directing council

PAN AMERICAN HEALTH ORGANIZATION

XXIV Meeting

regional committee

WORLD HEALTH ORGANIZATION

XXVIII Meeting

Mexico, D. F.
September-October 1976

CD24/INF/1 (Eng.)
5 August 1976
ORIGINAL: ENGLISH-SPANISH

STATUS OF MALARIA PROGRAMS IN THE AMERICAS

XXIV REPORT

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XXIV REPORT ON THE STATUS OF THE MALARIA PROGRAM IN THE AMERICAS, 1975

Introduction

The Director of the Pan American Sanitary Bureau has the honor to present to the Directing Council at its XXIV meeting the XXIV Report on the malaria program in the Americas, relating to 1975.

In April, 1975, the II Meeting of Directors of National Malaria Services of the Americas was held in Quito, Ecuador, with the objective of "studying the problems,re-examining the priority of the program and determining a new strategy." The recommendations of the Directors of Malaria Services were approved by the Directing Council of PASB in Resolution XXII of the XXIII Meeting, September-October 1975, expressing alarm at the serious deterioration of the epidemiological situation of malaria in some countries. This Resolution also requested that methodologies be developed which would be better adapted to the actual epidemiological and economic conditions of each country and that activities be intensified in research, training of personnel and promotion of internal and external financing for malaria programs.

From 1970 through 1975, the number of blood smears examined yearly varied from 8,997,318 to 10,134,212 and that of cases from 269,003 to 356,649, the slide positivity index for 1975--3.8 per cent--being the highest that it has been since 1958.

There are areas where progress was made, areas where the malaria situation was stationary, and some areas with manifest deterioration. In some high incidence areas which are at the same time areas of P. falciparum resistance to 4-aminoquinolines, deaths from malaria were registered.

Technical problems and the frequent appearance of operational, administrative and economic problems have made changes in the strategy used against malaria in the American Region necessary. This new approach, as determined by the II Meeting of NMES' Directors and the Resolution of the Directing Council already mentioned, began to be progressively applied in 1976.

The year of 1975 represents the starting point in the Americas for putting into practice more profound epidemiological studies, plans of operation which envisage combining methods in an integrated fashion, the extension of research programs at country level and in the universities, and a shift in the programs for the formation of professional workers and the training of auxiliaries in accordance with the current malaria situation and the new responsibilities of the malaria services.

As a result of the structure and of rural penetration of malaria programs, their personnel have accumulated knowledge and experience which ready them to assume additional responsibilities such as the eradication of A. aegypti, control of Chagas' disease, administrative support of other health programs and participation in the extension of health coverage to rural areas.

To sum up, there are extensive areas in which malaria has already been eradicated, others where it is possible to interrupt transmission of the disease and some where a good control program can bring incidence to a level compatible with economic and social development.

I. PRESENT SITUATION OF MALARIA PROGRAMS

A. General Information:

The estimated population of the Americas at 31 December 1975 was 555,676,000 persons, of which 205,872,000 (37.0 per cent) resided in originally malarious areas. Of the latter figure, 99,405,000 (48.3 per cent) lived in areas in which malaria has been eradicated (maintenance phase), 44,633,000 (21.7 per cent) in areas in which malaria transmission has been interrupted (consolidation phase)

and 61,834,000 (30.0 per cent) in areas where transmission still exists and anti-malarial measures are being applied (attack phase). Compared with the status at 31 December 1974, there was a net increase of 1.4 per cent of the population living in the maintenance and consolidation areas, i.e., from 68.6 per cent in 1974 to 70.0 per cent in 1975. Brazil transferred an area of 50,480 km^2 with 6,112,000 inhabitants from consolidation to maintenance and another area of 211,094 km^2 with 3,248,000 inhabitants from attack to consolidation phase. Transfer from attack to consolidation phase was also recorded in Costa Rica in an area of 2,712 km^2 with 38,803 inhabitants and in the Dominican Republic in an area of 560 km^2 with 8,722 inhabitants. In Table 1, the population in the malarious areas of the Americas is given by phases and by years since 1958, showing the general evolution of the malaria program. Maps 1 and 2 show the geographical extension of each phase of the program as of December 1974 and 1975 and Tables 2 and 3 give the population and the area in square kilometers by phases of the program and by country.

During 1975, a total of 9,276,932 blood slides was examined, of which 356,649 were found to be positive for malaria parasites, giving an annual blood examination rate (ABER) of 4.51 per cent and an annual parasite incidence (API) of 1.73 per 1,000 inhabitants, calculated on the basis of the entire population in the malarious areas. In 1974, the ABER was 4.48 per cent and the API 1.34 per 1,000 inhabitants. Table 4 shows the number of blood smears examined and the number of positives found, year by year since 1958 and Table 5 gives the results of blood slide examination of 1975 by countries and by phases of the program.

Considering the progress achieved, the present epidemiological situation and the availability of technical and financial resources, the malaria programs of this Region can be classified in three major groups as indicated in Table 6.

Group I consists of 12 political units (countries or territories) with a population of 70,395,000 or 34.2 per cent of the total of the malarious areas. Malaria eradication has been certified in the whole of the country in these units and their status has been maintained.

Group II includes nine political units with a population of 13,222,000 or 6.4 per cent of the total of the malarious areas. The program of French Guiana, which was listed under Group III in 1974, was transferred to Group II in 1975. Although there was a slight increase in the number of cases, the countries in this Group continued to maintain their favorable epidemiological situation during the year, except for Guyana where outbreaks of malaria were observed and emergency measures were applied.

Group III has 13 units and it is subdivided into Part 1 and Part 2. Part 1 consists of areas where malaria transmission has been interrupted and Part 2 where transmission still exists. During the year, Brazil transferred some areas from Part 2 to Part 1.

Considering the epidemiological situation by group of countries as a whole and comparing the number of cases registered in 1974 and 1975, it is apparent that there was a marked deterioration in Part 2 of Group III, as shown below:

Group	Population (in thousands)		N° of malaria cases		API per thousands	
	1974	1975	1974	1975	1974	1975
Group I	69 272	70 395	301	435	0.00	0.01
Group II	12 804	13 222	2 298	2 968	0.18	0.22
Group III						
Part 1	58 017	62 935	10 722	14 241	0.18	0.23
Part 2	60 662	59 320	255 682	339 005	4.21	5.71
Total	200 755	205 872	269 003	356 649	1.34	1.73

Tables 7, 8, 9 and 10 show the number of blood slides examined and positives found in 1975 in maintenance, consolidation, attack and non-malarious areas, respectively. There are difficulties to obtain adequate information on malaria deaths. The mortality data received from the countries as of to-date are shown in Table 11.

Of the 22 countries or territories in the Hemisphere where an active malaria program is being carried out, a marked increase in the number of malaria cases was observed in seven, a considerable decrease in five and no major change in the rest, comparing the figures of 1975 with those of 1974. Considering the Hemisphere as a whole, the malaria situation was stationary in 1975, except that in three countries in Central America it deteriorated considerably.

The National Malaria Services continue to work closely with the General Health Services in rural areas. As the malaria program advances, this participation is increasing. In 10 countries or territories, where eradication of malaria has been achieved, full integration of the National Malaria Services and the General Health Services has taken place.

B. Information by country

ARGENTINA - Malaria cases: 1974=171; 1975=100

Early in 1974, autochthonous cases were found in the Province of Salta near the border with Bolivia and consequently an area of 28,424 km^2 with 136,000 inhabitants returned to attack phase. With the intensification of antimalarial activities, the number of malaria cases was reduced from 805 in 1973 to 171 in 1974. Antimalarial campaign in this area continued in 1975 with two cycles of DDT spraying, intensive case detection and radical cure treatment. The Government provided the necessary financial resources to the program.

BELIZE - Malaria cases: 1974=96; 1975=90

Antimalarial activities continued to eliminate residual foci of transmission and to maintain surveillance operations. Epidemiological situation showed improvement in all Districts with the exception of Toledo District where 49 cases were detected during the year. The principal problem is the frequent importation of malaria cases from other countries. The movement of the Mayan population and laborers to and from other countries obliges the Malaria Service to maintain a permanent vigilance program.

BOLIVIA - Malaria cases: 1974=4,936; 1975=6,615

Since 1970, the program has not made any further progress due to financial and administrative problems. In 1975, the shortage of DDT obliged the Malaria Service to reduce activities. Major parts of the available resources were dedicated to Zone IV (Chuquisaca) and Zone VI (Tarija) where malaria transmission is more intense than in other parts of the country. As a result, the number of cases in these two zones was reduced, while that in the rest of the country increased. At the end of the year, the Government allocated extra-budgetary funds to buy the needed insecticide for 1975 and included a specific item for purchase of insecticides in the proposed regular malaria budgets for 1976-1980.

BRAZIL - Malaria cases: 1974=66,481; 1975=88,630

Further progress was observed in the area classified as "short-term eradication" which has a population of 34,255,000 or 79.0 per cent of the total in the originally malarious area. Of this population, 29,176,000 inhabitants or 85.2 per cent are in the area where malaria transmission has been interrupted. Comparing with that of 1974, there is an increase of 11.0 per cent in population living in the malaria-free area.

In the area classified as "long-term eradication" (the Amazon Basin) with a population of 9,123,000 or 21 per cent of the total in the originally malarious area, antimalarial activities were extended further into the interior, with 1,530,163 houses sprayed out of 1,721,400 planned. Of the 753,518 blood

slides examined during the year, 78,422 positives were found. In 1974, a total of 535,901 blood slides was examined with 52,459 positives. The increase in the number of cases was due to the fact that many of these slides were from areas where spraying had not been regularly carried out in previous years. The Government has given a high priority to the Amazon Region and is undertaking a huge social and economic development program, through construction of highways and intensive colonization which require permanent efforts to fight against malaria and other parasitic diseases.

Upon the request of the Government, a PAHO Evaluation Team visited the program from October 15 to November 7 to review the malaria program in the area of "Short-term Eradication." As results of this revision, an area of 50,480 km^2 with 6,112,000 inhabitants was transferred from consolidation to maintenance phase and another area of 211,094 km^2 with 3,248,000 inhabitants from attack to consolidation phase.

COLOMBIA - Malaria cases: 1974=22,406; 1975=32,690

In 1975, the malaria budget was increased by 25.8 per cent in relation to 1974. This increase was barely sufficient to meet the demands resulting from higher personnel and operating costs. The malaria situation showed no improvement during the year. The problems related to colonization, refusal of antimalarial measures in some rural communities, resistance of P. falciparum to chloroquine and behavioral resistance of A. nuñeztovari to DDT continued to exist. Residual house-spraying with DDT was applied in the attack-phase area, supplemented by mass drug administration every 15 days in 15 foci of intense malaria transmission. An investigation project in malaria immunology and chemotherapy was being elaborated jointly by the Government, PAHO and the University of New Mexico of the United States of America.

COSTA RICA - Malaria cases: 1974=152; 1975=290

In January 1975, an area of 2,712 km^2 with 38,803 inhabitants was transferred from the attack to the consolidation phase, the population in the consolidation area totaling 487,550 (76 per cent)and that in the attack-phase area 154,713 (24 per cent.) Two cycles of DDT spraying were applied in areas with 31,000 houses and 142,000 inhabitants and four cycles of propoxur spraying in areas with 7,000 houses and 10,000 inhabitants. A total of 290 cases was found in the country, of which 161 were imported from other countries. An outbreak of malaria was observed in the District Sierpo (consolidation), giving 55 autochthonous cases. Emergency measures applied were able to eliminate this focus. A rigid vigilance system will have to be maintained as long as the risk of importation of cases exists.

DOMINICAN REPUBLIC - Malaria cases: 1974=520; 1975=159

In June 1975, the Municipality of Pedro Santana was transferred from attack to consolidation phase, thus reducing the area in attack phase to 2,185 km^2 with a population of 83,792 (1.8 per cent of the total population in the malarious area). Two cycles of DDT house-spraying were carried out in the attack-phase area on the Haitian border. The malaria situation in the country depends upon the importation of cases from the neighboring country. In 1975, fewer cases were imported, especially through the southern route, Pedernales. No particular problems were encountered in connection with vigilance activities and elimination of small foci of infection originating from imported cases.

ECUADOR - Malaria cases: 1974=5,481; 1975=6,555

During 1975, antimalarial activities continued with the application of DDT house-spraying in the attack-phase area (2,381,000 inhabitants) and with epidemiological surveillance in the consolidation-phase area (1,753,000 inhabitants). The number of cases showed an increase in 1975, compared to that in 1974. Heavy rainfall in the coastal region, twice or three times as much as that of 1974, was considered the main contributing factor. In the consolidation-phase area, two small outbreaks occurred in the Province of Manabi but were effectively eliminated. The NMES personnel continued to participate in other health programs.

EL SALVADOR - Malaria cases: 1974=66,691; 1975=83,100

The principal attack measures applied during the year were residual house-spraying with propoxur and DDT and distribution of antimalarial drugs. During May and June, an antilarval project was initiated with the assistance of the army, at the new international airport area.

Susceptibility tests indicated that vector resistance to propoxur increased both in extension and intensity along the Pacific Coast, even in the Departments of La Union and San Miguel where the vector had had susceptibility. Epidemiological data confirmed that propoxur spraying had had very little effect. Further use of residual insecticides, propoxur or DDT or other, will have to be justified by especial epidemiological situation. During the year, seven areas were selected in which antilarval and other integrated control measures, will be applied.

FRENCH GUIANA - Malaria cases: 1974=351; 1975=319

In August 1974, an increase in malaria transmission was observed along the lower part of the Oiapoque River and in the vicinity of the capital city, Cayenne. Transmission continued until mid-1975 when it was finally brought under control through DDT residual house-spraying, mass drug administration including distribution of amodiaquinized salt and radical cure treatment of cases in the main foci. Importation of cases from other countries continued to be the principal problem in the areas in the maintenance and consolidation phases.

