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# STATUS OF MALARIA PROGRAMS IN THE AMERICAS

## XXXII REPORT

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# STATUS OF MALARIA PROGRAMS IN THE AMERICAS

## XXXII REPORT

## INTRODUCTION

The objectives of the Malaria Program in the Americas are to prevent and control the disease and reduce its incidence to levels compatible with the social and economic development of the countries of the Region, prevent epidemics and interrupt transmission wherever technically and financially possible. Both Member Governments and the Organization consider malaria a high-priority problem.

Anti-malaria activities during 1983 consisted essentially of the following: a) strengthening of epidemiological surveillance to prevent the re-establishment of the disease in countries and territories where transmission had been interrupted; b) treatment of cases to prevent deaths and reduce morbidity and consequent human suffering; c) formulation of criteria and rules for the stratification of malarious areas according to their different ecological, social, epidemiological and operational variables in order to facilitate the rational use of technical sources; d) training of human resources needed for prevention and control activities; e) promotion and support of basic and operational research with a view to developing more effective methods of control and better instruments for diagnosis, evaluation and epidemiological surveillance; and f) promotion of inter-agency coordination and financing machinery.

In 1983, the control activities in most of the countries of the Region continued to be based on residual spraying with insecticides, particularly DDT, although there was an appreciable drop in the use of DDT compared with past years owing to its being replaced by other types of insecticide, the adoption of measures to eradicate the vector in the larval stage, or because of lack of funds to purchase DDT.

Antimalarial drugs also continued to be used on a large scale both in presumptive treatment, and radical cure.

Although the number of cases registered in 1983 was greater than in previous years, the medium-term objectives of the Program were partially achieved, namely, prevention of the re-establishment of malaria in some countries and reduction of morbidity in others. In 15 countries, it was possible to halt the deterioration that had been observable for many years. However, in general, the number of cases registered in 1983 was again the highest in more than two decades. In three countries alone -Brazil, Colombia and Ecuador- there was an increase of more than 100,000 cases compared with 1982. Inadequate financing to meet the steep rise in operational costs was combined with equally important technical problems, such as the resistance of the vectors to insecticides in Central America and of P. falciparum to antimalarial drugs in South America.

# I. PRESENT STATUS OF MALARIA ERADICATION PROGRAMS

## A. General Information

Although there has been a steady deterioration in the malaria situation in nearly all the countries of the Region over the last five years, 14 countries with areas in the attack phase were able to halt that trend or even show signs of improvement in 1983. The number of cases registered in 1983 was the highest since 1958, as can be seen in Table I. The 829,727 cases registered, represented an increase of 16.0% over the previous year (715,177). The difference between the figures for the last two years was mainly due to the increase in the number of cases in Brazil, Colombia, Ecuador and Mexico.

The number of blood slides examined in 1983 was 8% higher than in 1982 (690,000 more). The annual blood examination rate (ABER) was 3.77% (see Graph 1).

If the malaria situation in the Americas is considered by sub-region, the picture is as follows:

In the Caribbean sub-region, transmission was confined to the Island of Hispaniola --Haiti and the Dominican Republic-- where all the cases were due to P. falciparum . In the Dominican Republic most of the cases were detected in areas classified by the Program as being in the maintenance phase, a sign that transmission has been re-established. There was, nevertheless, a slight decline in the number of cases in both countries; the decline was greater in Haiti, where 11,400 fewer cases were registered than in 1982.

In Cuba, all the cases detected were classified as imported from abroad.

As to the countries of the North American sub-region, transmission persists only in Mexico, where the upward trend continued. In 1983, the relative increase was substantial, 48.4% (24,179 more cases than in the previous year). The number of cases dropped slightly in the United States of America and there were no autochthonous cases.

There was some progress also in Central America and Panama, which is remarkable considering the political and social situation through which the sub-region has been passing in the last few years. The number of cases declined in four countries (El Salvador, Guatemala, Honduras and Nicaragua), which together registered 56,816 fewer cases than in 1982. There was a slight increase in Panama, and in Costa Rica the number was more than double the 1982 figure. In Belize, the increase in the number of cases was small in absolute terms but compared with the size of the population, the situation was worst in the whole Region, with an annual parasite incidence (API) of 28.8‰). Guatemala came next, with an API of 21.33‰, as can be seen in Table 7. The

number of blood slides examined in Belize was very large, (ABER=20.6%) also in Panama, Costa Rica, Guatemala and Nicaragua, where the ABER was more than 10%.

In the Andean sub-region (Bolivia, Colombia, Ecuador, Peru and Venezuela, there was a serious deterioration in all the countries. In Ecuador, where 14,633 cases were registered in 1982, the figure rose to 51,606 in 1983, an increase of over 250%. This was an increase of practically epidemic proportions and was due to the serious ecological problems encountered during 1982-1983 in the absence of adequate preventive measures to deal with them. For the first time in its history, Colombia registered more than 100,000 cases; the number of cases in Bolivia was more than double the 1982 figure and in Peru there was an increase of 39%. In Venezuela also, the number of cases registered was higher than in 1982.

In eastern South America (which includes Brazil, French Guiana, Guyana and Suriname), the upward trend in the number of cases which has been apparent for some time, continued only in Brazil, particularly in the Amazon basin. There was a slight increase in the number of cases in Guyana and a slight decline in French Guiana and Suriname. In Brazil, the number of cases rose from 221,939 in 1982 to 297,687 in 1983, with a slide positive rate (SPR) of 10.3% and an API of 5.35%o. In South America the largest number of P. falciparum cases was registered in Brazil (143,832), Colombia (47,615) and Ecuador (16,513), see Table 7.

The two countries of the La Plata basin where transmission has not been interrupted are Argentina and Paraguay. There was no change in the situation in those two countries. Paraguay succeeded in bringing the number of cases down from 66 to 49, with an API of 0.02%o, and Argentina from 567 to 535, with an API of 0.15%o.

The classification of the malaria programs by phases (attack, consolidation and maintenance) was used as part of the eradication strategy and it continued to be used in 1983 to facilitate comparisons with previous years. See Table 2.

In 1983, the population in the maintenance phase rose to 119.1 millon (47.8%); in the consolidation phase to 66.9 million (26.9%) and in the attack phase to 63.2 million (25.3%). With the exception of Belize, where the population in the consolidation phase was returned to the attack phase, and Brazil, where 160 municipios with a population of 3,694,382 and an area of 366,400 $km^2$ moved from the attack to the consolidation phase, there was no change in population or areas compared with 1982 (see Tables 3 and 4).

In the III Meeting of Directors of National Malaria Eradication Services (March 1979), the countries were classified according to the progress achieved up to 1978 and were divided into four groups on the basis of the development of transmission, the problems encountered and the resources available for malaria activities. This classification is still considered

useful, but Group II has to be subdivided and there must be further annotation in others. Table 5 summarizes the malaria situation observed over the first five years in the countries grouped according to this classification.

Group I. This comprises 12 countries or territories where malaria eradication was already certified in 1978. The population of this group of countries or territories was 75.0 million in 1983, or 30.1% of the total for the original malarious area. During the year there was no change in the situation in this group, where 810 cases were registered, 162 fewer than the previous year.

Group II. This group consists of eight countries or territories with a total population of 15.9 million, 6.4% of the original malarious area. Transmission was once interrupted or reduced to insignificant levels in all these countries. However, owing to the appearance of imported cases from neighbouring countries, it has been necessary to maintain surveillance to prevent the re-establishment of transmission. It has sometimes been possible to eliminate the residual foci or the outbreaks due to imported cases, but in other cases it has been impossible to prevent the re-establishment of transmission, with the result that the progress achieved in earlier years has been wiped out. As can be seen in Table 5, this group has been divided into two sub-groups, in which the present situation is as follows:

Sub-group A. Argentina, Costa Rica, Panama and Paraguay have been able to maintain the favorable situation since 1979. Although imported cases have continued to appear, transmission has never been re-established. In spite of the autochthonous cases that were reported, the risk of infection has been eliminated in those countries, leaving no residual foci of transmission. On the other hand, in French Guiana, which also belongs to this sub-group, the number of cases rose from 769 in 1981 to 1,143 in 1982 and in 1983 only 1,051 cases were registered.

