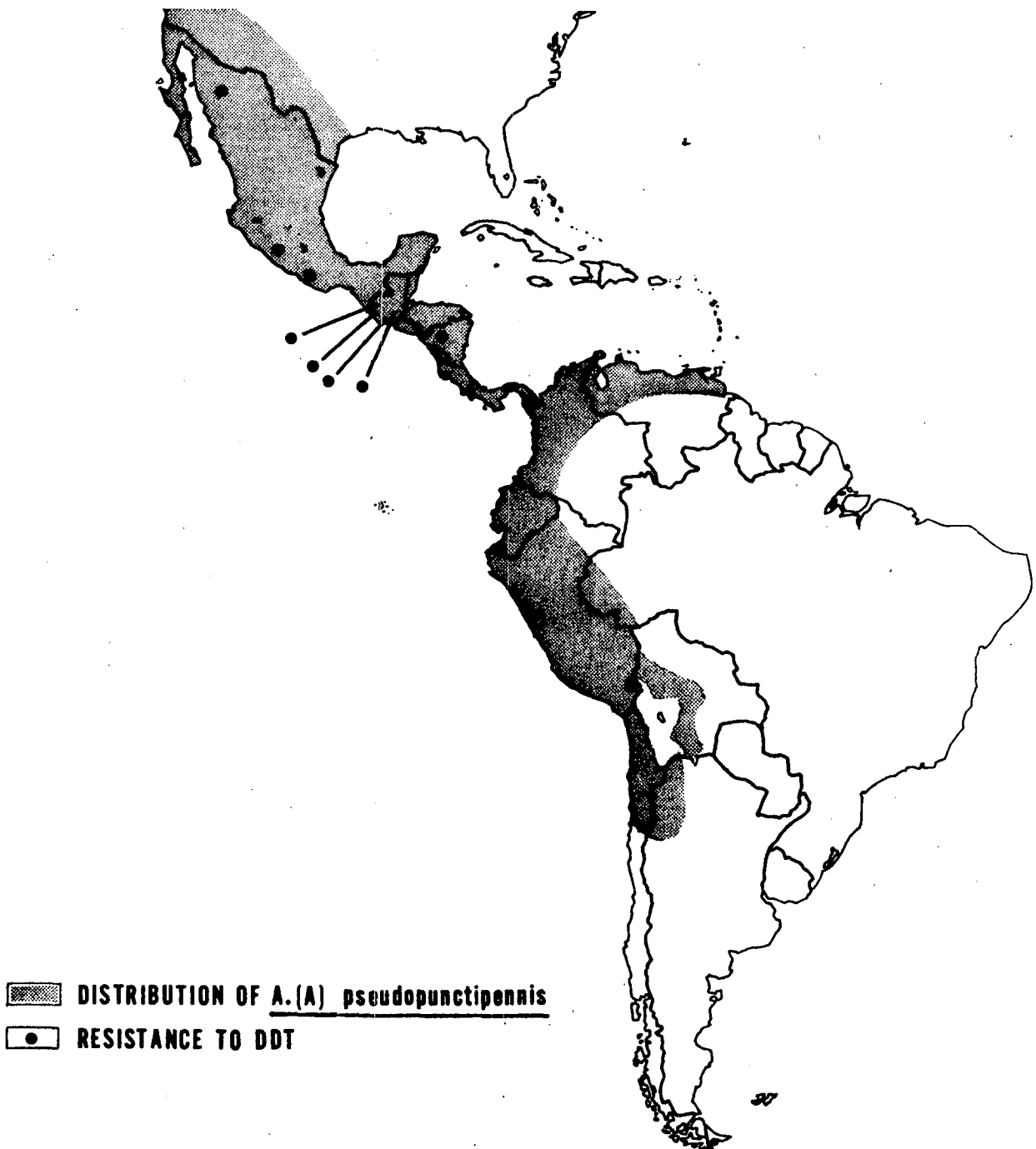
Map 4

**DISTRIBUTION OF A. (N) albimanus AND RESISTANCE TO DDT AND PROPOXUR  
(DECEMBER 1979)**



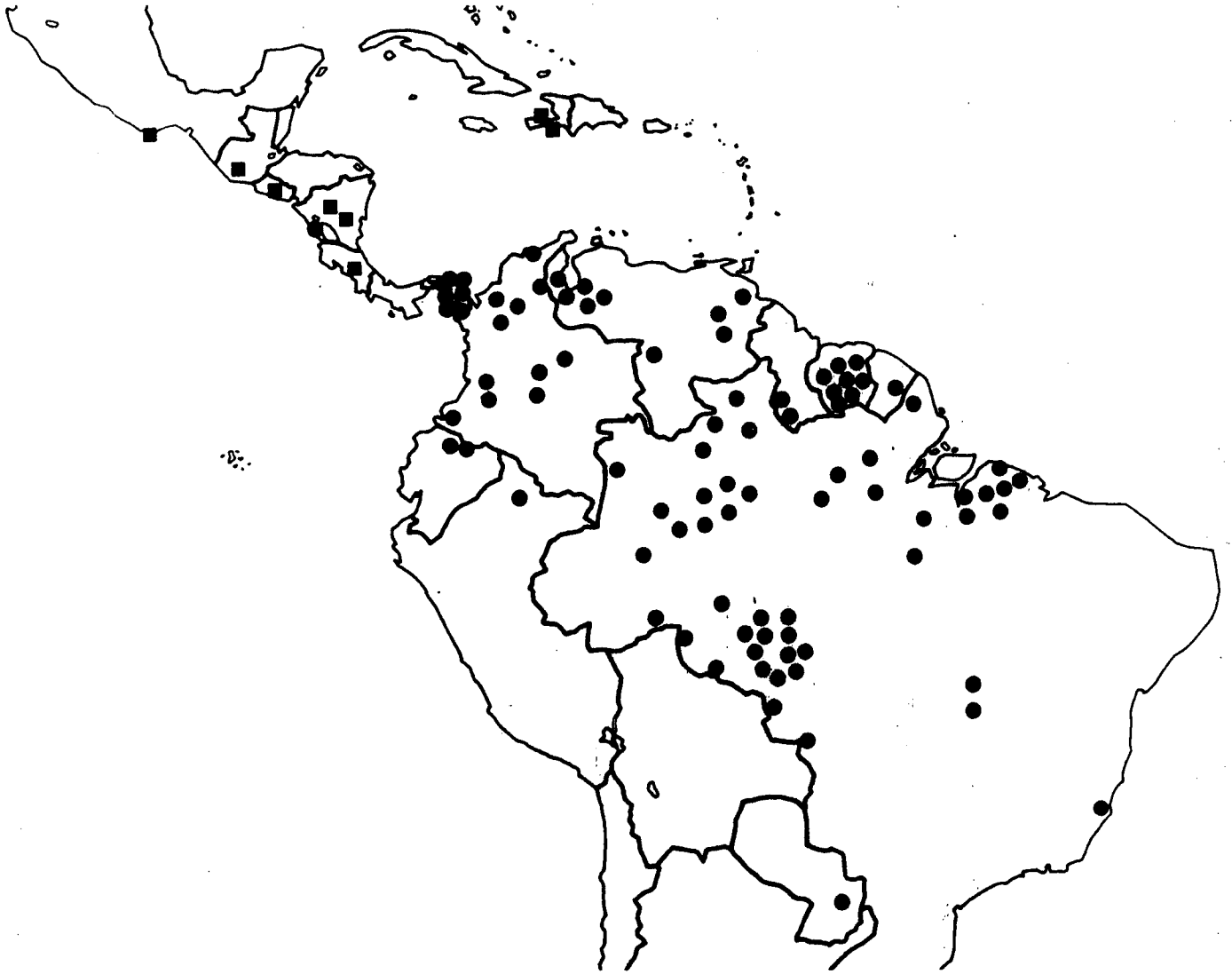
Map 5

**DISTRIBUTION OF A. (A) pseudopunctipennis AND RESISTANCE TO DDT  
(DECEMBER 1979)**



MAP 6

RESPONSE OF P. FALCIPARUM TO CHLOROQUINE 1961-1980



● Resistant      ■ Susceptible

Table 19  
PAHO/WHO TECHNICAL STAFF ASSIGNED TO MALARIA PROGRAMS IN THE AMERICAS  
FROM 1977 TO 1980

Country or other political or admin istrative unit	Medical Officers				Sanitary Engineers				Sanitary Inspectors				Entomologists				Others		
	1977	1978	1979	1980	1977	1978	1979	1980	1977	1978	1979	1980	1977	1978	1979	1980	1977	1978	1979
Belize .....	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-
Bolivia .....	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Brazil .....	2	2	2	2	1	1	1	1	-	-	-	-	-	-	1	1	1a)	1a)	1a)
Colombia .....	1	1	1	1	-	-	-	-	2	2	2	2	1	1	1	1	-	-	-
Costa Rica .....	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dominican Republic	-	-	-	-	-	-	-	-	1	1	1	1	-	-	-	-	-	-	-
El Salvador.....	1	-	-	-	-	-	-	-	1	1	1	1	-	-	-	-	-	-	-
Guyana .....	1	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-
Haiti .....	1	1	1	1	1	1	1	1	3	2	2	2	-	1	1	1	-	-	-
Mexico .....	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nicaragua .....	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-
Panama .....	-	-	-	-	1	1	1	-	-	-	-	-	1	1	1	-	-	-	-
Paraguay .....	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Peru .....	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Suriname .....	-	-	-	-	-	-	-	-	1	1	1	1	-	-	-	-	-	-	-
Headquarters and AMRO Projects ..	5	5	5	4	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-
<b>Total .....</b>	<b>16</b>	<b>14</b>	<b>14</b>	<b>12</b>	<b>6</b>	<b>4</b>	<b>4</b>	<b>2</b>	<b>9</b>	<b>9</b>	<b>7</b>	<b>7</b>	<b>3</b>	<b>5</b>	<b>6</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>1</b>