GUATEMALA - Malaria cases: 1974=4,030; 1975=4,979

In 1975, different antimalarial attack measures were applied to different areas based on epidemiological criteria. In the north, where the vector is susceptible to DDT, residual house-spraying with this insecticide continued. On the Pacific Coast and in some localities in the Central foot-hill areas where the vector is resistant to DDT, propoxur was applied. In some localities where the vector is also resistant to propoxur, larviciding with fenthion and radical cure treatment were carried out. In the central highland where transmission is low, attack measures were suspended and the area placed under epidemiological surveillance. Malaria incidence was low at the beginning of the year, but it began to show an upward trend during the third quarter. The resistance of A. albimanus to propoxur started to increase its extension and intensity.

GUYANA - Malaria cases: 1974=72; 1975=1,116

At the beginning of the year, malaria transmission was spreading over the Rupununi Savannah area, originating from imported cases. This resurgence of transmission coincided with the period in which antimalarial activities were very limited due to lack of insecticides and transportation. As a result, transmission extended to the Quitaro Forest balata bleeding area. With the arrival of DDT in August and of new vehicles in October, the malaria teams were able to spray the houses in the foci areas and to give radical cure treatment. Simultaneounly, the malaria surveillance system was improved throughout the Savannah area. The number of cases reached, 1,116, the highest figure ever recorded since the initiation of the current malaria program in 1958. Nearly half the P. falciparum cases studied in the Rupununi area were found to be resistant to chloroquine. They were given a 2-day course of sulfadoxin and pyrimethamine.

HAITI - Malaria cases: 1974=25,441; 1975=24,733

The intensity and extension of vector resistance to DDT obliged the Malaria Service to withdraw spraying operations from Zone III and a greater part of Zone II, replacing them with other control measures such as drug administration, fogging and antilarval operations.

The epidemiological situation was reviewed by national, USAID and PAHO staff during the second half of the year and a guide for preparation of a new plan of operation was elaborated. Four main foci, Cité Simone Duvalier, Petit Goave, Jacmel and Anse-a-Pitre, were given priority for initiation of antilarval works, such as cleaning and construction of drainage systems, application

of larvicide and elimination of swamps by diversion of intake flow. Preliminary results obtained from the works initiated in 1975 were encouraging. The program continued to receive valuable assistance from USAID.

HONDURAS - Malaria cases: 1974=7,503; 1975=30,289

Due to the financial difficulties of the program, regular residual house-spraying with insecticides was suspended in March, 1974. In September 1974, the country suffered from a flood caused by the hurricane "Fifi," along the Atlantic coastal region. For this reason, emergency spraying operations were carried out in 1975 with DDT and propoxur donated by USAID.

In the area on the Pacific Coast where the vector is resistant to DDT, propoxur was applied, but it was suspended from March 1974 to September 1975 due to lack of insecticide. During October-November, 1975, it was possible to spray 6,400 houses with insecticide supplied by PAHO/WHO. A considerable deterioration in the malaria situation was observed, particularly in "Valle de Sula" in the North and along "Golfo de Fonseca" in the South.

MEXICO - Malaria cases: 1974=26,800; 1975=27,925

The malaria incidence increased along the Pacific Coast and decreased in other areas of the country. Resistance of A. pseudopunctipennis to DDT is widely extended in the Basin of Rio Balsas, but this vector shows susceptibility to malathion, fenitrothion and propoxur. During the year, in the region of the Gulf of Mexico and the Yucatán Península, with a population of 8.7 million, only 586 cases were recorded in 300 localities with an annual parasite incidence (API) of 0.07 per 1,000 inhabitants, while in 1974, it was 0.12 per 1,000 inhabitants. In the rest of the country, 27,339 cases were registered in 6,977 localities, with an API of 1.34 per 1,000 inhabitants, compared with 1.31 per 1,000 in 1974. During the year, a serological laboratory was installed within the Malaria Service for future serological studies. The School of Public Health and PAHO prepared an Master of Public Health Course with emphasis on malaria and other parasitic diseases, to begin in February, 1976.

NICARAGUA - Malaria cases: 1974=12,167; 1975=24,692

On the Pacific Coast, with 1,698,000 inhabitants, A. albimanus is resistant to DDT, propoxur and malathion. Propoxur has been used since 1970 and good results were obtained until 1973. The magnitude of the vector resistance to propoxur, limited in intensity and extension in 1971, was increasing until 1974 when this insecticide began to lose its effectiveness in interrupting malaria transmission, especially in the Departments of Chinandega, Managua and León.

In July, 1975, the program was reviewed by a group of national and PAHO staff and it was recommended that application of insecticides be continued only in those areas or localities where the vector is susceptible, and antilarval measures were to be initiated in areas where practicable. The Review Group recommended antilarval works in 4 principal foci of transmission (the City of Managua, Ingenio San Antonio, Ingenio Montelimar and Tipitapa River).

PANAMA - Malaria cases: 1974=1,184; 1975=666

The program made further progress during 1975, having reduced the number of foci and the number of cases. As of the end of 1975, the last foci of transmission were confined to the Provinces Bocas de Toro and Darien. These foci gave a total of 462 cases or 70 per cent of the total cases registered in the country.

During the year, two outbreaks were observed, one being detected in June in Ualá, Darien Province, with 118 cases and the other in October in the Transisthmus highway, Colón Province, with 40 cases. With the application of propoxur house-spraying and ULV malathion and the treatment of cases, the outbreaks were quickly brought under control. Field activities have been oriented according to local epidemiological conditions, using the best available measures. The Government continued to give a high priority to the program and provided adequate resources.

PARAGUAY - Malaria cases: 1974=101; 1975=217

Transmission has been interrupted in the country except for a few localities where autochthonous cases were reported during the year. However, the development of the Itaipú hydroelectric project with new population settlement and colonization, is providing favorable conditions for malaria transmission. The Government is developing an epidemiological vigilance system to prevent re-establishment of malaria transmission in the country.

PERU - Malaria cases: 1974=12,485; 1975=14,338

The Malaria Program has been giving priority to the areas in the consolidation and maintenance phases, aiming at the elimination of remaining sources of infection. The foci of Cañete, Chincha and Río Chillón Valley in the maintenance phase area, were eliminated during 1975. In some foci in the consolidation phase area--Zarumilla, Tumbes, Saña and Casma--malaria transmission was interrupted, while in others--San Lorenzo Piura, Olmos-Lambayeque, Marañón and Río Mayo--cases continued to occur during the year. In the attack-phase areas, tramsmission continued without any major changes.

SURINAM - Malaria cases: 1974=3,984; 1975=2,741

The serious malaria outbreaks in the interior which started in early 1973 were brought under control during 1975 by better spraying coverage and single-dose mass drug administration twice a year. Of the 2,741 cases recorded in 1975, 91.8 per cent were detected during the first 4 months of the year. The Government gave a high priority to the malaria program especially in areas under socio-economic development, such as the Development Plan of West Surinam, Paramaribo-Apora Highway, Sonedancing Project of Agricultural Production with extensive Irrigation System and Hydroelectric Project of Kabalebo.

VENEZUELA - Malaria cases: 1974=7,648; 1975=5,909

The population in the originally malarious area was 8,866,000, of which 94.0 per cent lived in the maintenance-phase area, as of December 1975. The malaria situation in general showed improvements in the last three years, although no drastic results were observed in the attack-phase areas which include 140,000 km^2 and 500,000 inhabitants. The available antimalarial measures are not entirely effective, due mainly to exophily of the vector, the habits of the population, the existence of cases of *P. falciparum* resistant to 4-aminoquinolines and difficult accessibility.

C. Field operations

The use of residual insecticides continued as the principal method for interrupting malaria transmission in the Region. The number of house sprayings during the year totaled 13,532,982, with DDT being the predominant insecticide. Propoxur was used only in areas of vector resistance to DDT in countries of Central America and Panamá.

Since 1972 when 17,705,420 house sprayings were completed, spraying operations have declined annually. The continued decrease in sprayings is attributable to the transfer of areas from attack to consolidation, increasing insecticide costs and vector resistance. For this reason, increasing emphasis has been given to encouraging the application of classical mosquito control techniques in densely populated areas with persistent malaria transmission. Antilarval operations, such as larviciding, drainage, land-filling, etc. were initiated

during the year in selected areas of Haiti, Nicaragua and El Salvador. To further expedite the application of classical vector control procedures, PAHO/WHO elaborated a plan to hold an international seminar on mosquito control in 1976 in collaboration with the Department of Health of the State of California and the Government of El Salvador and with financial assistance from USAID.

Information on the number of houses sprayed with insecticides is given in Table 12 by spraying cycle and the types and quantities of insecticides used are shown in Table 13. In Table 14, the results of active and passive case detection are given by country and in Table 15 the number of personnel in the malaria programs is summarized by function. The increase in the number of personnel from 27,848 in 1974 to 29,256 in 1975 is indicative of the high priority given to the malaria program by the countries. Table 16 shows the number and types of transport utilized in the program.

D. Budget

Table 17 summarizes expenditures for malaria programs in 1974, estimated national expenditures for 1975 and national budget for 1976, by country. .

There has been an increase in national expenditures, from USA $47 million in 1970 to $64 million in 1974 and $101 million in 1975, reflecting the high priority that continues to be given to the program by the Countries of the Hemisphere. However, the decline of external assistance since 1972 and the increasing costs of personnel, supplies and equipment, have paradoxically resulted in an actual reduction of field operations rather than in the expansion of the program as these figures would seem to suggest.

Table 18 summarizes the expenditures of PAHO/WHO for malaria in 1975 and the estimated amount of assistance to be provided to the countries in 1976, 1977 and 1978. PAHO/WHO posts assigned to the program have been reduced from 105 in 1970 to 64 in 1975 and 60 in 1976. Graph 1 shows annual expenditures by governments in the Region and international contributions from 1957 to 1975.

II. SPECIAL TECHNICAL PROBLEMS

Maps 3 and 4 and Table 19 of this Report show the geographical distribution of the areas with technical problems of malaria transmission and data for eight countries, with an important note concerning the Amazon region.

The problems related to program financing and to the availability and prices of supplies and equipment become more important every day, and added to operational and technical problems have brought about the current situation and justify the new approach to the strategy of the fight against malaria.

Physiological resistance of vectors to insecticides is found in A. quadrimaculatus in the United States of America; A. pseudopunctipennis in Guatemala and Mexico; A. albimanus in Costa Rica, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua and Panama; and A. albitarsis in Colombia and Brazil. In Central America there are areas in which A. albimanus is resistant to DDT, BHC, dieldrin and malathion and in some localities of Guatemala, Honduras and Nicaragua and many in El Salvador this specie is also resistant to propoxur. In Guatemala, where there is high and generalized DDT-resistance, propoxur is in use with favorable results up to now but it is possible that the foci in which the vector is already resistant to this insecticide may spread. In El Salvador the problems are more complex and serious because of the widespread resistance of A. albimanus to DDT and propoxur, which, combined with difficult administrative and operational problems, has brought about a grave deterioration of the program and a considerable increase in malaria incidence. Nicaragua, where resistance to propoxur was first discovered, again experienced an increase in malaria incidence after an improvement in 1972 and 1973. In Honduras, despite the existence of DDT resistance, it is financial problems which have been the main determinant of the great deterioration which has occurred in the epidemiological situation. Costa Rica and Panama show a favorable evolution and prospects, with focal use of propoxur. In Mexico, the DDT-resistance of A. pseudopunctipennis is very extensive in the valley of the Balsas River; tests indicate that the vector is susceptible to malathion, fenitrothion and propoxur.

In the Americas many years' experience has taught us that exophily of vectors can be so pronounced as to require study and adoption of alternative attack methods. A. nuñeztovari in Colombia and Venezuela and A. (Kerteszia) cruzi cruzi in Brazil are good examples of this. In addition, behavioral problems are found with A. darlingi and A. aquasalis in other countries.

During the last 15 years, strains of P. falciparum resistant to chloroquine have been identified through in vivo and, recently, with Rieckmann's technique for in vitro tests, in certain areas of Brazil, Colombia, Guyana, Panama, Surinam and Venezuela.

Anthropological factors grow more important every day because of the demographic and ecological changes brought about by the current process of development in Latin America. Among them are the constant human migrations, the characteristics of housing, the primitive and isolated population groups; as well as impounded waters, irrigation systems, highway construction and the siting of new localities in colonization projects both large and small.

Mere enumeration of these problems demonstrates that norms and attack methods cannot be identical for all countries and malarious areas and that no general solution can exist which would resolve all the problems, but that in each country the situation must be studied by area and even, in some circumstances, by locality.

There are extensive areas in which the traditional strategy is still effective but other areas exist in which total coverage with insecticides is not effective and the application of other methods must be studied, especially in problem areas where the hope for improvement lies, at the present time, in use of an integrated operational methodology.

III. INVESTIGATIONS

The physiological and behaviouristic resistance of some vectors to the insecticides in use and the resistance of P. falciparum to 4-aminoquinolines have interfered with the progress of the malaria program in various countries in this Hemisphere and have motivated the necessities of expanding investigations to solve these problems and of finding new and more efficient measures against malaria.

The principal investigation activities carried out in 1975 are summarized as follows:

A. Evaluation of insecticides

A field trial (stage V) with landrin was completed early in 1975, using A. albimanus of both propoxur-susceptible and resistant strains because of possible cross resistance. It was observed that some A. albimanus strains resistant to propoxur are also resistant to landrin. No further activities beyond stage V were planned inasmuch as the insecticide was taken off the market and is no longer available commercially.

Studies on insecticides at stages III and IV were carried out during the year on sprayed panels of different types of materials used in house construction. The insecticides tested were chlorphoxim (OMS-1197), iodofenfos (OMS-1211), dursban (OMS-971), methoxychlor (OMS-466) and methyl-dursban (OMS-1155). Chlorphoxim gave a high mortality in propoxur-susceptible A. albimanus colonies. Its duration of residual effect is about two months. Among the insecticides tested, chlorphoxim seemed to be most promising and therefore further trials were initiated in Central America.

Among the insecticides tested with A. aegypti, methyl-dursban gave good results; the application of this insecticide as a residual house spray gave better results than perifocal application. Tests of methyl-dursban in domestic water containers showed a residual effect of more than two months against Aedes larvae. Similar tests were carried out with iodofenfos, which gave superior results to methyl-dursban insofar as residual effect is concerned.