Sub-group B. The situation has been deteriorating in Belize since 1979 owing to the re-establishment of transmission in many areas where it had been interrupted. In Guyana, there were fewer cases in 1982 than in 1981 but the number rose again in 1983. In the Dominican Republic the total number of cases dropped from 4,654 in 1982 to 3,801 in 1983.

Group III. This group comprises five countries with a population of 112.5 million, which is 45% of that of the original malarious area. Transmission in the areas in the attack phase has increased since 1979, but there has been no significant change in the consolidation and maintenance phases areas. A pronounced increase in malaria cases was observed in Brazil, due to outbreaks in parts of the Amazon region which are being settled. In Ecuador, in the Province of Esmeraldas where 40% of the cases originated, the foci grew larger. There was a considerable increase in the number of cases in Mexico. The number of cases almost doubled in Venezuela, although only a small number of blood slides was examined. Suriname continued to have

operational problems in 1983, with its mobile teams in the interior and there were frequent interruptions of malaria activities. In view of this fact, the health authorities decided to transfer the responsibility for the operations to the Medical Mission of the Interior (MEDIZEBS), which was able to continue the field work thanks to the good network of health services it has in the areas.

Group IV. The eight countries in this group have a total of 3.1 million $Km^2$ and a population of 45.8 millon. The situation has deteriorated as a result of the economic and social crisis and of far-reaching social changes. It is out of control in some areas, and half the cases in this group are concentrated in only three countries: El Salvador, Guatemala and Honduras. Nevertheless, 25,636 fewer cases than in 1982 were registered in the countries from this group in 1983. The number of cases has risen alarmingly in Colombia and Bolivia, although the malaria epidemiological indicators were low, particularly in Colombia.

Table 6 shows the overall results of case detection by phase of program. Table 7 presents the results for 21 countries with active malaria programs, giving the species of the parasites discovered and the epidemiological indicators: Brazil was the country in which the largest absolute number of blood slides was examined, together with Colombia and Mexico. Suriname had the highest annual blood examination rate (20.8%), followed by Belize and Panama; the largest slide positive rates were found in El Salvador, Colombia and Haiti. The countries with the largest number of P. falciparum cases were Brazil, Haiti and Colombia; and the highest annual parasite incidence (API) was recorded in Belize, Guatemala and French Guiana.

Table 8, 9, 10 and 11 show the number of slides examined and the number of positives by specie for each phase of the Program.

The results of active and passive case detection are shown below and the distribution by type of detection in each country of the Region is shown in Table 12.

| BLOOD SLIDES | TYPE OF DETECTION | | |
|---|---|---|---|
| | ACTIVE | PASIVE | TOTAL |
| EXAMINED | 4 265 895 | 5 126 808 | 9 395 703 |
| PERCENTAGE | 45.4 | 54.6 | 100.0 |
| POSITIVE | 128 438 | 701 289 | 829 727 |
| PERCENTAGE | 15.5 | 84.5 | 100.0 |

B. Field Operations

Reliance on residual insecticides alone in antimalarial operations has been steadily declining in recent years. However, spraying was the principal antimalarial measure used by the 21 countries in areas in the attack phase. DDT continued to be the most frequently used insecticide (See Table 13).

The trend towards diversification of the malaria control measures originally introduced, has continued, particularly in countries with vector resistance problems, some of which have prohibited the use of certain chemicals for ecological and other reasons, while others have done so because they have administrative and financial difficulties in purchasing these products from abroad.

There was a substantial reduction in DDT sprayings in 1983 and the number of sprayings recorded --3,629,088-- was the lowest in the last 10 years, as can be seen from the following figures:

| Year | Sprayings with DDT |
|---|---|
| 1974 | 14,270,027 |
| 1975 | 13,532,982 |
| 1976 | 11,347,781 |
| 1977 | 9,751,636 |
| 1978 | 9,098,629 |
| 1979 | 9,401,860 |
| 1980 | 9,166,577 |
| 1981 | 7,525,467 |
| 1982 | 4,541,133 |
| 1983 | 3,629,088 |

Table 14 shows the amounts of insecticides used in 1983, by country, and Table 15 the sprayings in the Region, from 1980 to 1983. There has been an increase in spraying with alternative insecticides in the last few years, especially with Fenitrothion, which was used in more than a million sprayings in 1983. On the other hand, there was a steep drop in the sprayings with Propoxur, the number fell from 85,848 in 1982 to under 12,000 in 1983. Neither El Salvador nor Haiti used DDT for malaria control, preferring to use Fenitrothion instead.

Deltametrine, a synthetic Piretrine with a powerful residual effect, has been used experimentally in Guatemala and Nicaragua. They have also been using Chlorphoxim.

Eight political units -Bolivia, Ecuador, El Salvador, Guayana Francesa, Haiti, Honduras, Mexico and Nicaragua- have been using larvicides as a control measure for the protection of 4 million persons. Haiti protected an area with

a population of 42,600 by the use of larvivorous fish. In El Salvador and in 494 localities of Mexico, sanitary engineering works were used for control. El Salvador reported that it had been spraying with pyrethroid at ultra-low volume in an area of 353 $km^2$ with a population of 60,000.

Antimalarial drugs were used for control measures in eight countries. They were used on the largest scale in El Salvador, for the protection of 576,349 persons, in 1983. Antimalarial drugs were also used on a larger scale in Colombia, Ecuador, Guatemala, Haiti, Honduras, Mexico and Nicaragua.

All the other countries of the Region also used antimalarial drugs for the presumptive treatment of fever cases and the radical treatment of proved malaria cases. Table 16 shows the drugs used in 1983 and gives estimates for 1984 in the 21 countries of the Americas with active malaria programs. The total consumption of drugs in these countries from 1980 to 1983 is shown in Table 17.

Table 18 gives a summary by category of the personnel employed in the malaria programs in 1982 and 1983.

## C. Budget

Table 19 presents a summary of the funds used for the malaria programs of the Region, divided into national expenditures, PAHO/WHO contributions and international grants and loans. The funds are expressed in absolute values for each year. Conversion to United States dollars is based on the official exchange rate in each country and does not include corrections for units of constant purchasing power. Graph 2 shows the funds invested in the malaria programs between 1957 and 1983 by source.

## D. Country Information

### ARGENTINA

A relative small percentage of the malaria control measures planned for 1983 were actually carried out. Only 76.3% of the domiciliary spraying planned for the area still in the attack phase in the Province of Salta was actually done. It was necessary to apply 893 emergency sprayings to control an outbreak discovered outside the attack area.

Only 49% of the programmed household visits for case detection were made. The anual blood examination rate was 10.5% in the area in the attack phase.

In general, there were no changes in the malaria situation in this area, but there was a fresh outbreak at San Pedro, Province of Jujuy, which is in the maintenance phase. This outbreak produced 47.4% of the cases registered in 1983 (535). During the period under consideration, in-service

refresher courses were organized for all the field personnel and the II Intensive Malaria Training Course for Technologists, which was expanded to include vector control, was held with the support of PAHO.

BELIZE

Although there was only an 18.8% increase in the number of registered cases in 1983 compared with the previous year, and an increase of 15% in the malaria-positive localities, Belize had the highest annual parasite incidence in the Region. The number of P. falciparum infections rose by 31.2%.

The entire country, except for the city of Belize and a few neighbouring localities, had to be returned to the attack phase. One cycle of sprayings was done, covering only 44.9% of the target (17,000 cases). The sprayings were carried out in the districts of Corazal and Orange Walk and in the rural section of the district of Belize. The coverage of the epidemiological evaluation activities was 30%.

Although the Government has assigned a high priority to the Program, the resources available are too limited to meet requirements. Besides carrying out its technical cooperation activities, PAHO provided a grant for the purchase of the materials and equipment needed to give the national program a fresh start in 1984.

BOLIVIA

There was a serious deterioration in the malaria situation in Bolivia in 1983, the number of cases was nearly double the figure for 1982. The situation was most serious during the first six months of the year, when 9,058 cases were registered. The Program operated with financial support from USAID (Title III of Public Law 480).

DDT continued to be used as the principal antimalarial measure; it was used in a concentration of $2g/m^2$. In some selected localities, spraying was applied every three months. Chemical larvicides were used in anopheles breeding areas and some experiments were made with biological control.