a) Parasitologist

Table 20

DRUGS PROVIDED BY PAHO/WHO TO THE MALARIA PROGRAMS IN THE AMERICAS 1958-1979

(in thousand of tablets)

Country or other political or administrative unit	1958-1978 <sup>a)</sup>							1979						
	Chloroquine 150 mg.	Primaquine		Pyrimethamine 25 mg.	Combined drug (b)	Aspirin 0.50 0.20 mg.	Fanasil	Chloroquine 150 mg.	Primaquine		Pyrimethamine 25 mg.	Combined drug <sup>b)</sup>		Fanasil
		15 mg.	5 gm.						15 gm.	5 gm.		Adult size	Infant size	
Argentina .....	2 078	419	232	712	-	-	-	100	30	30	-	-	-	-
Belize .....	888	201	197	6	22	140	-	35	35	35	-	-	-	-
Bolivia .....	10 320	1 870	691	960	830	200	15	700	120	60	-	-	-	-
Brazil .....	142 335	3 934	1 584	550	3 330	-	476	2 500	200	100	100	100	50	150
Colombia .....	35 395	2 757	830	6 649	13 470	120	502	1 200	80	50	-	1 470	-	50
Costa Rica .....	8 494	1 553	622	223	1 385	308	-	-	-	-	-	-	-	-
Cuba .....	4 350	38	69	80	-	-	-	-	-	-	-	-	-	-
Dominica .....	90	1	1	45	-	40	-	-	-	-	-	-	-	-
Dominican Republic .....	14 827	91	225	847	666	20	-	300	-	-	-	50	-	2
Ecuador .....	16 536	1 563	371	450	1 213	-	25	-	-	-	-	-	-	-
El Salvador .....	21 455	1 104	988	128	2 070	-	-	-	-	-	-	-	-	-
French Guiana .....	758	693	117	126	298	-	16	20	100	-	-	-	-	10
Grenada .....	43	-	-	45	-	20	-	10	10	10	-	-	-	-
Guatemala .....	21 998	1 747	741	127	8 049	250	2	500	450	120	-	-	-	-
Guyana .....	1 362	327	122	413	20	30	34	-	-	8	2	-	-	8
Haiti .....	13 900	102	5	1 480	31 608	-	-	-	-	-	-	-	-	-
Honduras .....	18 186	2 814	1 446	88	1 290	-	-	250	300	100	-	-	-	-
Jamaica .....	879	18	-	288	50	-	-	-	-	-	-	-	-	-
Mexico .....	90 966	13 007	16 265	10 679	6 942	-	-	3 390	690	550	-	-	-	-
Nicaragua .....	14 399	2 853	2 155	156	6 933	-	-	1 900	1 150	300	-	-	-	-
Panama .....	6 780	1 206	695	600	1 937	-	61	450	-	-	-	70	-	-
Canal zone .....	-	-	-	-	90	-	-	-	-	-	-	-	-	-
Paraguay .....	12 999	286	133	77	94	-	19	-	-	-	-	-	-	-
Peru .....	27 956	1 829	828	3 323	4 089	473	-	1 100	160	55	-	-	-	5
Saint Lucia .....	68	1	-	70	-	36	-	-	-	-	-	-	-	-
Suriname .....	4 055	898	363	1 018	905	138	24	100	90	25	50	200c)	25	9
Trinidad & Tobago .....	840	961	426	127	400	132	-	-	-	-	-	-	-	-
<b>Total .....</b>	<b>471 957</b>	<b>40 273</b>	<b>29 106</b>	<b>29 267</b>	<b>85 691</b>	<b>1 907</b>	<b>1 174</b>	<b>12 555</b>	<b>3 415</b>	<b>1 443</b>	<b>152</b>	<b>1 890</b>	<b>75</b>	<b>234</b>

a) During this period, Chloroquine, Pyrimethamine and Primaquine powder and Tricalcium phosphate have been provided to different malaria projects.

b) Chloroquine/Primaquine combined. c) Includes Daraclor tablets (Chloroquine/Pyrimethamine combined.)