B. Studies on larvivorous fishes

Studies on the local species of larvivorous fish in El Salvador continued with the objective of identifying their larvivorous potential; these studies include basic information on species, distribution and density of each specie identified. As of September, 18 species had been identified as larvivorous, but only three of them have a density sufficient to warrant further study of their influence on the larval population: Poecilia sphenops (chimbole), cichlasoma managuense (guapote tigre) and Astyanax fasciatus (plateada). Preliminary observation under laboratory conditions with the two latter species were very encouraging.

C. Studies on malaria immunology and chemotherapy

A plan for studies on malaria immunology and chemotherapy in Colombia was elaborated by the Government, the University of New Mexico and PAHO/WHO. This project has a financial support of USAID.

The objectives of this project are: a) to study the value of Colombian non-human primates, such as Aotus trivirgatus, as models for the production of human parasite antigens, b) to research the factors that affect the production of gametocytes in primates and the infectivity of mosquitoes. To perfect the techniques for the collection, isolation and preservation of human parasites, c) to study the possible pathological and toxicological effects of immunizing agents on primates, d) to evaluate the effectiveness of possible methods of immunization on non-human primates and possibly in field studies and e) to study the value of new antimalarial drugs and drug combinations for the treatment of cases of P. falciparum resistant to the 4-aminoquinolines by means of controlled clinical tests.

PAHO continued to give support and to collaborate with the Department of Preventive Medicine of the University of New York for the development of a method of active immunization against malaria using irradiated sporozoites. These studies are also directed towards solution of the problems hindering production and purification of antigen.

D. Serological studies

PAHO/WHO collaborated with the Malaria Program of Mexico in establishing a laboratory for serological studies. Two fellowships were awarded for training of national staff in serological techniques and some laboratory equipment and supplies were provided.

PAHO/WHO continued to collaborate with the Malaria Program of Costa Rica in the study on the applicability of serological techniques in epidemiological surveillance of malaria and other parasitic diseases. In Panama, PAHO/WHO provided one fellowship and some laboratory material for malaria serological surveys.

E. Entomological studies

PAHO continued its support to the Entomology Department of the University of California (Riverside) for the study of the mechanism of A. albimanus resistance to insecticides. The results of these studies will serve as a guide for selection of new insecticides.

Under the joint auspices of the Ministries of Health of Brazil, Colombia and of PAHO/WHO, genetic studies of malaria vectors, A. nuñeztovari and A. albitarsis were continued.

IV. TRAINING OF NATIONAL AND INTERNATIONAL STAFF

In 1975 the School of Malariology at Maracay, Venezuela, completed its XXXI International Course of Malariology and Environmental Sanitation, which started in November, 1974. Thirty per cent of the course was devoted to introductory courses, parasitology, bacteriology, entomology, epidemiology, chemotherapy and other related subjects; 30 per cent to malaria, and 40 per cent to environmental sanitation and to vector borne diseases other than malaria. In addition to national

participants, two medical officers, one from El Salvador and another from Bolivia, attended on PASB/Government of Venezuela fellowships.

Special training programs of shorter duration were also provided by the School of Maracay and a technical officer from Ecuador participated in a two-month course in vector Biology and Control. A medical officer from Paraguay followed a four-week training program in Venezuela and Colombia, with emphasis on malaria eradication activities and the development of rural health services. The use of propoxur in Central America was the subject of field observations by a Sanitary Engineer from Colombia and by a PAHO Technical Officer assigned to the same country.

Refresher courses were also given in various national malaria services in the microscopic diagnosis of malaria, with the participation of national laboratory technicians of the malaria programs, rural hospitals and health units.

A medical officer (parasitologist) from Colombia received a one-year PAHO fellowship to study malaria immunology at the University of New York; this will be followed by additional training in immunology and chemotherapy at the University of New Mexico (Albuquerque), and at the Southern Research Institute in Birmingham, Alabama, all in preparation for his future participation in a malaria research project in Colombia to be supported by the Government of Colombia, PAHO/WHO and USAID.

A serological laboratory established by the Ministry of Health of Costa Rica with PAHO's technical assistance now serves as an added training resource. In 1975 this laboratory received three PAHO fellows, from Mexico, Panama and Brazil.

As a part of the staff development program of PAHO, the Organization provided assistance to an engineer/malariologist to obtain a Master's degree in Sanitary Engineering at the "Universidad Autónoma" of Mexico, for a medical officer to obtain a Master's of Public Health, with specialization in tropical diseases, at the Johns Hopkins University (Baltimore, USA), and for a medical officer to obtain a Master's of Public Health at the University of Puerto Rico.

It should also be mentioned that, during the year, a PAHO technical officer assigned to the malaria program of Belize, attended a seminar sponsored by WHO and the Danish Agency for International Development, (DANIDA) in Jamaica, on the control of insects and rodents in urban areas.

In 1975 PAHO participated in the organization of a three-week Seminar on Mosquito Control for national and international staff, of a Master of Public Health course with specialization in malaria and other parasitic diseases, and of a 4-month course on Medical Entomology and Epidemiology. These training activities, to be developed in 1976, have the support of the Government of the State of California, USA; the Governments of Mexico and El Salvador; PAHO/WHO, USAID and the University of São Paulo, Brazil.

V. INTERNATIONAL COORDINATION AND COOPERATION

PAHO/WHO continued to assign personnel and to provide limited quantities of supplies and equipment to national programs. Since 1958 PAHO/WHO has been giving priority to the provision of antimalarial drugs for presumptive treatment of febrile cases and for radical-cure treatment of confirmed cases (See Table 20).

Table 21 shows the number of medical officers, sanitary engineers, entomologists, sanitary inspectors and other professional staff members who were assigned to projects during the period 1973-1976.

The Government of Venezuela continued its policy of granting six fellowships to candidates selected by the Organization for training at the School of Malariology and Environmental Sanitation in Maracay, Venezuela. The cost of travel to Venezuela of two fellows, one from El Salvador and another from Bolivia, was defrayed by PAHO/WHO with other expenses of the participants in the course being absorbed by the Venezuelan Government.

In April,1975, a Meeting of the Directors of Malaria Programs of the Hemisphere was held in Quito, Ecuador, for the purpose of exchanging information,

coordinating operational and surveillance activities and adopting a more flexible strategy atuned to the present situation of the program. Besides this meeting, contact was maintained at border areas by interested countries, to solve problems of mutual interest.

The Organization supported the following inter-country meetings in 1975:

Surinam-Guyana, January 20, at New Nickerie, Surinam

Surinam-French Guiana, January 28, Albina, Surinam

Belize-Guatemala, February 24-25 in Guatemala City, Guatemala

Peru-Ecuador, 16-21 June, Piura, Peru

Guatemala-Belize-Honduras-Mexico-El Salvador, 27-29 August, Guatemala City, Guatemala

Colombia-Venezuela, 30-31 October, Cúcuta, Colombia, and San Cristóbal, Venezuela

Brazil-Paraguay, 27-28 November, Pto. Pres. Stroessner, Paraguay

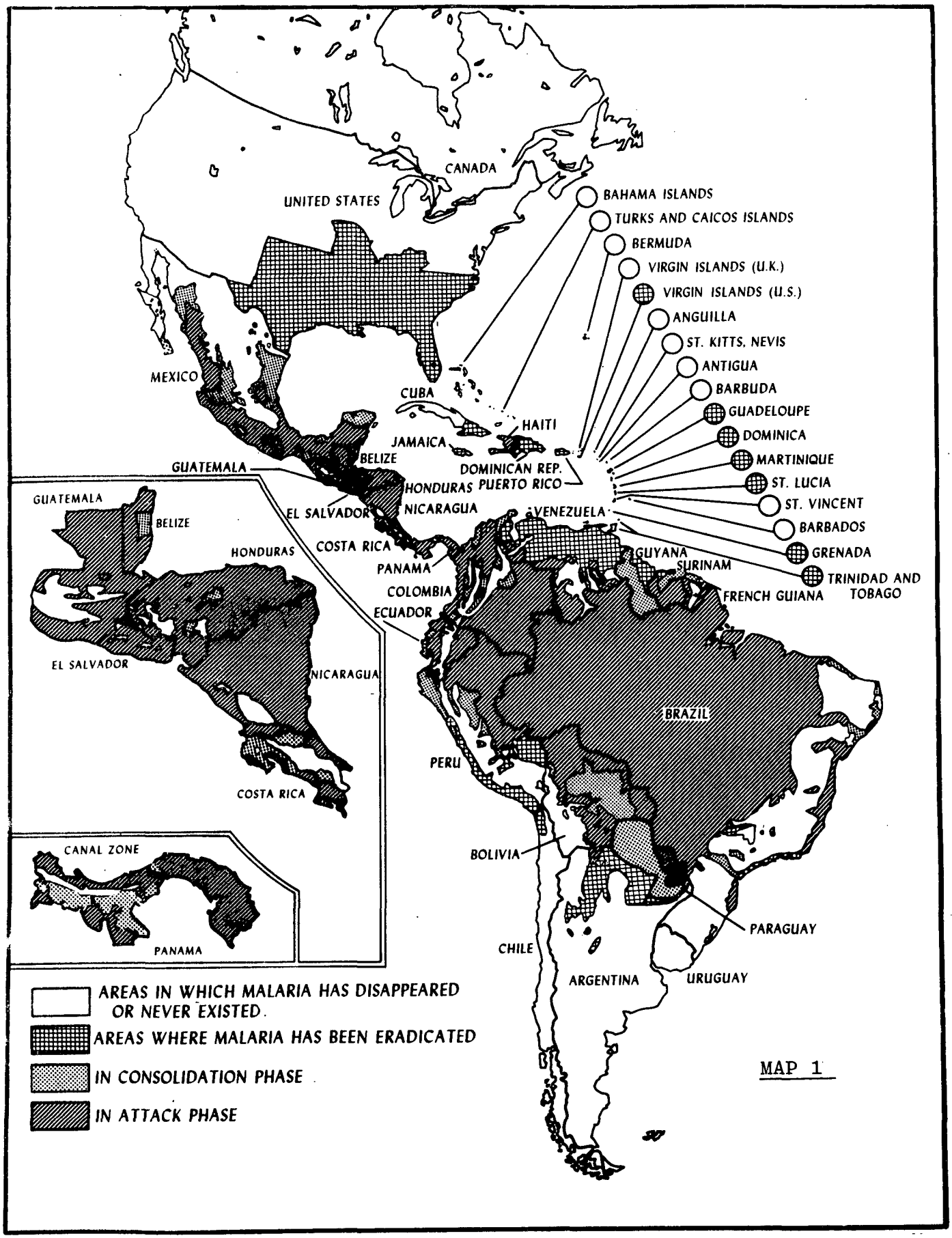
The contributions of PAHO, WHO, and USAID to malaria programs in 1975 and estimated amounts for 1976 are shown in Table 22.

Table 1

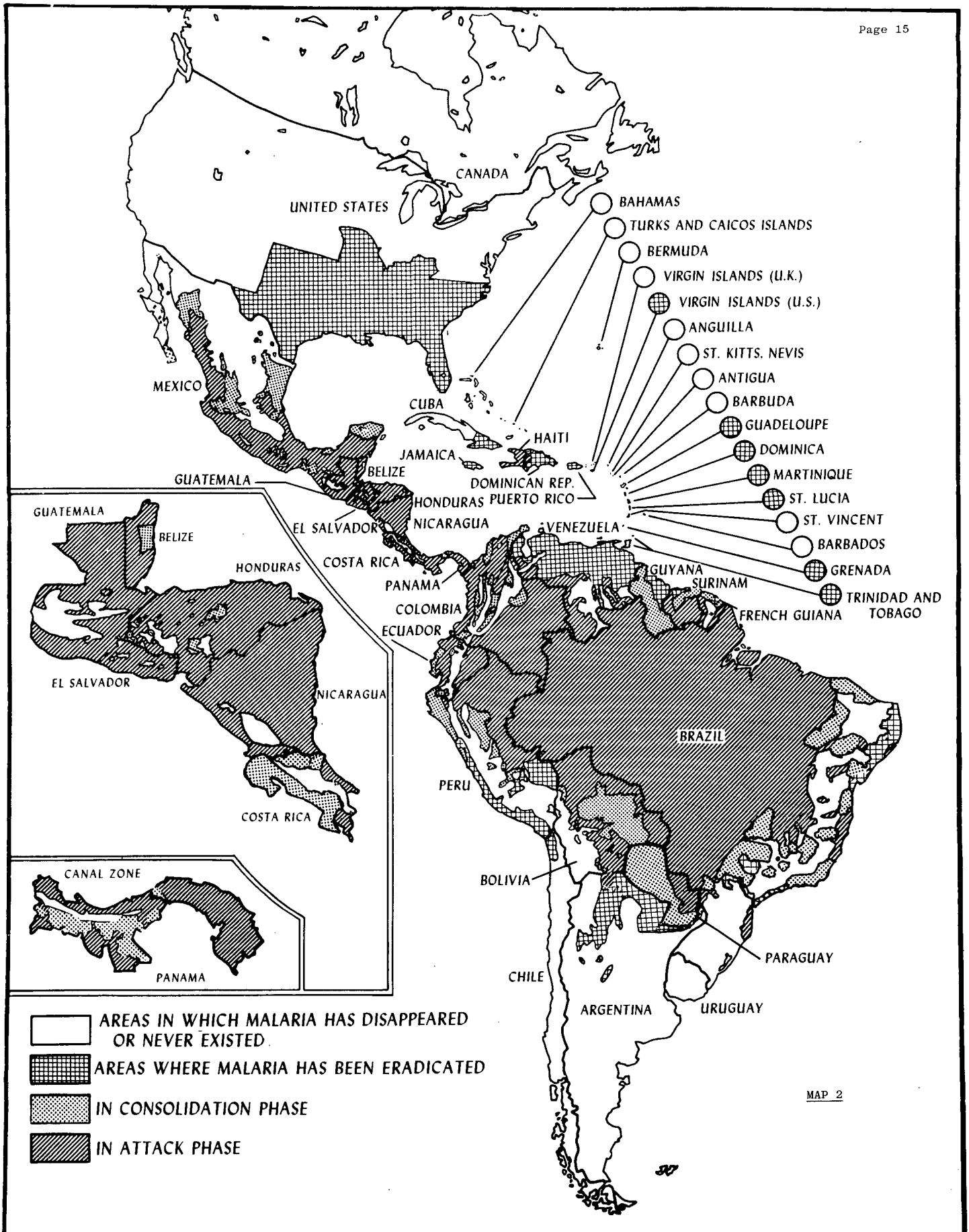
POPULATION IN THE MALARIOUS AREAS
IN THE AMERICAS, 1958-1975

(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



STATUS OF THE MALARIA PROGRAM IN THE AMERICAS , 31 DECEMBER 1974



MAP 2

STATUS OF THE MALARIA PROGRAM IN THE AMERICAS, 31 DECEMBER 1975

Table 2

STATUS OF THE MALARIA PROGRAM IN THE AMERICAS, BY POPULATION, 1975

(Population in thousands)