The major problems encountered by the Program were due to cut-backs in funds and the decline in the purchasing power of the national currency. There were difficulties with administrative procedures, and political and social problems due to work stoppages and general strikes.

In the north (Province of Vaca Diez, Beni), there is an area where P. falciparum is resistant to Chroloquine and also to Sulfadoxin combined with Pyrimetamine. There are intense migratory movements between Brazil and Bolivia in the same region and official and unplanned settlement areas which are "not controllable".

BRAZIL

As a result of the evaluations made late in 1982, in 1983 Brazil transferred an area of 366,400 $km^2$ with a population of 3,694,382 from the attack phase to the consolidation phase. This area contains 160 municipios of the states of Piauí, Espirito Santo, Minas Gerais, Santa Catarina, Goiás and Mato Grosso do Sul which were "under observation" (attack phase with spraying suspended). Spraying was interrupted also in 48 other municipios with an area of 57,193 $km^2$ and a population of 500,214.

The sprayings dropped from 74.6% of coverage in the first cycle to 56.5% in the second because there was not enough DDT to reach the target. Case detection, on the other hand, rose to 122% of the planned program; 48.3% were discovered by passive detection, the method by which 89.1% of all cases were detected in Brazil.

There was no change in the upward trend in the malaria cases. In 1983 there was a 34.4% increase in the number of cases relative to the previous year. The API rose from 4.1‰ in 1982 to 5.3‰ in 1983. Nearly all the cases originated in the region of the Amazon (286,990). The API calculated on the basis of the population of this area alone was as high as 20.5‰ in 1983. There are 66 municipios contributed 230,777 cses, 80.4% of all cases detected in Amazonia and 77.5% of those detected in the country as a whole. Two thirds of the country's positives originated in the states of Pará and Rondonia.

This situation had repercussions on the so-called "short-term eradication" area, which was affected by the penetration of cases from Amazonia. The total number of positives, which was 7,289 in 1982, rose to 10,697 in 1983. Most of these cases were imported from other areas, but the number of autochthonous ones rose from 595 in 1982 to 1,386 in 1983.

In addition to the serious technical problems encountered in the Amazon region, the Program ran into administrative difficulties with respect to the admission of personnel and the acquisition of insecticides. It was possible to deal with some of these problems through the use of supplementary funds that were obtained for the Program. Brazil is continuing to channel the available resources to the priority areas of its malaria program, in an effort to make better operational use of the funds.

COLOMBIA

The malaria situation continued to be unsatisfactory in 1983. The 105,360 cases detected during the year correspond to an API of 5.8‰. Two thousand deaths were estimated to be due to malaria.

Colombia has initiated an epidemiological stratification of its malarious area, which is divided into high, medium and low risk areas. In 1983 more than 35,000 cases were registered in the Pacific Slope region which was the most affected, 85% of which were due to P. falciparum.

Seventy three per cent of the total cases were originated in areas where transmission persists, which have a population of 2.3 million. Some of the low risk areas in the Departments of Nariño, Cauca and Valle and the Intendencia of Casanare were seriously affected by imported cases.

The insecticide coverage was only 59.5% of what had been programmed, owing to lack of financial resources, late arrival of critical inputs, disturbances of public order and problems connected with the drug traffic.

In view of the serious deterioration in the situation, the Ministry of Health declared a state of emergency and decided to establish a health plan with priority for certain activities. With respect to malaria, the immediate and medium-term objective of the plan are to reduce morbidity in the malarious areas by 50%, eliminate mortality and pevent reinfection of the areas where transmission has been interrupted.

To achieve these objectives, a greater intrasectoral involvement in surveillance activities, through the Health Sections of the Departments, will be sought. The administration of the operational personnel will be decentralized and multisectoral activities with community participation in malaria programs will be encouraged.

COSTA RICA

There was no great changes in 1983 in the areas in the attack and consolidation phases. The API was 0.35‰ and the annual blood examination rate 17.2%. However, the number of cases detected (245) was more than twice the figure for the year before. As a result of intense migratory movements in the northern border area, there were outbreaks in some Cantons of the Provinces of Alajuela and Limon, which reported 138 and 60 cases, respectively. For this reason it was necessary to initiate monthly mass drug treatments to 6,695 persons in 34 localities and to strengthen the control measures in an area with about 2,300 refugees. 51 cases were detected among this group, which represented 21% of the total for the country.

Imported cases from five countries accounted for 61% of the total number registered in the country.

The Government continued to give high priority to the Program, for which it provided adequate financing. It was necessary, however, to draw on extraordinary funds to deal with the emergencies in the north.

DOMINICAN REPUBLIC

There was some improvement in the malaria situation in 1983. The total number of cases dropped from 4,654 in 1982 to 3,801 in 1983. All the cases detected were due to *P. falciparum*. The slide positive rate (SPR) and the annual parasite incidence (API) dropped by 36% and 21‰, respectively, from

1982 to 1983. There was an extraordinary allocation of resources from the funds provided under the bilateral cooperation program with the United States under Title III of Public Law 480, thanks to which the sprayings activities programmed could be carried out more completely. Fifty thousand dwellings in selected areas with a high incidence of malaria were sprayed, drainage work was done and channels were cleaned out in the frontier areas of Dajabon and Pedernales. There was a continued increase in the use of larvivorous fish for biological control.

Reseach into the socio-economic factors influencing malaria transmission continued, and studies on the use of serological diagnosis of malaria in the country were carried out in collaboration with the Universidad Autónoma de Santo Domingo.

The principal problems were connected, as previously, with the migratory movements in the border area, which are intense during the sugar cane harvest, when many workers from the neighbouring country are admitted and live in temporary shelters which favor the maintenance of transmission. It is estimated that about 19,000 workers from Haiti enter the country legally every year. Blood samples are taken from them and presumptive treatment are given, however, this cannot be done with illegal entrants. PAHO collaborated actively in the coordination of international meetings between the Dominican Republic and Haiti.

The first seminar-workshop using modules for the self-teaching of elementary malaria, epidemiology and control was held in Santo Domingo. The modules were prepared by PAHO and were aimed at training personnel of the general health services to participate effectively in malaria control.

ECUADOR

There was a serious deterioration of the situation in this country, when the number of cases rose from 14,633 in 1982 to 51,606 in 1983, an increase of 352%. An even greater increase was in the number of cases due to P. falciparum (411%). The principal foci of transmission is located in the Province of Esmeraldas, where 40% of the total cases detected were originated in 1983, although, in this area only 6% of the population of the malarious area lives. A process of deterioration and dispersal of cases from this foci to the Provinces of Manabi, Los Rios, Guayas and Cañar has been going on for the last two years as a result of migratory movements to localities that are not protected by insecticides. In 1983, more than 700 new localities of transmission were discovered, nearly all located in the area in the consolidation phase.

Ecuador suffered from a very prolonged rainy season, which caused serious flooding and losses of human lives, crops and dwellings and led to refugee movements. Unfortunately, the Malaria Service did not receive the funds required to remedy the situation, at least partially, until it was too

late. The supplies collected in response to the emergency (imported insecticides, donations, etc.) did not arrive in time, and transmission increased alarmingly. Efforts are being made to negotiate bilateral aid agreements which would ensure adequate financing for the Program for at least five years. The money would be used to resume a mass campaign to remedy the present situation, which may become progressively worse if it proves impossible to obtain the materials and equipment to ensure adequate coverage with control measures.

EL SALVADOR

The malaria situation improved slightly in 1983 compared with the previous year. However, malaria continues to be a serious health problem which is the fourth largest cause of morbidity in the country.

Antimalarial drugs have been used for control measures in areas where the vectors are multiresistant to insecticides, sometimes singly or in combination with other antivector control measures.

With the funds available, which have been used to apply the above-mentioned measures in priority areas, it has been possible to cover only 24% of what is called the "hyperendemic" area, which represents only 8% of the total malarious area.

FRENCH GUIANA

There was a decline in the number of cases from 1982 to 1983. The number of imported cases decreased to half compared with the previous year, as a result of a stricter control of foreigners entering the territory.