Country or other political or administrative unit	Total population	Population of originally malarious areas							
		Total		Malaria eradication claimed (maintenance phase)		Consolidation phase		Attack phase	
		Total	%	Total	%	Total	%	Total	%
Argentina	25 200	3 056	12.1	2 928	95.8	60	2.0	68	2.2
Bahamas	204[a]	-	-	-	-	-	-	-	-
Barbados	246[a]	-	-	-	-	-	-	-	-
Bolivia	5 624	1 784	31.7	-	-	1 061	59.5	723	40.5
Brazil	107 663	43 378	40.3	10 720	24.7	12 466	28.7	20 192	46.6
Canada	22 830	-	-	-	-	-	-	-	-
Chile	10 741[a]	226[b]	2.1	226	100.0	-	-	-	-
Colombia	24 612	14 542	59.1	-	-	9 896	68.1	4 646	32.0
Costa Rica	2 008	642	32.0	-	-	487	75.9	155	24.1
Cuba	9 271	3 250	35.1	3 250	100.0	-	-	-	-
Dominican Republic	4 697	4 666	99.3	4 538	97.3	44	0.9	84	1.8
Ecuador	6 715	4 134	61.6	-	-	1 753	42.4	2 381	57.6
El Salvador	4 090	3 524	86.2	-	-	-	-	3 524	100.0
Grenada and Carriacou	106	40	37.7	40[c]	100.0	-	-	-	-
Guatemala	5 379	2 346	43.6	-	-	-	-	2 346	100.0
Guyana	803[d]	803	100.0	754	93.9	49	6.1	-	-
Haiti	5 451	4 025	73.8	-	-	-	-	4 025	100.0
Honduras	2 771	2 519	90.9	-	-	458	18.2	2 061	81.8
Jamaica	2 060	1 610	78.2	1 610[c]	100.0	-	-	-	-
Mexico	58 545	29 113	49.7	-	-	13 839	47.5	15 274	52.5
Nicaragua	2 239	2 239	100.0	-	-	-	-	2 239	100.0
Panama	1 668	1 606	96.3	-	-	425	26.5	1 181	73.5
Paraguay	2 647	2 214	83.6	-	-	1 248	56.4	966	43.6
Peru	15 827	5 517	34.9	1 511	27.4	2 660	48.2	1 346	24.4
Trinidad and Tobago	1 091	862[b]	79.0	862[c]	100.0	-	-	-	-
United States of America	213 121	60 715	28.5	60 715[c]	100.0	-	-	-	-
Uruguay	3 064	-	-	-	-	-	-	-	-
Venezuela	11 817	8 866	75.0	8 335[e]	94.0	-	-	531	6.0
Antigua	71[a]	-	-	-	-	-	-	-	-
Belize	132	132	100.0	-	-	77	58.3	55	41.7
Bermuda	57[a]	-	-	-	-	-	-	-	-
Canal Zone	48	48	100.0	-	-	48	100.0	-	-
Caiman Islands	11	-	-	-	-	-	-	-	-
Dominica	75[a]	15[b]	20.0	15[c]	100.0	-	-	-	-
Falkland Islands	2	-	-	-	-	-	-	-	-
French Guiana	55	55	100.0	34	61.8	16	29.1	5	9.1
Guadeloupe	352[a]	308[b]	87.5	308[c]	100.0	-	-	-	-
Martinique	364[a]	227	62.4	227	100.0	-	-	-	-
Montserrat	13[a]	-	-	-	-	-	-	-	-
Netherland Antilles	242[a]	-	-	-	-	-	-	-	-
Puerto Rico	2 951	2 951	100.0	2 951[c]	100.0	-	-	-	-
St. Kitts, Nevis, Anguilla	66[a]	-	-	-	-	-	-	-	-
St. Lucia	114	108	94.7	108[c]	100.0	-	-	-	-
St. Pierre & Miquelon	6	-	-	-	-	-	-	-	-
St. Vincent	104[a]	-	-	-	-	-	-	-	-
Surinam	422	268	63.5	190	70.9	46	17.2	32	11.9
Turks & Caicos Islands	6	-	-	-	-	-	-	-	-
Virgen Islands (U.K.)	12	-	-	-	-	-	-	-	-
Virgen Islands (U.S.A.	83	83	100.0	83	100.0	-	-	-	-
Total	555 676	205 872	37.0	99 405	48.3	44 633	21.7	61 834	30.0

a) Provisional figure estimated by PAHO. b) Estimated. c) Population in areas where eradication of malaria has been certified by PAHO/WHO. d) 1974 population figure provided by country. e) Includes an area with 6 281 877 inhabitants, where eradication of malaria has been certified by PAHO/WHO.

Table 3

STATUS OF THE MALARIA PROGRAM IN THE AMERICAS, BY AREA, 1975
(Area in Km^2)

Country or other political or administrative unit	Total area	Originally malarious areas							
		Total		Malaria eradication claimed (maintenance phase)		Consolidation phase		Attack phase	
		Total	%	Total	%	Total	%	Total	%
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	-	-	-	-	-	-	-	-
Bolivia	1 098 581	821 346	74.8	-	-	367 940	44.8	453 406	55.2
Brazil	8 511 965	6 898 045	81.0	132 882	1.9	349 110	5.1	6 416 053	93.0
Canada	9 221 016	-	-	-	-	-	-	-	-
Chile	741 767	55 287	7.5	55 287	100.0	-	-	-	-
Colombia	1 138 914	970 849	85.2	-	-	113 176	11.7	857 673	88.3
Costa Rica	50 900	35 446	69.6	-	-	22 653	63.9	12 793	36.1
Cuba	114 524	37 502	32.7	37 502[a]	100.0	-	-	-	-
Dominican Republic	48 442	47 562	98.2	44 281	93.1	1 096	2.3	2 185	4.6
Ecuador	291 906	175 462	60.1	-	-	27 797	15.8	147 665	84.2
El Salvador	21 149	18 655	88.2	-	-	-	-	18 655	100.0
Grenada and Carriacou	344	103	29.9	103[a]	100.0	-	-	-	-
Guatemala	108 889	80 350	73.8	-	-	-	-	80 350	100.0
Guyana	215 025	215 025	100.0	39 437	18.3	175 588	81.7	-	-
Haiti	27 750	19 100	68.8	-	-	-	-	19 100	100.0
Honduras	112 088	101 351	90.4	-	-	6 862	6.8	94 489	93.2
Jamaica	11 310	10 028	88.7	10 028[a]	100.0	-	-	-	-
Mexico	1 967 183	1 150 000	58.5	-	-	424 694	36.9	725 306	63.1
Nicaragua	127 358	118 358	92.9	-	-	-	-	118 358	100.0
Panama	75 650	69 840	92.3	-	-	16 231	23.2	53 609	76.8
Paraguay	406 752	406 552	100.0	-	-	301 189	74.1	105 363	25.9
Peru	1 285 215	961 171	74.8	195 818	20.4	221 930	23.1	543 423	56.5
Trinidad and Tobago	5 605	5 444	97.1	5 444[a]	100.0	-	-	-	-
United States	9 359 781	2 309 601	24.7	2 309 601[a]	100.0	-	-	-	-
Uruguay	186 926	-	-	-	-	-	-	-	-
Venezuela	915 741	600 000	65.5	460 054[b]	76.7	-	-	139 946	23.3
Antigua	280	-	-	-	-	-	-	-	-
Bermuda	53	-	-	-	-	-	-	-	-
Belize	22 965	22 965	100.0	-	-	8 811	38.4	14 154	61.6
Canal Zone	1 432	1 432	100.0	-	-	1 432	100.0	-	-
Cayman Islands	183	-	-	-	-	-	-	-	-
Dominica	751	152	20.2	152[a]	100.0	-	-	-	-
Falkland Islands	11 961	-	-	-	-	-	-	-	-
French Guiana	90 000	90 000	100.0	200	0.2	82 300	91.5	7 500	8.3
Guadeloupe	1 779	1 136	63.9	1 136	100.0	-	-	-	-
Martinique	1 080	300	27.8	300	100.0	-	-	-	-
Montserrat	84	-	-	-	-	-	-	-	-
Netherland Antilles	961	-	-	-	-	-	-	-	-
Puerto Rico	8 899	8 899	100.0	8 899[a]	100.0	-	-	-	-
St.Kitts, Nevis, Anguilla	396	-	-	-	-	-	-	-	-
St. Lucia	603	510	84.6	510[a]	100.0	-	-	-	-
St.Pierre and Miquelon	240	-	-	-	-	-	-	-	-
St. Vincent	389	-	-	-	-	-	-	-	-
Turks and Caicos Islands	522	-	-	-	-	-	-	-	-
Surinam	163 820	163 750	100.0	8 955	5.5	55 345	33.8	99 450	60.7
Virgin Islands (U.K.)	174	-	-	-	-	-	-	-	-
Virgin Islands (U.S.A.)	344	344	100.0	344[a]	100.0	-	-	-	-
Total	40 387 981	15 745 616	39.0	3 645 460	23.2	2 179 403	13.8	9 920 753	63.0

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

Table 4

TOTAL SLIDES EXAMINED AND MALARIA CASES, IN THE AMERICAS, 1958-1975

Year	Number of slides examinded	Number of slides found positive
1958	1 716 103	56 705
1959	2 749 117	75 612
1960	3 955 149	79 998
1961	5 341 004	99 539
1962	7 221 367	177 089
1963	7 903 156	227 026
1964	8 156 290	254 572
1965	9 069 950	241 462
1966	11 731 451	333 245
1967	11 609 226	369 341
1968	12 522 696	282 773
1969	12 179 190	323 782
1970	9 925 162	344 170
1971	10 134 212	338 416
1972	9 695 953	284 813
1973	9 400 682	280 276
1974	8 997 318	269 003
1975	9 276 932	356 649

Table 5

CASE DETECTION BY COUNTRY AND PHASE OF PROGRAM, 1975

Country or other political or administrative unit	Total		Maintenance phase		Consolidation phase		Attack phase		Non-malarious areas	
	Slides examined	Positive cases	Slides examined	Positive cases	Slides examined	Positive cases	Slides examined	Positive cases	Slides examined	Positive cases
Argentina	52 015	100	40 638	41	6 467	6	4 900	53	10	-
Bolivia	133 601	6 615	-	-	24 939	873	107 127	5 684	1 535	58
Brazil	2 617 755	88 630	23 861	316	681 365	2 174	1 822 580	83 460	89 949	2 680
Canada	...	49	-	-	-	-	-	-	...	49
Colombia	385 691	32 690	-	-	187 064	4 817	197 300	27 755	1 327	118
Costa Rica	166 814	290	-	-	88 718	98	77 597	119	499	73
Cuba	376 301	87	214 973	7	-	-	-	-	161 328	80
Dominican Republic	374 478	159	336 922	52	7 885	1	29 597	106	74	0
Ecuador	306 917	6 555	-	-	132 725	396	171 802	6 134	2 390	25
El Salvador	538 909	83 100	-	-	-	-	510 801	81 886	28 108	1 214
Grenada and Carriacou	24	1	24	1	-	-	-	-	-	-
Guatemala	418 749	4 979	-	-	-	-	415 150	4 831	3 599	148
Guyana	55 758	1 116	11 941	8	43 817	1 108	-	-	-	-
Haiti	346 934	24 733	-	-	-	-	346 934	24 733	-	-
Honduras	266 923	30 289	-	-	21 394	366	243 209	29 871	2 320	52
Jamaica	17 648	5	17 648	5	-	-	-	-	-	-
Mexico	1 805 782	27 925	-	-	408 083	1 220	1 375 398	26 589	22 301	116
Nicaragua	259 675	24 692	-	-	-	-	259 675	24 692	-	-
Panama	394 995	666	-	-	80 386	7	314 577	659	32	-
Paraguay	125 132	217	-	-	54 994	2	68 845	211	1 293	4
Peru	225 114	14 338	51 588	43	94 510	2 733	79 015	11 561	1	1
Trinidad and Tobago	15 707	4	15 707	4	-	-	-	-	-	-
United States	221	333	221	333	-	-	-	-	-	-
Venezuela	275 102	5 909	155 265	1 119	-	-	118 812	4 575	1 025	215
Antigua	...	1	-	-	-	-	-	-	...	1
Belize	19 116	90	-	-	6 847	19	12 269	71	-	-
Canal Zone	2 651	11	-	-	2 651	11	-	-	-	-
Dominica	334	3	334	3	-	-	-	-	-	-
French Guiana	15 250	319	6 685	179	4 516	72	4 049	68	-	-
Guadeloupe	...	1	...	1	-	-	-	-	-	-
Puerto Rico	...	1	...	1	-	-	-	-	-	-
St. Lucia	9	0	9	0	-	-	-	-	-	-
Surinam	79 327	2 741	15 581	34	22 014	150	38 631	2 506	3 101	51
Total	9 276 932	356 649	891 397	2 147	1 868 375	14 053	6 198 268	335 564	318 892	4 885

Table 6

CLASSIFICATION OF MALARIA PROGRAMS IN RELATION TO PROGRESS ACHIEVED
AS OF 31 DECEMBER 1975

GROUP I Eradication certified in the whole of the country		GROUP II Malaria eradication in sight, if the current progress continues		GROUP III		
					Population (in thousands)	
Countries	Population (in thousands)	Countries	Population (in thousands)	Countries	Part 1 Transmission interrupted (maintenance or consolidation phase)	Part 2 Attack phase
Chile	226	Argentina	3 056	Bolivia	1 061	723
Cuba	3 250	Costa Rica	642	Brazil	23 186	20 192
Granada and Carriacou[a)]	40	Dom. Republic	4 666	Colombia	9 896	4 646
Jamaica	1 610	Guyana	803	Ecuador	1 753	2 381
Trinidad & Tobago	862	Panama	1 606	El Salvador	0	3 524
U.S.A. (Continent) ...	60 715	Canal Zone	48	Guatemala	0	2 346
Puerto Rico	2 951	Paraguay	2 214	Haiti	0	4 025
Virgin Islands	83	Belize	132	Honduras	458	2 061
Dominica	15	French Guiana	55	Mexico	13 839	15 274
Guadeloupe	308		-	Nicaragua	0	2 239
Martinique	227		-	Peru	4 171	1 346
St. Lucia	102		-	Venezuela	8 335	531
	-			Surinam	236	32
12 Units	70 395 34.2%	9 Units	13 222[a)] 6.4%	13 Units	62 935 30.6%	59 320 28.8%

a) 2 514 000 inhabitants are in areas in the attack phase.