An outbreak at Remiere was detected early in the year, which was quickly brought under control. In the island of Cayenne, the situation deteriorated considerably in the course of the year. At the present time, only the urban area of Cayenne is still in the maintenance phase. An increase in housing construction near forest areas seems to have been partly responsible for the increase in transmission.

There was no improvement in the attitude of the bush Negroes, who are still refusing to cooperate with the Program.

GUATEMALA

The Malaria Service carried out control measures in the three ecological regions into which the country is divided. The measures consisted essentially of intradomiciliary sprayings with insecticides and radical treatment of malaria cases. The coverage of the northern zone was not so extensive as had been planned, because of social unrest. Case detection also suffered for the same reason. Spraying with a synthetic piretrine

("Deltametrine") was continued in the south part of this zone and Chlorfoxim was used in other areas where the vector is susceptible. In the rest of the country fenitrothion was used.

Although there were some problems, the number of cases fell by 17% compared with 1982 and the API also fell, from 26.34%o to 21.33%o. Nevertheless, Guatemala had the highest parasite incidence in the Region after Belize.

GUYANA

There was a drastic reduction of funds assigned to the Program in 1983, with the result that it was impossible to carry out the programmed activities. The number of cases detected rose in 1983, in spite of a sizable drop in the number of slides examined, which gives some idea of the seriousness of the problem. The gold miners of the Cuyuni river were the most seriously affected by the increase of transmission. Thanks to a relatively short rainy season in the Rupununi river area, it was possible to complete one cycle of sprayings with DDT, even though the sprayings began late. The dry weather may have contributed to relatively small number of P. falciparum cases compared with the number detected in the same area in 1982.

The principal problems encountered by the Program were connected, as usual with lack of transport; drugs were in short supply, particularly Primaquine. In addition, there were some personnel problems which led to a number of resignations and a general decline in the morale of the workers. Closer ties were established between the Malaria Service and the General Health Services in the course of the year; as a result, various malaria components were included in the personnel training programs of MEDEX and the Community of Health Workers. PAHO assigned an entomologist to the country.

HAITI

There was a slight decrease in the number of cases during the year (65,354 in 1982 compared with 53,954 in 1983). However, there has not been much change in the situation for the last five years. For the last two years, efforts have been concentrated on controlling malaria outbreaks, reducing the incidence and dealing with the serious cases encountered. Activities had to be curtailed because insufficient funds were assigned to the Program and the vector control could not be properly carried out. The sprayings for the first cycle, which were scheduled to begin in April, had to be interrupted owing to administrative problems. Two cycles of distribution of selective drugs and three cycles of sprayings with Fenitrothion were carried out. The effectiveness of different strenghts of this insecticide is being tested in various localities.

The available resources are used for priority activities aimed at improving malaria surveillance, encouraging general practitioners to use the

control strategies developed by the SNEM, improving the parasitological diagnostic capacity, trying to obtain more community cooperation and investigating some of the socio-cultural factors involved in transmission. Monitoring of the sensitivity of P. falciparum to Chloroquine continued throughout the year.

HONDURAS

Malaria activities were intensified in Honduras during 1983, as far as both coverage and the diversification of measures were concerned. However, administrative difficulties continued, particularly in connection with recruitment of personnel, which caused interruption of some activities and limited their effectiveness. Basic sanitation work aimed at controlling the vector during the larval stage was initiated in 1983. More five-days mass radical treatments was given. Sprayings with insecticides were carried out more regularly and the quality of the care provided by the volunteer collaborators of the Program improved.

The in-service information system was overhauled and modernized computerized data tabulation was introduced.

Personnel training and entomological work improved because of the increased funds assigned for this purpose.

The overall result of these activities was a decline in the total number of cases registered in 1983 compared with 1982 (37,536 and 57,482, respectively). The number of cases due to P. falciparum also declined throughout the country. The improvement was most obvious in the problem area of Choluteca, where sprayings with insecticides, antilarval measures and radical cure treatments were programmed and there was also satisfactory support from the voluntary collaborators in charge of the notification posts.

In the north of the country there is a refugee area with about 10,000 Miskito Indians where many malaria cases have been detected, for that reason, control measures have been reintroduced in the area, which had been left without coverage because of lack of funds.

MEXICO

The upward trend in malaria transmission continued in 1983. There was an increase of 24,000 in the number of cases in absolute figures, which represents 22% higher than in 1982. The number of P. falciparum cases also increased significantly, particularly in the southern border area, where migratory movements of population are coming from the Central American countries.

In 1983 the authorities decided to transform the National Malaria Eradication Campaign into a control program and gradually integrate this in

Public Health Services, in accordance with the Federal Government's policy of decentralizing the health services.

The principal ac'ivities continued to be the detection of malaria cases, parasitoscopic diagnosis and radical treatment of the cases detected, insecticides spraying in localities with cases, combined with larvicides and basic sanitation measures in some areas, and the entomo-epidemiological research being carried out at the Malaria Research Center in Tapachula.

Funds to meet all these needs were not enough, but it is expected that this problem will be solved with the establishment of malaria programs at State level with the participation of institutions from the health sector, including the Social Security.

NICARAGUA

The Government continued to give priority to the Malaria Program and it maintained its decision to achieve eradication. This made for a better organization of the Program at the central and popular levels.

The number of cases decreased slightly in 1983, a year in which transmission was kept at hypoendemic levels, particularly on the Pacific slopes where nearly 70% of the population lives.

The principal activities were intradomiciliary spraying, mass drug radical treatments and collective treatments in problem localities. Anti-larval measures and space sprayings (ULV) were carried out in selected areas.

The major problems Nicaragua had to face were vector resistance to insecticides, shortage of funds and materials, and difficulty in maintaining the continuity of the programmed activities, all of which are also faced in many countries of the region.

PANAMA

This country has brought the malaria situation well under control and there was no change in 1983. There were 334 and 341 cases in 1982 and 1983, respectively. Seventeen cases were detected in areas in the consolidation phase and the rest were found in the attack phase area. Of the 341 cases detected in 1983, 199 were classified as imported (187 from Colombia) and 132 autochthonous.

The attack measures consisted essentially of insecticides spraying, mainly DDT, but Fenitrothion was used also in an area of 25 $Km^2$ and Propoxur, in four-month cycles was used in an area of 11,083 $Km^2$.

PARAGUAY

There were no unfavorable developments in 1983; only 49 cases were detected, 30 of which were imported from abroad, including the 10 cases of P. falciparum detected.

Epidemiological surveillance was intensive. There is one special area that is still being sprayed, it has 24,000 houses and is located in two Departments near the border with Brazil where the influence of the Itaipu dam is felt.

The Government continued to give absolute priority to the malaria control activities, thanks to which it was possible to carry out all the programmed activities completely and at the proper time.

PERU

The General Health Services continued to be responsible for all malaria activities. There was a serious deterioration in the malaria situation in 1983, owing partly to the widespread flooding which affected large areas, especially in the north.

The total number of cases detected during the year was 28,563, an increase of 39% compared with 1982, when 20,483 cases were detected. It has been reported that the old areas in the consolidation and maintenance phases have been reinfected and that coverage with insecticide was low in the areas in the attack phase; this was due to a shortage of funds, which prevented adequate supplies of DDT in time.

An international multidisciplinary revision of the Program was undertaken in Peru, with the participation of PAHO, CDC and AID personnel. The International Committee recommended, inter alia, the restructuring of the Program and the establishment of a central unit at the national level for the normalization of all malaria activities, the decentralization of executive authority to the Health Regional level and the assignment of adequate funds to the Program.

The need for technical training at all levels continued to be greatly in Peru, particularly among the health personnel responsible for the epidemiological surveillance of malaria at the regional level.

VENEZUELA

There was a progressive falling of in the malaria programmed activities owing to shortage of funds to cover operational costs and per diem for sprayers and evaluators. As a result of the incomplete coverage, transmission increased in the western area in attack phase (southern part of the state of Tachira), where extensive irrigation and hydroelectric schemes are now under

way. The effects were felt in some areas, particularly in the north of the state of Barinas, which is in maintenance phase, and in the south of the state of Porgutuese, which is also in maintenance phase.

In the south of the country, in areas in maintenance phase of the state of Bolivar, there were intense movements of miners. This gave grounds for fearing that the malaria situation could be deteriorating, and became evident in 1984.