Table 7

SLIDES EXAMINED AND POSITIVES, BY SPECIES AND CLASSIFICATION,
MAINTENANCE AREAS, 1975

Country or other political or administrative unit	Number of Slides examined	Total No. of positive cases	Species of parasite				Classification of cases							
									Imported					
			P.falciparum	P.vivax	P.malariae	Mixed infections	Autochthonous	Relapsing	from abroad	from areas within country	Induced	Introduced	Criptic and Unclassified	No investigated
Argentina	40 638	41	-	41	-	-	11	-	6	1	-	-	1	22
Brazil	23 861	316	72	238	-	6	-	-	-	311[a]	3	-	-	2
Cuba	214 973	7	3	1	3	-	-	-	7	-	-	-	-	-
Dominican Republic ...	336 922	52	52	-	-	-	10	-	15	-	-	4	-	23
Grenada and Carriacou	24	1	-	-	1	-	-	1	-	-	-	-	-	-
Guyana	11 941	8	6	2	-	-	1	-	3	-	-	3	-	1
Jamaica	17 648	5	2	3	-	-	-	-	5	-	-	-	-	-
Peru	51 588	43	1	42	-	-	6	3	1	17[b]	11	-	-	15
Trinidad and Tobago ..	15 707	4	1	-	3	-	-	2	1	-	--	-	1	-
United States of America	221	333[c]	80	209	12	3	-	-	331	-	2[d]	-	-	-
Venezuela	155 265	1 119	495	618	1	5	557	4	75	378	4	101	-	-
Dominica	334	3	-	-	3	-	-	1	-	-	-	-	2	-
French Guiana	6 685	179	178	1	-	-	125	-	6	17	-	-	20	11
Guadeloupe	...	1	...	...	...	...	-	-	1	-	-	-	-	1
Puerto Rico	...	1	...	...	...	...	-	-	-	-	-	-	-	-
St. Lucia	9	0	-	-	-	-	-	-	-	-	-	-	-	-
Surinam	15 581	34	34	-	-	-	-	-	-	23[e]	-	-	-	11
Total	891 397	2 147	924	1 155	23	14	710	11	451	747	10	108	24	86

a) One case imported from Consolidation phase area. b) Includes 4 cases imported from Consolidation phase areas. c) Includes 6 P.ovale and 23 with undetermined infection. d) One congenital case. e) Seven cases imported from Consolidation phase areas.

Table 8

SLIDES EXAMINED AND POSITIVES, BY SPECIES AND CLASSIFICATION, CONSOLIDATION AREAS, 1975

Country or other political or administrative unit	Population (thousands)	No. of slides examined	Total No. of positive cases	API (a)	Species of parasite				Origin of infections							
					P. falciparum	P. vivax	P. malariae	Mixed infections		Relapsing	Imported		Induced	Introduced	Cryptic	Unclassified or not investigated
											from abroad	from areas within country				
Argentina	60	6 467	6	0.1	-	6	-	-	1	1	1	1	-	-	-	2
Bolivia	1 061	24 939	873	0.8	13	859	1	-	194	-	3	40	-	-	-	636
Brazil	12 466	681 365	2 174	0.2	250	1 909	2	13	968	8	8	874[b]	11	2	3	300
Colombia	9 896	187 064	4 817	0.5	2 001	2 782	-	34	694	3	54	3 272	8	8	153	625
Costa Rica	487	88 718	98	0.2	-	98	-	-	37	-	23	26	-	12	-	-
Dominican Republic ..	44	7 885	1	0.02	1	-	-	-	-	-	-	-	-	-	-	1
Ecuador	1 753	132 725	396	0.2	72	323	-	1	113	2	2	203	1	38	-	37
Guyana	49	43 817	1 108	22.6	847	260	-	1	396	-	21	-	-	14	1	676
Honduras	458	21 394	366	0.8	10	349	1	6	7	11	3	33	-	-	-	312
Mexico	13 839	408 083	1 220	0.1	-	1 212	8	-	560	98	2	280	7	1	8	264
Panama	425	80 386	7	0.02	-	7	-	-	4	-	-	3	-	-	-	-
Paraguay	1 248	54 994	2	0.0	-	2	-	-	-	-	1	-	-	-	-	1
Peru	2 660	94 510	2 733	1.0	-	2 732	1	-	703	3	-	211	2	-	-	1 814
Belize	77	6 847	19	0.2	-	19	-	-	8	-	5	1	-	-	2	3
Canal Zone	48	2 651	11	0.2	1	10	-	-	3	-	8	-	-	-	-	-
French Guiana	16	4 516	72	4.5	72	-	-	-	67	-	2	-	-	-	1	2
Surinam	46	22 014	150	3.3	150	-	-	-	127	-	-	14[c]	-	-	-	9
Total	44 633	1 868 375	14 053	0.3	3 417	10 568	13	55	3 882	126	133	4 958	29	75	168	4 682

a) Annual Parasite Incidence per 1000 inhabitants. b) 35 cases imported from maintenance phase areas. c) 1 case imported from maintenance phase areas.

Table 9

SLIDES EXAMINED AND POSITIVES BY SPECIES,
ATTACK AREAS, 1975

Country or other political or administrative unit	Slides examined			Species found			
	Total	Positive		P. falciparum	P. vivax	P. malariae	Mixed infections
		Number	Percentage				
Argentina	4 900	53	1.1	-	53	-	-
Bolivia	107 127	5 684	5.3	650	4 986	-	48
Brazil	1 822 580	83 460	4.6	38 402	44 538	35	485
Colombia	197 300	27 755	14.1	13 565	14 026	10	154
Costa Rica	77 597	119	0.2	23	96	-	-
Dominican Republic	29 597	106	0.4	106	-	-	-
Ecuador	171 802	6 134	3.6	1 144	4 971	1	18
El Salvador	510 801	81 886	16.0	15 682	65 697	-	507
Guatemala	415 150	4 831	1.2	99	4 731	-	1
Haiti	346 934	24 733	7.1	24 732	1	-	-
Honduras	243 209	29 871	12.3	1 019	28 810	-	42
Mexico	1 375 398	26 589	1.9	21	26 560	7	1
Nicaragua	259 675	24 692	9.5	3 629	20 894	-	169
Panama	314 577	659	0.2	304	352	-	3
Paraguay	68 845	211	0.3	11	200	-	-
Peru	79 015	11 561	14.6	-	11 548	13	-
Venezuela	118 812	4 575	3.9	958	3 597	2	18
Belize	12 269	71	0.6	-	71	-	-
French Guiana	4 049	68	1.7	58	10	-	-
Surinam	38 631	2 506	6.5	2 506	-	-	-
Total	6 198 268	335 564	5.4	102 909	231 141	68	1 446

Table 10

SLIDES EXAMINED AND POSITIVES BY SPECIES,
NON-MALARIOUS AREAS, 1975

Country or other political or administrative unit	Slides examined			Species found			
	Total	Positive		P.falciparum	P.vivax	P.malariae	Mixed infections
		Number	Percentage				
Argentina	10	0	-	-	-	-	-
Bolivia	1 535	58	3.0	-	58	-	-
Brazil	89 949	2 680	3.0	334	2 335	1	10
Canada	...	49	-	...	...	...	...
Colombia	1 327	118	8.9	45	72	-	1
Costa Rica	499	73	14.6	8	65	...	...
Cuba	161 328	80	0.05	51	14	15	-
Dominican Republic	74	0	-	-	-	-	-
Ecuador	2 390	25	1.0	-	25	-	-
El Salvador	28 108	1 214	4.3	120	1 094	-	-
Guatemala	3 599	148	4.1	-	148	-	-
Honduras	2 320	52	2.2	1	51	-	-
Mexico	22 301	116	0.5	104	12	-	-
Panama	32	0	-	-	-	-	-
Paraguay	1 293	4	0.3	-	4	-	-
Peru	1	1	100.0	-	1	-	-
Venezuela	1 025	215	21.0	11	204	-	-
Antigua	...	1	-	...	...	...	...
Surinam	3 101	51	1.6	50	1	-	-
Total	318 892	4 885	3.0	724	4 084	16	11

Table 11

DEATHS FROM MALARIA, 1970-1974

Country or other political or administrative unit	Number of deaths from malaria					Malaria deaths as a % of all deaths					Malaria deaths per 100 000 inhabitants				
	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974	1970	1971	1972	1973	1974
Argentina	1	...	...	...	...	0.00	...	...	...	...	0.0	...	...	...	...
Bolivia[a]	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Brazil	76	96	34	105	131	...	...	...	...	...	0.10	0.12	0.04	0.13	0.15
Canada	1	0	0	...	...	0.00	-	-	...	...	0.0	-	-	...	...
Colombia	604	698	814	...	...	0.45	0.50	0.51	...	...	2.9	3.2	3.6	...	...
Costa Rica	1	3	1	1	...	0.01	0.03	0.01	0.01	...	0.1	0.2	0.1	0.1	...
Dominican Republic	3	2	1	...	...	0.01	0.01	0.00	...	...	0.1	0.0	0.0	...	...
Ecuador	97	93	72	48	...	0.16	0.15	0.11	0.07	...	1.6	1.5	1.1	0.7	...
El Salvador	122	399	86	85	69	0.35	1.39	0.27	0.27	0.23	3.5	2.6	2.3	2.2	1.8
Guatemala	20	8	...	...	...	0.03	0.01	...	...	...	0.4	0.1	...	...	...
Guyana	1	0	...	...	...	0.02	-	...	...	...	0.1	-	...	...	...
Haiti	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Honduras	65	58	117	86	...	0.32	0.28	0.54	0.41	...	2.5	2.2	4.4	3.1	...
Jamaica	1	2	...	...	...	0.01	0.01	...	...	...	0.1	0.1	...	...	...
Mexico	33	38	43	22	...	0.01	0.01	0.01	0.00	...	0.1	0.1	0.1	0.04	...
Nicaragua	254	...	90	135	...	1.64	...	1.62	1.15	...	12.8	...	4.6	6.6	...
Panama	16	9	9	4	12	0.16	0.09	0.10	0.04	0.14	1.1	0.6	0.6	0.3	0.7
Paraguay	2	4	0	0	0	0.02	0.03	-	-	-	0.2	0.3	-	-	-
Peru	43	31	26	...	...	0.04	0.03	0.04	...	...	0.3	0.2	0.6	...	...
United States of America	5	6	...	...	...	0.00	0.00	...	...	...	0.0	0.0	...	...	...
Venezuela	8	15	17	9	4	0.01	0.02	0.02	0.01	0.01	0.1	0.1	0.2	0.1	0.03
Belize	0	0	0	0	...	-	-	-	-	...	-	-	-	-	...
French Guiana	1	1	...	...	...	0.28	0.24	...	...	...	2.0	2.0	...	...	...
Puerto Rico	0	2	...	...	...	-	0.01	...	...	...	-	0.1	...	...	...
Surinam	...	1	...	...	...	...	0.04	...	...	...	...	0.2	...	...	...

... Information not available.

a) Partial information, refers only to Capital cities.