A large contribution amounting to 10 million bolivares was secured during the second half of the year to cover existing deficits, purchasing of drugs, insecticides, etc. and paying personnel.

The number of cases in Venezuela rose from 4,269 in 1982 to 8,388 in 1983, when the annual slide examination rate was low.

## II. PROBLEMS AFFECTING THE PROGRESS OF THE PROGRAM

Although there was an improvement in the malaria situation in some countries during 1983, the total number of cases (829,727) was the highest for the last quarter of a century. In terms of absolute numbers of cases, two countries -Brazil and Colombia- accounted for nearly half of the total, with 403,047 cases between them. There was an appreciable deterioration in the malaria situation in Mexico and Ecuador, and also in Bolivia and Belize, although the total number of cases in the latter two countries was much smaller than in the other four.

On the other hand, there was no change in the countries belonging to Group I of Table 5, which continue to be free of malaria.

In Group II also the situation has remained relatively stable on the whole, although there was a marked deterioration in two counries -Belize and the Dominican Republic.

In Belize surveillance was sometimes paralised, which facilitated the reintroduction of cases and the re-establishment of transmission in areas which had reached the consolidation phase, and this forced the authorities to return nearly the whole area to the attack phase as from 1983. The Dominican Republic, which had succeeded in bringing large parts of its territory into the maintenance phase, whith only 159 cases in 1975, now has 3,801, nearly all located in the maintenance phase areas, which is a sign of re-establishment of transmission. The deterioration was linked to the intense migratory movements in the border area with Haiti and to the lack of adequate funds to ensure a timely solution of the problems.

Brazil is in Group III. Despite the increase in the number of cases reported in the Country, Brazil is continuing to make significant progress, for it has not only succeeded in keeping large areas that were in the

maintenance and consolidation phases free of malaria, but in 1983 it added 160 "municipios" with a population of 3,694,000 to this area. The malaria problems are concentrated in the Amazon Basin, were it is clear that progress in this region depends not only on the availability of sufficient funds but on a stabilization of the migratory situation, which is very intense and is complicated by ecological factors. The susceptible human population that migrates to the Amazon region runs a greater risk of contracting malaria there than elsewhere because of life, work and housing conditions which facilitate disease transmission and make it difficult to apply effective control measures.

The resistance of P. falciparum to the usual malarial drugs particularly in areas of Colombia, Venezuela, Guyana, Suriname, French Guiana, Brazil and Peru poses a problem in primary health care and requires special attention in epidemiological surveillance. The classification of the malarious areas according to the response of P. falciparum to Chloroquine is shown in Map 5.

The Malaria Program has deteriorated in Mexico, which has induced the authorities to integrate the National Antimalaria Campaign in the Coordinated Health Services at the State level. This has the advantage of incorporating the efforts to solve the malaria problems in a large section of the public helath and Social Security sector. It isconsidered essential to initiate a vast training program for the general health services personnel that are to be responsible for the program to ensure that real progress is made with the new strategy.

Mexico has suffered from intense migratory movements in the south-east border area. The entry of displaced persons and migrants from Central America has been reflected in an increase in transmission in that region.

Venezuela was faced with problems stemming from the lack of funds to meet its needs which, combined with other problems connected with internal and external migratory movements, which led to the increase in transmission recorded in 1983.

Ecuador suffered the worst natural disaster in many years. The problems produced by the "El Niño" current were compounded by heavy rains, flooding, destruction of crops and large-scale displacement of the homeless. The country has initiated a series of measures to deal with the situation, most of which are aimed at finding international financing for the restructuring of its control program.

Colombia and Bolivia were the only countries in Group IV where the malaria situation deteriorated compared with 1982. In Colombia, the deterioration is explained by a combination of many epidemiological, social, economic, financial and political factors.

Colombia also has the problem of the resistance of P. falciparum to antimalarial drugs, which, together with the migratory movements to the new settlement areas, helps to maintain an epidemiological situation which is difficult to deal with.

In Bolivia, the funds from an international grant have begun to run out, and that, combined with the country's soaring inflation rate, has meant that the funds available were not sufficient to achieve a satisfactory solution of the malaria problem. The favorable trend the country had previously been showing unfortunately deteriorated in 1983. Contributory causes were a long series of meteorological phenomena, consisting of heavy rains in some areas and serioru droughts in others, which caused large numbers of displaced persons to move to less affected areas; the result was that transmission was disseminated in the low lands of the country, instead of being focalized in two or three areas. Bolivia also has a serious problem of P. falciparum resistance to Chloroquine and other drugs which is a matter of concern to the Program authorities, although P.falciparum infections only represent 11.8% of the total number of cases recorded in 1983.

Central America is still faced with the problem of the multiresistance of A. Albimanus to insecticides, and also with the social and political conflicts which are besetting nearly every country of the sub-region and which have been causing intense migratory movements between neighboring countries (see Maps 6 and 7). It is noteworthy that only three countries - Guatemala, Honduras and El Salvador -, which have a combined population of 16.8 million (2.6% of the total for the sub-region), registered 169,937 malaria cases in 1983, i.e., 20.5% of the total for the Americas (829,727).

Nearly all the countries are feeling a justified desire to find a solution for the problems affecting the malaria program. The geographical distribution of the areas with serious technical problems is shown in Table 20. All the Governments realize the seriousness of the problems and are assigning the necesary priority to the Program, but unfortunately the resources available are not sufficient deal with all situations.

## III. RESEARCH

There was continuing support for malaria research in the fields of immunology, entomology, applied social sciences, epidemiology and vector control. The Malaria Research Center at Tapachula, Mexico, continued its studies on the biology, ecology and vector capacity of anopheles mosquitoes, on alternative methods of control and on the evaluation of the effectiveness of new insecticides. The aim of this project is to discover new methods of control or combinations of old and new methods which, when adapted to local conditions in countries with persistent malaria problems, will help them to achieve their immediate objectives. In 1983, the studies centered on the problems of the Central American countries and of south-eastern Mexico, which are affected by the resistance of A. albimanus to insecticides.

Brazil has continued to offer support for operational research aimed at solving the epidemiological, ecological and social problems encountered in the Amazon Basin. A group has been established with headquarters at Belém de Pará which has been studying the biology of the vectors and the intense migratory movements occurring in the forest areas that are being settled. Different control methods adapted to local conditions are being tried out experimentally by this group in order to determine which one is the most effective for malaria control under such conditions.

The Organization has encouraged studies and participated actively in the following fields of research:

A. Studies on malaria immunology

These studies have been being made at the National Institute of Health in Bogotá, Colombia, where work is being done on the production and purification of antigens for the merozoites of P. falciparum with a view to preparing immunizing agents for an experimental model using Aotus trivirgatus griceimembra. The Institute is equiped to carry out immunological studies on animal models (rodents and non-human primates). In collaboration with the National Malaria Service, it has investigated and characterized different strains of P. falciparum and carried out studies on the sensitivity of this parasite to antimalarial drugs; it has also established the immunological profiles of some populations. The project has received support from AID, and PAHO/WHO has cooperated in it.

B. Characterization of strains of P. falciparum

The Evandro Chagas Institute at Belém de Pará, Brazil, continued with the studies initiated in August 1981 on the characterization of the strains of P. falciparum collected in the region of the Amazon. After continuos culturing by the Trager and Jensen method (1976), enzyme typification studies were made by the Carter technique (1978) for glucosephosphate-isomerase (GPI), adenosine-deaminase (ADA), lactate-deshydrogenase (LDH), glutamate-deshydrogenase (GDH) and peptides (PEP).

Studies of antigenic diversity were made using monoclonal antibodies (McBride et al., 1982) and "micro" tests were made in order to study the sensitivity to Chloroquine and Mefloquine of parasites collected from patients and cultivated in vitro.

The enzimatic analysis of 32 specimens showed that most of the strains were similar for the enzymes studies. At the same time, "antigenic diversity" studies showed that there were great similarities between 25 strains analysed for monoclonal antibodies. All these studies are still going on.

This work is being supported by the SESP Foundation and the National Research Council of Brazil, the UNDP/World Bank/WHO Special Program for Research and Training in Tropical Diseases (TDR), and PAHO/WHO.

C. Malaria chemotherapy

In view of the increasingly wide dissemination, both in South America and in South East Asia, of strains of P. falciparum that are multiresistant to the antimalarial drugs used in the programs, a project for the clinical and therapeutic study of Mefloquine was started in Belém de Pará, Brazil.

Mefloquine is a quinolinomethanol developed by the Walter Read Army Institute of Research of the United States of America, which gave the compound the number 142,490.

The project agreement provided for a Phase I for observations of pharmacokinetics and tolerance, and Phases II and III for studies of the efficacy, safety and optimum dosage of drug, administered alone or with other drugs.

The program for Phase III included a clinical study for the evaluation of two different schemes:

(a) Evaluation of the effect on parasitemia of administering two tablets of MSP (Mefloquine + Sulfadoxine + Pyrimethamine) by mouth in a single dose in clinical cases of malaria with positive blood slides for the asexual forms of P. falciparum (over 400 per $mm^3$).

Each tablet contained 250 mg. of Mefloquine base + 500 mg. of Sulfadoxine + 25 mg. of Pyrimethamine.

(b) Comparison of the gametocytocide effect of adding a 45 mg. dose of Primaquine to (a) above, either on day 0, or on day 4, or on day 7, haphazardly, and evaluating the presence, extent and duration of the gametocitemia.

As of December 1983, these studies were still unfinished. It is hoped that the evaluation and comparison of the results will be available some time in 1984.

The project was based on the Barros Barreto Hospital at Belém, which provided the necessary facilities. The following also cooperated: the Brazilian Superintendency of Public Health Campaigns (SUCAM); the Department of Health of the State of Pará; the UNDP/World Bank/WHO Special Program for Research and Training in Tropical Diseases, and PAHO/WHO.

D. Migration and health

PAHO set up a working group with the participation of the Tropical Diseases, Epidemiology and Health Research Coordination Programs and with the support of groups of technical consultants on social sciences applied to the problems of tropical diseases, particularly malaria.

A program of comparative research on malaria and migration is under way and guides for the preparation of the research agreements for the countries interested in participating are available. Activities connected with these studies have been initiated in Belize, Colombia, Costa Rica, the Dominican Republic, Guatemala, Haiti, Mexico, Nicaragua and Panama.

The aim of the project is to establish the relationship between production methods in agriculture, migration to the rural sector and changes in the epidemiological profile of certain tropical diseases, particularly malaria. Progress has been made in the inter-institutional work towards a better understanding of the epidemiology, as a preliminary step towards designing more effective control methodologies for tropical diseases such as malaria.

The preliminary investigations carried out so far in some border areas have given a better idea of the conditions of life, work and health of the population and they may serve as a basis for the programming of activities and the implementation of the primary health care strategy in accordance with priority needs.

E. Other field research

Other research activities carried out by national investigators, with the support of PAHO/WHO are:

- Determination of host preference of Anopheles albimanus of the Chiapas coast of Mexico (1983-1984).

- Indoor applications of Chlorphoxim against Anopheles albimanus of the South coast of Chiapas, Mexico (1981-1982).

- Longevity of the vector Anopheles albimanus; Mexico (1981-1984).

- Precipitin tests - feeding habits of Anopheles albimanus, (1981-1984).

- Search for sporozoites in Anophelines captured in the field and experimental infection of mosquitoes with Plasmodium vivax; Mexico (1982-1985).

- The use of two-curtain trap techniques in a village scale trial to evaluate chlorphoxim on the South West of Mexico (1981-1982).

- Evaluation of insecticides and repellents, and methods of applying them, for the prevention of malaria among Amazonian migratory laborers living in huts without walls - Amazon Region of Brazil (1981 - 1984).

- Epidemiological studies on Malaria in Brazil through radio-immunoassay detection of sporozoites infected mosquitoes with labeled monoclonal species specific antibodies, Brazil (1983-1985).

- Pilot study on distribution posts for antimalaria drugs and volunteer collaborators for the treatment and surveillance of malaria on the Pacific Coast of Guatemala (1982-1984).

- Study of the susceptibility of P. falciparum to chloroquine in-vitro technique; Oaxaca, Mexico (1981-1983).

- The collective distribution of drugs using combined dose schemes in three consecutive cycles, as an alternative or supplementary measure for the control of malaria; Chiapas, Mexico (1981 - 1982).

- Clinical - pharmacological testing of the anti-malarial drug mefloquine, Belem, Brazil (1979-1985).

- Resistance of the vector Anopheles albimanus to insecticides; Mexico (1979 - 1984).

- Strain differentiation of malaria parasites in Brazil; (1981 - 1984).

- Plasmodium falciparum and macrophage activation; Brasilia, Brazil (1982-1984).

- Experiments with B. thuringiensis israelensis and larvivorous fish are continuing in various countries, but no reports are yet available on the results.

A summary of the research projects, with the names of institutions, authors and publications appears in "Research in Progress" 1982-1983, document Ref.: RD.23/1, published by the Pan American Health Organization (PAHO/WHO) in September, 1984.

## IV. PERSONNEL TRAINING

During 1983, the regular annual training courses for malariologists were given in Mexico and Venezuela. A similar training course was given in Colombia also.

The University of South Carolina gave courses on vector control in Spanish and English which were attended by students from several Latin American countries.

PAHO/WHO initiated a training program for the general health services about the epidemiology and control of malaria. Several working groups were convened during the year to prepare the teaching materials to be used in the training, based on autodidactic modules to be used in one-week workshops.

## V. FOURTH CONTINENTAL MEETING OF DIRECTORS OF MALARIA SERVICES

The IV Continental Meeting of Directors of Malaria Services took place in Brasilia in July 1983. At this meeting, the epidemiological, social, political and economic situation of the countries that are engaged in the control of malaria and the reasons for the deterioration that has been observable for the last several years were reviewed and analysed. Emphasis was placed on the need to study in greater depth the factors determining transmission and the variables which affect malaria control, thus laying the bases for the restructuring of programs and the use of different strategies, supported by maximum use of available resources and a proper concentration of efforts on the human groups most at risk.

In seeking solutions to the problem, great importance was attached to the strengthening of the health infrastructure in each country and the inclusion of malaria control in the primary health care strategy, with the decided and active but flexible participation of the communities affected in the search for solutions and the adoption of practical control measures.

## VI. OTHER ACTIVITIES

In connection with the emergency situation in some of the countries of the Andean group, PAHO prepared special programs aimed at strengthening the epidemiological surveillance machinery in the affected areas. Similar programs were worked out to meet the needs of the countries in efforts to identify sources of financing for the programs and in exploring every possibility of support.

According to the analysis of the world economic situation and its social repercussions carried out but the United Nations Committee on Development Planning of the Economic and Social Council in April 1983 there is increasing evidence of a deep crisis and therefore all Governments should respond urgently to new cooperative initiatives in order to deal with its repercussions on the economy, development and human health.

The intensity and duration of the crisis through which every Central American country is passing indicate that the social problems must be solved if there is to be a slackening of tension. In this field, the improvement of health points the way towards solidarity, understanding and cooperation, which are fundamental conditions for the re-establishment of peace.

In the sub-region of Central America and Panama, the countries have begun to take the necessary steps to attain the goal of health for all by the year 2000 and are striving to meet their basic needs through the strategy of primary health care. In view of the importance and seriousness of the health problem produced by malaria, the Ministers of Health of the sub-region decided at their most recent Meeting (XXVIII REMCAP), held in Panamá in August 1983, to support and strengthen malaria control activities, and they urged that

further efforts should be made to mobilize funds for this purpose from national sources, bilateral agreements or international agencies. They also endorsed the recommendations on this subject made by the XII Meeting of Directors General of Health and reaffirmed the commitments contained in Resolution VIII adopted by the XXVII REMCAP, heldat San José, Costa Rica, in August 1982. Lastly, they recommended that Governments should adopt the recommendations put forward by the Regional Meeting on Malaria held in Brasilia, Brazil, in July 1983.

In view of the above considerations, malaria control in Central America and Panama has been included as a priority program in the activities of the Contadora Group.