Table 12

HOUSES SPRAYED WITH RESIDUAL INSECTICIDES,[a] BY COUNTRY AND BY CYCLE, 1975

Country or other political or administrative unit	1st Cycle			2nd Cycle			3rd Cycle			4th Cycle			Total sprayings
	Houses planned	Houses sprayed	% sprayed	Houses planned	Houses sprayed	% sprayed	Houses planned	Houses sprayed	% sprayed	Houses planned	Houses sprayed	%	
Argentina	16 255	14 607	89.9	15 749	12 498	79.4	-	-	-	-	-	-	27 105
Bolivia	40 034	32 188	80.4	20 739	19 867	95.8	-	-	-	-	-	-	52 055
Brazil	3 152 006	2 756 637	87.5	2 855 247	2 525 741	88.5	-	-	-	-	-	-	5 282 378[b]
Colombia (Semestrial)	308 617	268 225	86.9	313 773	262 792	83.8	-	-	-	-	-	-	531 017
(Annual cycle)	110 622	84 064	76.0	-	-	-	-	-	-	-	-	-	84 064
(Emergency cycles)	-	27 390	-	-	21 396	-	-	-	-	-	-	-	48 786
Costa Rica (Semestrial)	29 849	29 778	99.8	30 996	31 302	101.0	-	-	-	-	-	-	61 080
(Quarterly, propoxur)	712	693	97.3	721	681	94.5	1 040	1 403	134.9	1 163	1 650	141.9	4 427[c]
Dominican Republic	6 837	5 897	86.3	6 962	6 095	87.5	-	-	-	-	-	-	11 992
Ecuador (Semestrial)	182 899	160 262[d]	87.6	160 520	159 549	99.4	-	-	-	-	-	-	319 811
(Annual cycles)	164 856	8 640[d]	-	-	-	-	-	-	-	-	-	-	8 640
El Salvador (Semestrial)	4 567	3 525	77.2	4 567	3 667	80.3	-	-	-	-	-	-	7 192
(Quarterly, propoxur)	82 326	73 310	89.0	82 326	77 813	94.5	82 326	78 780	95.7	82 326	79 031	96.0	308 934
(2 cycles, Quarterly, propoxur)	13 972	19 015	136.1	13 972	18 857	135.0	-	-	-	-	-	-	37 872
Guatemala (Semestrial)	125 996	91 388	72.5	108 445	100 888	93.0	-	-	-	-	-	-	192 276
(Quarterly, propoxur)	89 896	39 855	44.3	93 752	90 233	96.2	109 852	101 633	92.5	103 195	94 534	91.6	326 255[e]
Guyana (Semestrial)	2 100	278	13.2	2 100	1 973	94.0	-	-	-	-	-	-	2 251
(Annual cycle)	3 245	2 886	88.9	-	-	-	-	-	-	-	-	-	2 886
Haiti	231 842	227 394[f]	98.1	111 195	110 480[g]	99.4	-	-	-	-	-	-	337 874
Honduras (Spray. with DDT)	82 188	53 876[h]	65.6	148 848	135 220[g]	90.8	-	-	-	-	-	-	189 096
(Spray. with propoxur)	79 837	73 082[h]	91.5	8 802	8 707[h]	98.9	6 271	5 490[i]	87.5	-	-	-	87 279
Mexico (Semestrial, attack)	1 886 994	1 870 145	99.1	1 921 355	1 840 432	95.8	-	-	-	-	-	-	3 710 577
(Semestrial, Consolid.)	86 702	87 625	101.1	91 916	88 996	96.8	-	-	-	-	-	-	176 621
(4-Months cycles)	60 563	59 791	98.7	60 957	60 144	98.7	62 122	60 550	97.5	-	-	-	180 485
Nicaragua (Semestrial)	32 863	25 249	76.8	36 373	34 761	95.6	-	-	-	-	-	-	60 010
(Quarterly, propoxur)	129 205	112 105	86.8	126 182	117 373	93.0	128 901	115 375	89.5	43 764	39 976	91.3	384 829
Panama (Semestrial)	54 868	50 595	92.2	51 156	48 292	94.4	-	-	-	-	-	-	98 887
(Annual cycle, DDT)	13 096	12 465	95.2	-	-	-	-	-	-	-	-	-	12 465
(Quarterly, propoxur)	6 495	6 213	95.7	6 715	6 122	91.2	3 521	3 234	91.8	3 525	3 323	94.3	18 892
Paraguay (Semestrial)	81 292	79 492	97.8	77 621	41 099	52.9	-	-	-	-	-	-	120 591
(4-Month cycles)	1 784[j]	2 345[j]	131.4	2 382[j]	3 236[j]	135.9	2 406	3 468	144.1	-	-	-	9 049
Peru	232 640[j]	174 673[j]	75.1	232 640[j]	183 012[j]	78.7	-	-	-	-	-	-	366 828[k]
Venezuela (Semestrial)	35 069	22 366	63.8	4 375	3 128	71.5	-	-	-	-	-	-	25 494
(4-Month cycles)	141 784	115 607	81.5	174 662	149 452	85.6	175 484	146 191	83.3	-	-	-	411 250
Belize	5 919	5 992	101.2	6 373	6 387	100.2	-	-	-	-	-	-	12 379
French Guiana	7 200	6 010[l]	83.5	7 200	6 010[l]	83.5	-	-	-	-	-	-	12 020
Surinam	9 153	3 806[l]	41.6	13 328	5 529[l]	41.5	-	-	-	-	-	-	9 335
Total	7 514 283	6 607 469	87.9	6 791 949	6 181 732	91.0	571 923	516 124	90.2	233 973	218 514	93.4	13 532 982

a)DDT semestrial sprayings unless otherwise indicated. b) In addition, 86 943 emergency sprayings were applied. c) Emergency sprayings with DDT were also applied to 770 houses and to 643 houses with propoxur. d) Annual cycle started in November. e) In addition, emergency sprayings with propoxur, 9 407 houses and 27 941 with DDT. f) Sprayings in the North Coast. g) Sprayings from June to December. h) Emergency sprayings with propoxur in Valle de Sula. i) Sprayed with propoxur in problem area. j) Includes houses sprayed in Consolidation areas. k) Includes 9 143 mergency sprayings. l) Includes houses sprayed with dieldrin.

Table 13

INSECTICIDES USED IN THE MALARIA PROGRAMS

Country of other political or administrative unit	DDT (kg.)				Propoxur 50% (kg.)		Other	
	1975		1976 (Est.)		1975	1976 (Est.)	1975	1976 (Est.)
	100%	75%	100%	75%				
Argentina	600	10 774	1 000	15 000	-	-	-	-
Bolivia	39	35 287	400	80 000	-	-	-	-
Brazil	197 892	3 065 795	334 022	3 440 877	-	-	-	-
Colombia	524	355 358	10 000	300 000	-	6 000	1 648 a)	150 000 a)
Costa Rica	3 857	43 128	1 656	20 778	3 133	7 058	-	-
Dominican Republic	1 356	4 528	1 814	5 443	-	-	-	-
Ecuador	-	252 272	-	306 000	-	-	-	-
El Salvador	-	5 207	1 202	25 304	225 932	207 000	-	-
Guatemala	2 426	135 645	2 722	158 533	138 094	198 300	315 b)	450 b)
Guyana	1 449	1 536	15 978	17 228	-	-	-	-
Haiti	296	100 946	300	80 000	6 674 d)	- d)	466 c)	600 c)
Honduras	1 469	82 720	6 970	104 300	34 445 d)	56 500 d)	-	-
Mexico	55 195	2 295 708	62 000	2 800 000	-	-	20 e)	-
Nicaragua	657	28 565	700	42 000	156 018	150 000	-	-
Panama	8 500	56 418	6 350	68 580	13 586	12 960	-	-
Paraguay	-	73 741 f)	-	75 658	-	-	-	-
Peru	-	195 568 f)	-	392 170	-	-	-	-
Venezuela	14 814	251 002	13 400	389 000	-	-	(g)	(g)
Belize	2 160	5 743	2 825	6 387	-	-	-	-
French Guiana	1 560	387	1 750	400	-	-	4 540 h)	6 000 h)
Surinam	105	3 461	160	4 500	-	-	239 i)	-

a) Kg. of Malathion 50%. In 1975, 8,007 kg. of BHC were also used. In 1976, 100,000 kg. of Carbaril will be used. b) Lts. of Abate. In 1975, 48.8 kg. of Clorfoxim were used.c) Lts. of Malathion 95%. d) In 1975, 218 Lts. of Propoxur 20% were used and in 1976 300 Lts. will be used.e) Lts. of Baytex 50%. f) Used up to October. g) In 1975 were used: 47,610 Lts. DDT-CE; 9,192 Lts. Baytex; 2,298 Lts. Lethane; 2,997 Lts. Malathion and 1,299 kg. BHC. In 1976 will be used: 65,000 Lts. DDT-CE, 19,175 Lts. Baytex, 3,000 Lts. Lethane, 4,200 Lts. Malathion and 4,000 kg. BHC. h) In 1975 and 1976 respectively: 1,700 and 2,100 Lts. Malathion; 2,077 and 2,700 Malathion ULV; 2,355 and 3,300 kg. Abate and 108 Lts. Dibron used in 1975. i) Includes 209 Lts. DLN/20% and 30 Lts. DLN/50%.

Table 14

COMPARATIVE RESULTS OF ACTIVE AND PASSIVE CASE DETECTION IN MALARIA PROGRAMS IN THE AMERICAS, 1975

Country or other political or administrative unit	Average number of evaluators	Active case detection			Passive case detection						Total	
		Blood slides			Average number of notification posts	Average of notification posts producing slides per month	Blood slides			Average of slides per month per productive notification post	Blood slides	
		Examined	Positive	Percent			Examined	Positive	Percent		Examined	Positive
Argentina	99	41 270	70	0.2	...	107	10 745	30	0.3	0.3	52 015	100
Bolivia	114	113 222	3 245	2.9	2 806	322	20 379	3 370	16.5	5.3	133 601	6 615
Brazil	4 107	1 954 497	30 081	1.5	27 952	12 299	663 258	58 549	8.8	4.5	2 617 755	88 630
Canada	-	-	-	-	-	-	...	49	-	-	...	49
Colombia	403	184 174	11 746	6.4	7 280	3 846	201 517	20 944	10.4	4.4	385 691	32 690
Costa Rica	84	163 393	157	0.1	6 466	80	3 421	133	3.9	6.7	166 814	290
Cuba	-	15 086	1	0.01	...	...	361 216	86	0.02	-	376 301	87
Dominican Republic	156	32 157	104	0.3	4 658	1 649	342 321	55	0.02	17.3	374 478	159
Ecuador	...	114 929	558	0.5	5 613	2 779	191 988	5 997	3.1	5.8	306 917	6 555
El Salvador	94	57 543	7 674	13.3	2 749	2 231	481 366	75 426	15.7	18.3	538 909	83 100
Grenada and Carriacou	-	-	-	-	-	-	24	1	4.2	-	24	1
Guatemala	159	213 711	1 333	0.6	5 564	2 679	205 038	3 646	1.8	6.4	418 749	4 979
Guyana	19	55 257	1 027	1.9	255	4	501	89	17.8	10.5	55 758	1 116
Haiti	59	160 926	7 020	4.4	...	3 236	186 008	17 713	9.5	4.8	346 934	24 733
Honduras	42	26 294	896	3.4	3 011	1 667	240 629	29 393	12.2	12.0	266 923	30 289
Jamaica	...	15 152	0	-	-	-	2 496	5	0.2	-	17 648	5
Mexico	799	1 442 169	12 528	0.9	58 652	5 871	363 613	15 397	4.2	5.2	1 805 782	27 925
Nicaragua	118	41 845	2 872	6.9	3 886	2 311	217 830	21 820	10.0	7.9	259 675	24 692
Panama	219	362 792	510	0.1	1 196	323	32 203	156	0.5	1.2	394 995	666
Paraguay	...	50 766	87	0.2	4 332	1 012	74 366	130	0.2	6.1	125 132	217
Peru	118	96 074	9 351	9.7	4 596	1 058	129 040	4 987	3.9	10.2	225 114	14 338
United States of America	-	-	-	-	-	-	221	333	-	-	221	333
Trinidad and Tobago	-	-	-	-	-	-	15 707	4	0.03	-	15 707	4
Venezuela	432	102 400	2 558	2.5	2 564	4 593	172 702	3 351	1.9	3.1	275 102	5 909
Antigua	-	-	-	-	-	-	...	1	-	-	...	1
Belize	11	17 641	58	0.3	119	20	1 475	32	2.2	6.1	19 116	90
Canal Zone	...	572	0	-	...	....	2 079	11	0.5	-	2 651	11
Dominica	-	-	-	-	-	-	334	3	0.9	-	334	3
French Guiana	...	12 954	70	0.5	32	26	2 296	249	10.8	7.4	15 250	319
Guadeloupe	-	-	-	-	-	-	...	1	-	-	...	1
Puerto Rico	-	-	-	-	-	-	...	1	...	-	...	1
St. Lucia	-	-	-	-	-	-	9	0	-	-	9	0
Surinam	30	52 226	828	1.6	81	13	27 101	1 913	7.1	173.7	79 327	2 741
Total	-	5 327 049	92 774	1.7	-	-	3 949 883	263 875	6.7	-	9 276 932	356 649

Table 15

PERSONNEL EMPLOYED IN THE MALARIA PROGRAMS IN THE AMERICAS
31 DECEMBER 1974 AND 1975

(Part-time personnel in parentheses)

Title	1974	1975
Engineers	112 (1)	112
Spraying Chiefs	314 (2)	322
Sector Chiefs	580	621
Squad Chiefs	2 538 (38)	2 357 (38)
Spraymen	10 449 (123)	11 077 (111)
Draftsmen	104	100
Physicians	194 (5)	191 (3)
Entomologists	60 (1)	57
Assistant Entomologists	174 (4)	167
Statisticians and Statisticians' Assistants	413	438
Evaluation Inspectors	1 188	1 611
Evaluators	7 018	7 109
Microscopists	793 (15)	1 011
Administrators	77	74
Administrative Assistants	678	711
Accountants	42	44
Disbursing Officers	69	52
Storekeepers	82	87
Storekeepers' Assistants	75	77
Secretaries	244	253
Others	714	811
Transport Chiefs, Mechanics and Assistant Mechanics	481	448
Drivers	979 (2)	1 022
Motorboat Operators	353 (2)	409
Boatmen	117	95
TOTAL	27 848 (193)	29 256 (152)

Table 16

MEANS OF TRANSPORT IN MALARIA PROGRAMS IN THE AMERICAS, 1975

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		Motorcycles		Bicycles		Motor boats		Boats without motor		Saddle and pack animals	Other	
	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b		a	b
Argentina	1	2	28	15	27	29	2	3	-	-	10	4	1	-	-	-	-	-	-
Bolivia	-	-	8	7	15	24	2	-	8	7	-	-	15	10	-	-	80	16	35
Brazil	44	-	242	5	771	15	8	-	5	-	472	-	358	-	7	-	1 182	-	-
Colombia	3	7	58	70	128	65	33	8	19	21	130	75	150	25	70	58	1 260	-	-
Costa Rica	1	-	10	1	19	-	2	-	26	12	35	10	35	15	-	-	40	-	-
Dominican Republic	1	-	41	11	2	-	7	-	143[a]	-	-	-	-	-	-	-	66	-	-
Ecuador	1	1	34	4	32	13	3	2	30	6	31	1	34	-	4	-	278	20	-
El Salvador	-	-	17	6	17	3	2	-	1	12	-	-	-	-	-	-	-	1	-
Guatemala	-	2	9	49	-	30	-	11	-	83	-	8	-	14	-	-	-	-	9
Guyana	-	-	-	-	6	2	-	-	3	-	4	1	9	-	5	-	5	-	-
Haiti	4	2	61	10	49	13	11	6	-	-	-	-	1	1	1	-	-	-	-
Honduras	2	-	18	10	20	9	9	1	6	30	-	-	2	1	-	-	84	-	-
Mexico	18	12	330	218	453	211	25	3	-	-	-	-	20	20	-	-	2 209	-	-
Nicaragua	2	1	26	1	29	1	39	1	20	-	-	-	18	-	21	-	-	-	-
Panama	-	3	19	8	12	12	3	7	-	23	20	-	47	24	-	-	-	35	59
Paraguay	2	-	24	8	5	-	15	-	155	29	43	7	21	-	-	-	-	28	13
Peru	-	2	14	30	-	9	-	12	30	9	30	9	2	61	-	-	-	-	-
Venezuela	12	-	146	-	123	-	40	-	18	-	321	-	138	-	-	-	715	90[b]	
Belize	-	-	5	-	7	-	-	1	-	-	-	1	5	1	-	-	-	-	-
French Guiana	1	-	-	-	2	2	2	1	-	-	-	-	6	3	3	-	-	-	-
Surinam	1	1	1	-	3	-	1	-	3	1	-	-	-	-	-	-	-	-	-
Total	93	33	1 091	453	1 720	438	204	56	467	233	1 096	116	862	175	111	58	5 919	190	116

a) Property of the users. b) Fogging machines and equipment for ULV.

Table 17

NATIONAL EXPENDITURES 1974-1975 AND BUDGET 1976 FOR THE MALARIA PROGRAMS IN THE AMERICAS

(In U.S. dollars)

Country or other political or administrative unit	National Expenditures 1974			Estimated National Expenditures 1975			National Budget 1976		
	Internal financing	Loans	Total	Internal financing	Loans	Total	Internal financing	Loans	Total
Argentina	1 680 665	-	1 680 665	1 664 829	-	1 664 829	...	-	...
Belize	71 431	-	71 431	75 595	-	75 595	102 712	-	102 712
Bolivia	440 615	-	440 615	448 470	-	448 470	687 094	-	687 094
Brazil	16 110 219	-	16 110 219	41 792 591	-	41 792 591	26 755 587[a]	-	26 755 587[a]
Colombia	2 699 090	-	2 699 090	3 026 666[b]	-	3 026 666[b]	3 463 788[c]	545 454	4 009 242
Costa Rica	798 862	-	798 862	716 641[b]	-	716 641[b]	581 444[c]	-	581 444[c]
Dominican Republic	779 580	-	779 580	779 580	-	779 580	779 580	-	779 580
Ecuador	1 697 466	540 000	2 237 466	1 923 963	360 000	2 283 963	3 200 000	-	3 200 000
El Salvador	2 086 877		2 086 877	2 508 036	-	2 508 036	3 121 200	-	3 121 200
French Guiana	980 550	-	980 550	980 550	-	980 550	...	-	...
Guatemala	2 456 893	-	2 456 893	2 642 000[d]	-	2 642 000[d]	2 810 785[d]	-	2 810 785
Guyana	55 697	-	55 697	96 424	-	96 424	121 568	-	121 568
Haiti	131 000	-	131 000	300 000	-	300 000	500 000	-	500 000
Honduras	852 744	-	852 744	1 001 288	-	1 001 288	1 054 204	-	1 054 204
Mexico	18 010 483	-	18 010 483	21 598 480	-	21 598 480	25 807 876	-	25 807 876
Nicaragua	2 895 463	-	2 895 463	2 612 857	-	2 612 857	2 977 000	-	2 977 000
Panama	1 448 928	-	1 448 928	1 659 789	-	1 659 789	1 991 130	-	1 991 130
Paraguay	728 387	85 063	813 450	939 921	-	939 921	1 245 079	-	1 245 079
Peru	1 391 681	-	1 391 681	2 118 422	-	2 118 422	2 118 422	-	2 118 422
Surinam	557 062	-	557 062	593 220	-	593 220	592 090	-	592 090
Venezuela	7 568 545	-	7 568 545	13 465 474	-	13 465 474	13 938 139	-	13 938 139
Total	63 442 238	625 063	64 067 301	100 944 796	360 000	101 304 796	91 847 698	545 454	92 393 152

a) Does not include São Paulo State budget. b) Expenditures up to November. c) Six months budget. d) Includes A. aegypti campaign.

Table 18

ESTIMATED REQUIREMENTS FOR MALARIA PROGRAMS
IN THE AMERICAS

	1975[a]	1976[b]	1977[b]	1978[b]
TOTAL COST	104 612 061	95 603 731	-	-
GOV. AND OTHER SOURCES	102 354 796	93 338 152	...	...
PAHO/WHO PORTIONS:				
Personnel costs and travel	1 964 726	1 949 125	1 969 840	2 079 915
Supplies and equipment ...	237 087	267 065	345 790	349 905
Fellowships	22 434	18 700	30 900	36 320
Grants and others	33 018	30 689	29 000	29 000
TOTAL	2 257 265	2 265 579	2 375 530	2 495 140

SOURCES OF PAHO/WHO FUNDINGS

SOURCE	1975[a]	1976[b]	1977[b]	1978[b]
PAHO-Reg.....	1 259 296	1 372 605	1 246 890	1 346 225
PAHO-PG.....	7 751	1 189	-	-
OMS-Reg.....	990 218	891 785	1 128 640	1 148 915
TOTAL	2 257 265	2 265 579	2 375 530	2 495 140

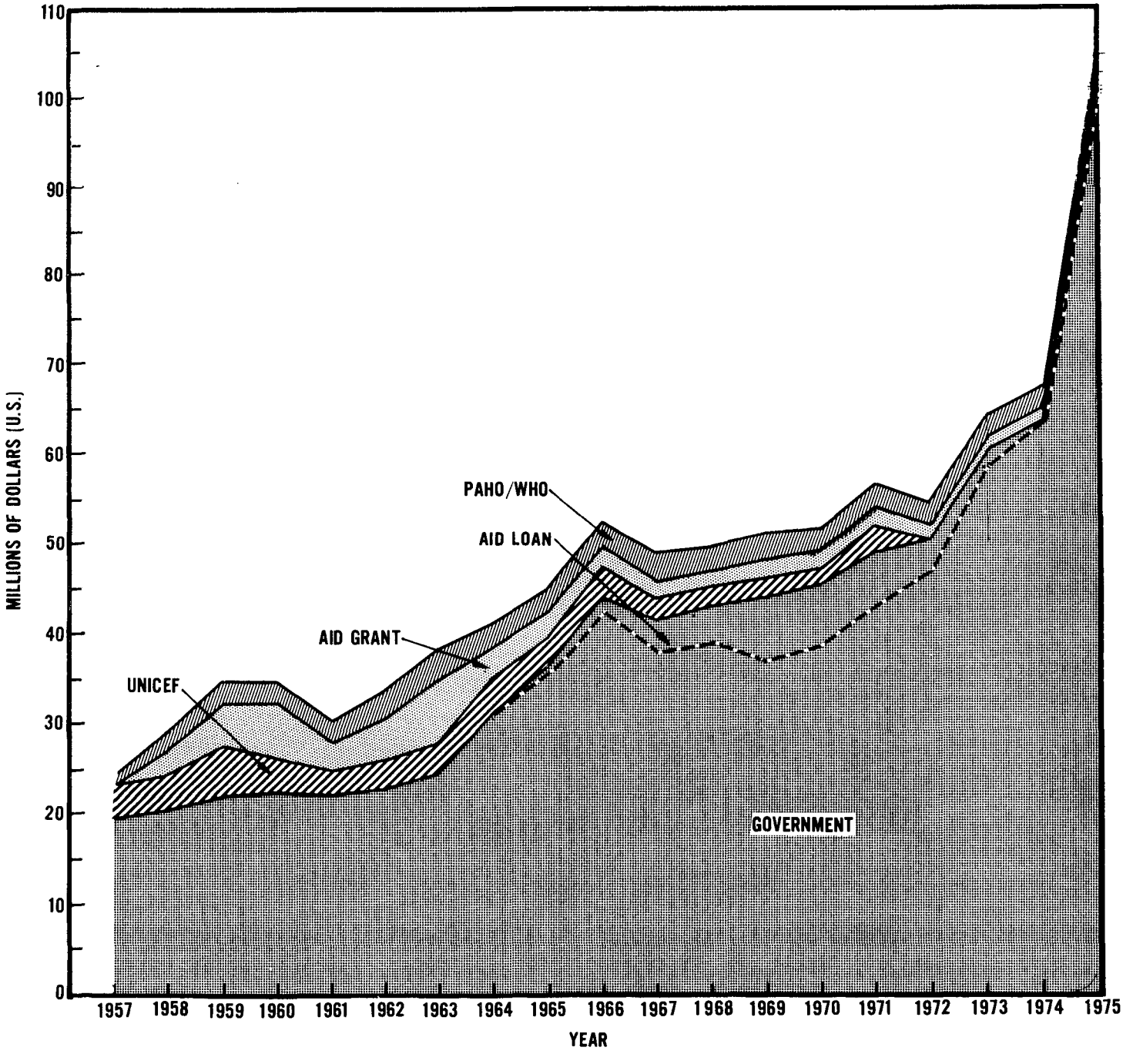
PAHO/WHO PERSONNEL

CATEGORY	1975[a]	1976[b]	1977[b]	1978[b]
Medical Officer.....	20	19	16	16
Sanitary Engineer	7	6	6	5
Entomologist	5	7	6	6
Parasitologist	2	2	1	1
Epidemiologist	2	2	2	2
Economist	1	1	1	1
Administrative Office	1	2	1	1
Laboratory Adviser	1	-	-	-
Sanitary Inspector	17	15	14	14
Other	9	6	6	6
TOTAL	65	60	53	52

a) Expenses.
b) Estimated requirements.

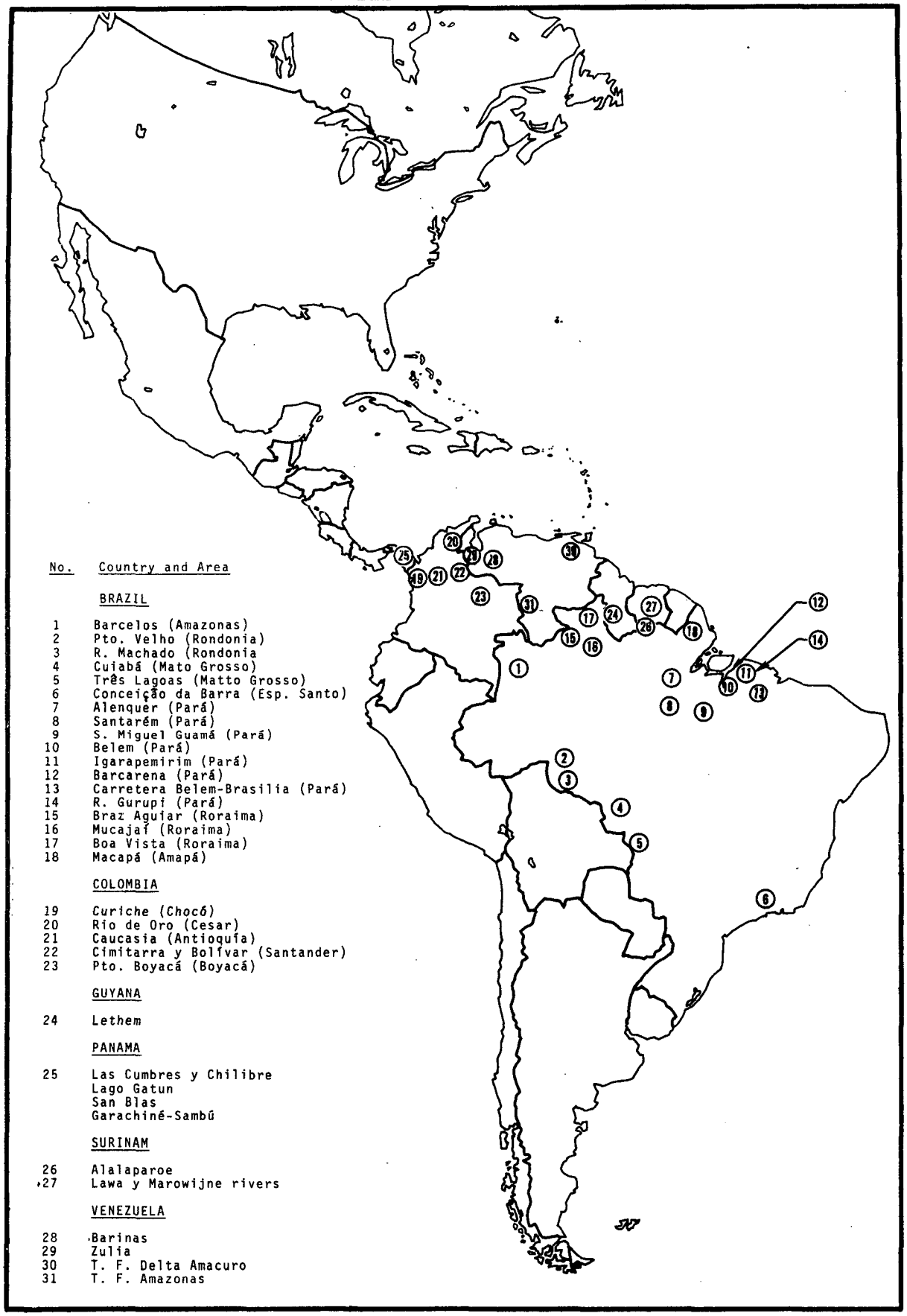
GRAPH 1

MALARIA PROGRAM EXPENDITURES, 1957–1975



MAP 3

AREAS WHERE CASES OF FALCIPARUM RESISTANT TO 4-AMINOQUINOLINES HAVE BEEN NOTIFIED



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

Map 4

GEOGRAPHICAL DISTRIBUTION OF AREAS OF TECHNICAL PROBLEMS

(SHOWN IN TABLE NO. 19)