In 1983 PAHO granted the following scholarships:

1. Integral Control of Vectors

| | |
|---|---|
| Length | 13 July - 2 September 1983 |
| Place: | South Carolina, E.U.A. |
| Institution: | University of South Carolina |
| 19 OPS scholarships: | (4-Brazil, 5-Colombia, 2-Cuba, 2-Guatemala, 2-Mexico, 1-El Salvador, 1-Haiti, 1-Panama, 1-Trinidad and Tobago. |

2. International Course on Malaria and Environmental Sanitation

| | |
|---|---|
| Lenght: | 11 months |
| Place: | Maracay, Venezuela |
| Institution: | Malariology School |
| 5 OPS scholarships: | (2-Brazil, 2-Panama, 1-Bolivia). |

3. XI Specialized Course on Epidemiologic Entomology

| | |
|---|---|
| Length: | August - November 1983 |
| Institution: | Sao Paulo University<br>Faculty of Public Health |
| Place: | Sao Paulo, Brazil |
| 2 OPS scholarships: | (1-Brazil, 1-French Guyana). |

4. Course on Vector and Urban Plagues

| | |
|---|---|
| Lenght: | 10-28 October 1983 |
| Place: | Bogota and Cartagena, Colombia |
| Institución: | OMS, Denmark Government (DANIDA) and Health Minister of Colombia. |
| 15 OPS scholarships: | (2 - Brazil, 2-Chile, 2 Dominican Republic, 1-Cuba, 1-Ecuador, 1-El Salvador, 1-Guatemala, 1-Mexico, 1-Nicaragua, 1-Paraguay). |

5. III International Course on Malaria

| | |
|---|---|
| Length: | 5 September - 25 November 1983 |
| Place: | Bogota, Colombia |
| Institution: | Direct Campaign Direction |
| 4 OPS scholarships: | (1-Argentina, 1-Brazil, 1-Paraguay, 1-Peru) |

6. Malaria Course for Medical Officers and Engineers

| | |
|---|---|
| Length: | September - December 1983 |
| Place: | Mexico |
| Institution: | Public Health School and Program of Antimalaria Campaign |
| 3 OPS scholarships: | (2-Brazil, 1-Guatemala) |

7. International Course on Public Health with Emphasis on Paludismo

| | |
|---|---|
| Place: | Mexico, D.F., Mexico |
| Institution: | Secretaría de Salubridad y Asistencia de México |
| 2 OPS scholarships: | (1-Belize, 1-Paraguay). |

The following border meetings were held in 1983:

| Countries | Place of the Meeting | Date |
|---|---|---|
| Argentina - Bolivia | Yacuiba, Bolivia | 30 November 1983 |
| Brazil - Paraguay | Foz de Iguazu, Brazil | 14-15 April 1983<br>22-23 August 1983<br>19-20 December 1983 |
| Colombia - Ecuador | Pasto, Colombia | 2 - 6 May 1983 |
| Colombia - Venezuela | Merida, Venezuela | 23-25 February 1983 |
| Colombia - Venezuela | Bucaramanga, Colombia | 28-30 November 1983 |
| Costa Rica - Panama | Paso Canoas and Sixaola | Monthly |
| Guyana - Suriname | Springlands Guyana | 30 November 1983 |
| French Guiana/Suriname | Albina | 3 May 1983 |
| Haiti - Dominican Republic | Santo Domingo | 12-17 September 1983 |
| Paraguay - Brazil | Ciudad Presidente Stroessner, Paraguay | 17-18 February 1983<br>23-24 June 1983<br>13-14 October 1983<br>29-30 November 1983 |

Table 1

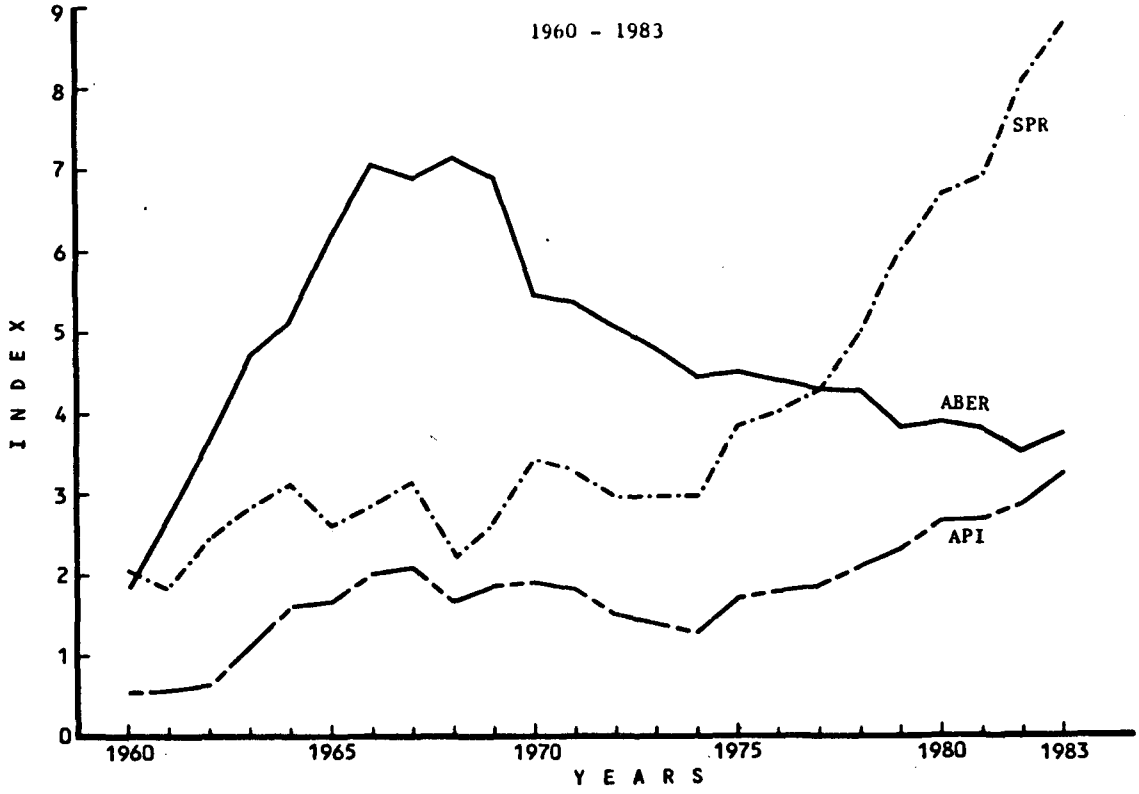
MALARIA MORBIDITY IN THE AMERICAS
1958 - 1983

| Year | Population | | Blood Slides | | | Morbidity per 100,000 inhabitants | |
|---|---|---|---|---|---|---|---|
| | Total Countries | Total malarious areas | Examined | Positive | % | Total Countries | malarious areas |
| 1958 | 387 276 | 135 409 | 1 716 103 | 56 705 | 3.3 | 14.64 | 41.88 |
| 1959 | 394 606 | 145 920 | 2 749 117 | 75 612 | 2.8 | 19.16 | 51.82 |
| 1960 | 400 500 | 143 586 | 3 955 149 | 79 998 | 2.0 | 19.88 | 55.71 |
| 1961 | 416 008 | 147 292 | 5 341 004 | 99 539 | 1.9 | 23.93 | 67.58 |
| 1962 | 427 919 | 153 742 | 7 221 367 | 177 089 | 2.5 | 41.38 | 115.19 |
| 1963 | 434 950 | 152 021 | 7 903 156 | 227 026 | 2.9 | 52.20 | 149.34 |
| 1964 | 447 666 | 158 642 | 8 156 290 | 254 572 | 3.1 | 56.87 | 160.47 |
| 1965 | 455 527 | 146 389 | 9 069 950 | 241 462 | 2.7 | 53.01 | 164.95 |
| 1966 | 463 649 | 166 469 | 11 797 983 | 333 280 | 2.8 | 71.88 | 200.21 |
| 1967 | 474 868 | 169 901 | 11 609 228 | 369 388 | 3.2 | 77.79 | 217.41 |
| 1968 | 484 664 | 174 704 | 12 522 696 | 282 773 | 2.3 | 58.34 | 161.86 |
| 1969 | 491 483 | 176 325 | 12 179 190 | 323 782 | 2.7 | 65.88 | 183.63 |
| 1970 | 505 819 | 181 257 | 9 925 162 | 344 170 | 3.5 | 68.04 | 189.88 |
| 1971 | 513 544 | 185 492 | 10 134 212 | 338 416 | 3.3 | 65.90 | 182.44 |
| 1972 | 524 774 | 190 448 | 9 695 953 | 284 813 | 2.9 | 54.23 | 149.55 |
| 1973 | 535 109 | 195 528 | 9 400 682 | 280 276 | 3.0 | 52.38 | 143.34 |
| 1974 | 544 865 | 200 755 | 8 997 318 | 269 003 | 3.0 | 49.37 | 134.00 |
| 1975 | 555 676 | 205 872 | 9 276 878 | 356 692 | 3.8 | 64.19 | 173.26 |
| 1976 | 565 249 | 211 086 | 9 352 775 | 379 364 | 4.1 | 67.11 | 179.72 |
| 1977 | 576 942 | 215 550 | 9 274 480 | 398 925 | 4.3 | 69.14 | 185.07 |
| 1978 | 587 704 | 220 153 | 9 493 751 | 468 923 | 4.9 | 79.84 | 213.00 |
| 1979 | 600 263 | 226 361 | 8 630 653 | 515 271 | 6.0 | 85.84 | 227.63 |
| 1980 | 610 021 | 231 366 | 8 943 369 | 602 836 | 6.7 | 98.82 | 260.56 |
| 1981 | 627 375 | 239 260 | 9 100 529 | 629 629 | 7.0 | 100.36 | 263.16 |
| 1982 | 635 954 | 245 307 | 8 826 418 | 715 177 | 8.1 | 112.46 | 291.54 |
| 1983 | 639 212 | 249 327 | 9 395 703 | 829 727 | 8.8 | 129.80 | 332.79 |