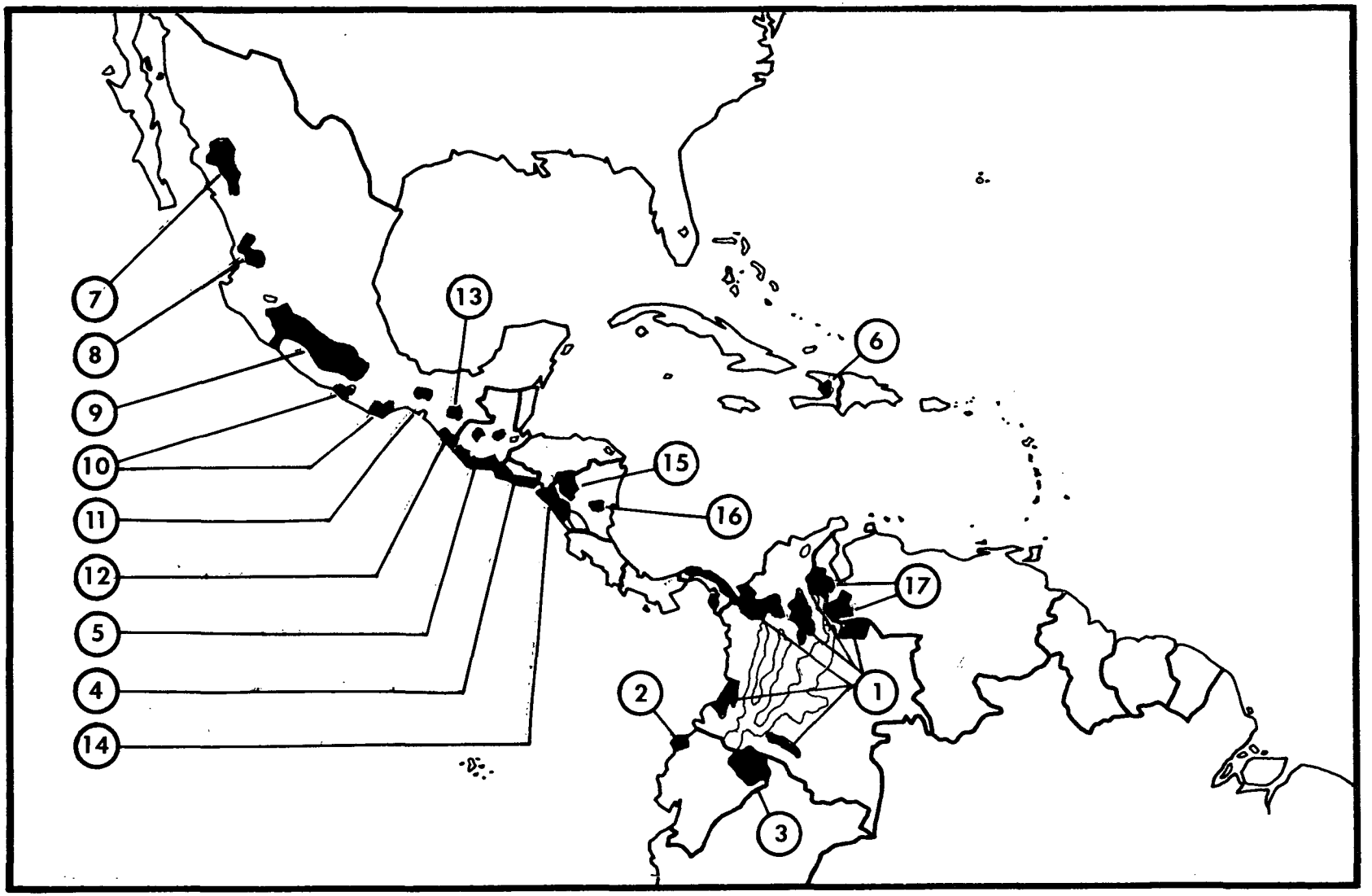


Table 19

GEOGRAPHIC DISTRIBUTION OF AREAS OF MALARIA TRANSMISSION WHERE PROGRESS DEPENDS ON APPLICATION OF NEW ATTACK MEASURES TO SOLVE TECHNICAL PROBLEMS, 1975

Countries and Areas	Population of Affected Areas	Area Involved (Km^2)	Insecticides Used		Principal Vectors	Causes of the Problem
			Type Used	Years of Coverage		
Colombia						
1. Caribbean Coastal Zone, Magdalena River, Pacific Coastal Zone, Catatumbo Eastern Slope of Eastern Mountains, Alto Caqueta, Sarare	745 367	105 925	DDT	10-16	A. darlingi A. punctimac. A. nuñeztovari A. albimanus A. pseudopunc. A. nelvae A. albitarsis	Vector behavior; poor housing; colonization; social problems; parasite resistance to chloroquine; refusal to spraying
Ecuador						
2. Esmeraldas 3. Napo	282 100	40 583	DDT	8	A. punctimac. A. albimanus	Colonization; poor housing
El Salvador						
4. Coastal Area	922 777	7 689	DDT Propoxur	17 5	A. albimanus	Vector resistance to DDT and Propoxur
Guatemala						
5. Pacific Coastal Zone, Eastern Central Zone, Northern Zone	1 427 635	36 981	DDT Propoxur	17 5	A. albimanus A. pseudopunc. A. vestitipenn.	Vector resistance to DDT; colonization
Haiti						
6. Cite Simone O.Duvalier, Jackmel, Valle de la Coma, Gross-Morne, Southeast area, Petir-Goave, Nois Neuf	466 540	3 645	DDT	12	A. albimanus	Vector resistance to DDT; movement of people
Mexico						
7. Basins of Rivers Fuerte Sinaloa, Humaya and Tamazula 8. Huicot 9. Basin of Balsas River 10. Costa Chica of Guerrero and Oaxaca Coastal Zone 11. "El Istmo", Northeastern Slope of the Golf of Mexico, Oaxaca State 12. Tapachula-Suchiate 13. Central part of Chiapas	2 913 480	162 547	DDT	18	A. albimanus A. pseudopunct.	Internal migration; poor housing; temporary shelters and modification of houses; vector resistance to DDT; actions that remove insecticides from surfaces
Nicaragua						
14. Pacific Coast 15. Central Region 16. Atlantic Region, Zelaya	1 686 891	30 138	DDT Malathion Propoxur	16 5 5	A. albimanus	Vector resistance to DDT, Malathion and Propoxur
Venezuela						
17. Western Area	419 351	19 738	DDT	25	A. nuñeztovari A. darlingi	Vector exophily; population movement; colonization; refusal to permit spraying; poor public cooperation
T O T A L	8 864 141	407 246				

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.

Table 20

DRUGS PROVIDED BY PAHO/WHO TO THE MALARIA PROGRAMS IN THE AMERICAS, 1958-1975

(In thousands of tablets)

Country or other political or administrative unit	Total 1958-1974[a]								1975					
	Chloroquine 150 mg.	Primaquine		Pyrimethamine 25 mg.	Combined drug (b)	Aspirin		Fanasil	Chloroquine 150 mg.	Primaquine		Pyrimethamine 25 mg.	Combined drug (b)	Fanasil
		15 mg.	5 mg.			0.50 gr.	0.20 gr.			15 mg.	5 mg.			
Argentina	2 018	399	222	712	-	-	-	-	-	-	-	-	-	-
Bolivia	9 620	1 425	691	858	620	200	-	13	200	50	-	2	50	1
Brazil	131 535	2 144	1 052	305	2 303	-	-	249	2 000	30	27	40	184	47
Colombia	32 395	2 643	830	6 649	11 592	100	20	339	1 000	40	-	-	-	163
Costa Rica	6 994	1 153	487	213	1 385	227	81	-	300	50	30	-	-	-
Cuba	4 350	38	69	80	-	-	-	-	-	-	-	-	-	-
Dominican Republic	14 230	91	225	847	306	10	10	-	-	-	-	-	-	-
Ecuador	14 686	1 136	266	430	1 013	-	-	-	250	20	5	-	-	-
El Salvador	19 905	965	915	128	2 070	-	-	-	500	17	8	-	-	-
Guatemala	18 333	1 292	366	127	8 049	200	50	2	400	-	25	-	-	-
Guyana	987	269	99	338	-	30	-	25	-	-	-	-	-	-
Haiti	12 420	102	5	1 480	31 608	-	-	-	750	-	-	-	-	-
Honduras	15 690	2 024	1 275	88	1 290	-	-	-	381	140	35	-	-	-
Jamaica	879	18	-	288	50	-	-	-	-	-	-	-	-	-
Mexico	80 916	10 936	15 372	10 679	5 442[c]	-	-	-	1 000	300	-	-	1 010[c]	-
Nicaragua	13 109	2 538	2 155	156	6 933	-	-	-	740	140	-	-	-	-
Panama	6 660	1 046	533	462	1 787	-	-	28	120	-	50	43	-	30
Paraguay	11 962	256	118	71	76	-	-	11	350	-	-	3	-	3
Peru	25 256	1 639	733	2 800	4 089	433	40	-	200	50	25	23	-	-
Trinidad and Tobago	815	940	419	121	400	112	20	-	25	21	7	6	-	-
Belize	562	67	97	6	22	61	79	-	41	15	10	-	-	-
Canal Zone	-	-	-	-	90	-	-	-	-	-	-	-	-	-
Dominica	90	1	1	45	-	40	-	-	-	-	-	-	-	-
French Guiana	388	223	47	41	48	-	-	5	70	70	-	5	-	5
Grenada	43	-	-	45	-	20	-	-	-	-	-	-	-	-
St. Lucia	68	1	-	70	-	36	-	-	-	-	-	-	-	-
Surinam	3 105	444	193	886	265	128	10	10	300	245	120	-	-	5
Total	427 016	31 790	26 170	27 925	79 438	1 597	310	682	8 627	1 188	342	122	1 244	254

a) During this period, Chloroquine, Primaquine powder and Tricalcium phosphate have been provided to different projects.
b) Chloroquine/Primaquine combined (adult and infant size), c) Includes 160,000 Tabs. Daraclor (Chloroquine/Pyrimethamine combined).

Table 21

PAHO/WHO TECNICAL STAFF ASSIGNED TO MALARIA PROGRAMS IN THE AMERICAS
FROM 1973 TO 1976

Country or other political or administrative unit	Medical Officers				Sanitary Engineers				Sanitary Inspectors				Entomologists				Others			
	1973	1974	1975	1976	1973	1974	1975	1976	1973	1974	1975	1976	1973	1974	1975	1976	1973	1974	1975	1976
Bolivia	1	1	1	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-[a]	-[b]	-[c]
Brazil	4	3	3	2	2	1	2	1	-	-	-	-	1	-	-	-	-	3[a]	2[b]	1[c]
Colombia	1	1	1	1	-	-	-	-	3	2	3	3	-	1	1	1	-	-[c]	-[c]	-[c]
Costa Rica	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1[c]	1[c]	1[c]
Dominican Republic	1	-	-	-	-	-	-	1	-	1	1	-	-	-	-	-	-	-	-	-
Ecuador	1	1	1	1	-	-	-	-	1	2	2	2	-	-	-	-	-	-	-	-
El Salvador	1	1	1	1	1	1	1	-	1	1	1	1	1	1	1	1	-	-	-	-
El Salvador-0201	-	1	1	-	-	-	-	-	-	2	2	-	-	2	2	-	-	-	-	-
Guatemala	1	-	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	1[d]	1[d]	1[d]
Guyana	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Haiti	2	1	-	-	-	-	-	-	1	1	3	3	-	-	-	-	-	-	2[e]	2[e]
Honduras	1	1	1	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-
Mexico	1	1	1	1	1	1	1	1	-	-	-	-	1	-	-	-	-	-	-	-
Nicaragua	2	1	1	1	-	-	-	1	1	-	1	1	1	-	-	-	-	-	-	-
Panama	1	-	-	-	1	1	1	1	-	1	1	1	-	1	1	1	-	-	-	-
Paraguay	1	1	1	1	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Peru	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Belize	-	-	-	-	-	-	-	-	1	1	1	1	-	-	-	-	-	-	-	-
Surinam	-	-	-	-	-	-	-	-	1	-	1	1	-	-	-	-	-[f]	-[g]	-[g]	-[h]
DMP HQS and AMRO projects	11	6	5	6	1	1	1	1	2	-	-	2	2	-	-	4	5[f]	1[g]	1[g]	2[h]
Total	31	21	20	19	9	6	7	6	14	12	17	15	6	5	5	7	5	6	7	7

a) One parasitologist, one assistant engineer and one laboratory adviser. b) One parasitologist and one laboratory adviser.
c) Parasitologist. d) Administrative methods officer. e) Epidemiologists. f) One economist, one statistician, two administrative methods officers and one laboratory adviser. g) Economist. h) One economist and one administrative methods officer.

Table 22

INTERNATIONAL CONTRIBUTIONS TO MALARIA PROGRAMS IN THE AMERICAS
1975 AND ESTIMATED 1976

(U.S. dollars)

Country or other political or administrative unit	Date of initiation of total coverage	1975			1976 (estimated)		
		PAHO	WHO and WHO/TA	AID (USA) (fiscal year)[a]	PAHO	WHO and WHO/TA	AID (USA) (fiscal year)[a]
Argentina	Aug. 1959	7 141	-	-	5 000	-	-
Bolivia	Sep. 1958	33 737	-	-	46 080	-	-
Brazil	Aug. 1959	247 837	56 599	-	184 255	58 880	-
Colombia	Sep. 1958	189 797	-	-	224 970	-	-
Costa Rica	Jul. 1957	45 506	43 309	-	13 305	47 100	-
Dominican Republic	Jun. 1958	-	21 074	-	36 225	-	-
Ecuador	Mar. 1957	102 117	-	-	98 610	-	-
El Salvador	Jul. 1956	27 173	104 619	-	5 500	77 000	-
El Salvador-0201 ..	-	65 864	177 271	-	-	-	-
Guatemala	Aug. 1956	95 130	37 760	-	7 850	24 695	-
Guyana	Jan. 1947	-	-	-	44 710	-	-
Haiti	Jan. 1962	96 995	-	1 050 000	174 790	-	945 000
Honduras	Jul. 1959	-	72 718	-	-	-	-
Mexico	Jan. 1957	50 243	40 989	-	78 420	39 000	-
Nicaragua	Nov. 1958	20 156	42 497	-	46 870	48 500	-
Panama	Aug. 1957	30 797	71 502	-	29 500	72 970	-
Paraguay	Oct. 1957	33 781	-	-	48 060	-	-
Peru	Nov. 1957	48 069	-	-	40 410	-	-
Belize	Feb. 1957	28 247	-	-	37 645	-	-
French Guiana	Sep. 1963	1 481	-	-	5 000	-	-
Surinam	May 1958	-	46 779	-	-	41 840	-
Inter-country projects and general services		142 976	275 101	-	246 594	481 800	-
Total		1 267 047	990 218	1 050 000	1 373 794	891 785	945 000

a) AID loans shown in Table