GRAPH 1

MALARIA EPIDEMIOLOGICAL INDICATORS IN THE AMERICAS

1960 - 1983




SPR - Slide Positivity Rate (%).
ABER - Annual Blood Examination Rate (%).
API - Annual Parasite Incidence (‰).

Table 2

POPULATION IN THE MALARIOUS AREAS
IN THE AMERICAS, 1958 - 1983
(Population in thousands)

| Year | Originally malarious areas | | | | | Total Population |
|---|---|---|---|---|---|---|
| | Maint. phase | Consolid. phase | Attack Fase | Prep. phase or program not yet started | Total | |
| 1958 | 52 866 | 1 996 | 46 196 | 34 351 | 135 409 | 387 276 |
| 1959 | 52 856 | 9 349 | 56 292 | 27 423 | 145 920 | 394 606 |
| 1960 | 54 363 | 10 101 | 53 400 | 25 722 | 143 586 | 400 500 |
| 1961 | 56 979 | 17 879 | 39 021 | 33 413 | 147 292 | 416 008 |
| 1962 | 59 299 | 30 424 | 49 276 | 14 743 | 153 742 | 427 919 |
| 1963 | 56 546 | 33 901 | 31 910 | 29 664 | 152 021 | 434 950 |
| 1964 | 57 414 | 32 277 | 34 426 | 34 525 | 158 642 | 447 666 |
| 1965 | 60 975 | 34 731 | 38 575 | 12 108 | 146 389 | 455 527 |
| 1966 | 69 760 | 36 128 | 43 369 | 17 212 | 166 469 | 463 649 |
| 1967 | 70 720 | 41 581 | 44 766 | 12 834 | 169 901 | 474 868 |
| 1968 | 72 441 | 45 812 | 56 234 | 217 | 174 704 | 484 664 |
| 1969 | 72 757 | 46 987 | 56 375 | 206 | 176 325 | 491 483 |
| 1970 | 80 770 | 40 518 | 59 807 | 162 | 181 257 | 505 819 |
| 1971 | 81 306 | 43 644 | 60 396 | 146 | 185 492 | 513 544 |
| 1972 | 86 634 | 42 016 | 61 645 | 153 | 190 448 | 524 774 |
| 1973 | 87 969 | 45 535 | 61 915 | 109 | 195 528 | 535 109 |
| 1974 | 91 527 | 46 042 | 63 130 | 56 | 200 755 | 544 865 |
| 1975 | 99 405 | 44 633 | 61 834 | - | 205 872 | 555 676 |
| 1976 | 101 068 | 48 813 | 61 205 | - | 211 086 | 565 249 |
| 1977 | 104 567 | 50 610 | 60 373 | - | 215 550 | 576 942 |
| 1978 | 105 611 | 59 734 | 54 808 | - | 220 153 | 587 704 |
| 1979 | 113 092 | 57 280 | 55 989 | - | 226 361 | 600 263 |
| 1980 | 114 620 | 58 087 | 58 659 | - | 231 366 | 610 021 |
| 1981 | 117 042 | 59 962 | 62 256 | - | 239 260 | 627 375 |
| 1982 | 118 338 | 62 028 | 64 941 | - | 245 307 | 635 954 |
| 1983 | 119 175 | 66 970 | 63 182 | - | 249 327 | 639 212 |

Table 3

STATUS OF THE MALARIA PROGRAMS IN THE AMERICAS, BY POPULATION, 1983
(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 | 78a) | - | - | - | - | - | - | - | - |
| Argentina | 29 630 | 3 656 | 12.3 | 3 494 | 95.6 | 76 | 2.1 | 86 | 2.3 |
| Bahamas | 221a) | - | - | - | - | - | - | - | - |
| Barbados | 272a) | - | - | - | - | - | - | - | - |
| Belize | 159 | 159 | 100.0 | 28 | 17.6 | - | - | 131 | 82.4 |
| Bermuda | 57 | - | - | - | - | - | - | - | - |
| Bolivia | 5 397 | 2 172 | 38.1 | - | - | - | - | 2 172 | 100.0 |
| Brazil | 129 660 | 55 623 | 43.0 | 14 813 | 26.6 | 21 978 | 39.5 | 18 832 | 33.9 |
| British Virgin Islands | 14a) | - | - | - | - | - | - | - | - |
| Canada | 24 945a) | - | - | - | - | - | - | - | - |
| Cayman Islands | 18a) | - | - | - | - | - | - | - | - |
| Chile | 11 683a) | 257b) | 2.2 | 257 | 100.0 | - | - | - | - |
| Colombia | 27 735 | 18 101 | 65.6 | - | - | 13 150 | 72.6 | 4 951 | 27.4 |
| Costa Rica | 2 441 | 697 | 28.6 | - | - | 601 | 86.2 | 96 | 13.8 |
| Cuba | 9 940 | 3 350b) | 33.7 | 3 350c) | 100.0 | - | - | - | - |
| Dominica | 88a) | 18b) | 20.4 | 18c) | 100.0 | - | - | - | - |
| Dominican Republic | 5 962 | 5 922 | 99.2 | 5 781 | 97.6 | 50 | 0.9 | 91 | 1.5 |
| Ecuador | 8 319 | 5 126 | 61.6 | - | - | 2 237 | 43.6 | 2 889 | 56.4 |
| El Salvador | 5 229 | 4 683 | 89.6 | - | - | - | - | 4 683 | 100.0 |
| Falkland Islands | 2a) | - | - | - | - | - | - | - | - |
| French Guiana | 73 | 73 | 100.0 | 38 | 52.0 | 30 | 41.1 | 5 | 6.9 |
| Grenada | 100 | 40 | 40.0 | 40c) | 100.0 | - | - | - | - |
| Guadeloupe | 332a) | 295b) | 89.0 | 295c) | 100.0 | - | - | - | - |
| Guatemala | 7 464 | 3 002 | 40.2 | - | - | - | - | 3 002 | 100.0 |
| Guyana | 836 | 836 | 100.0 | 751 | 89.8 | - | - | 85 | 10.2 |
| Haiti | 5 500 | 4 729 | 86.0 | - | - | - | - | 4 729 | 100.0 |
| Honduras | 4 092 | 3 756 | 92.0 | - | - | - | - | 3 756 | 100.0 |
| Jamaica | 2 263 | 1 686b) | 74.5 | 1 686c) | 100.0 | - | - | - | - |
| Martinique | 330a) | 205b) | 62.4 | 205c) | 100.0 | - | - | - | - |
| Mexico | 79 278 | 40 247 | 50.7 | 5 916 | 14.7 | 22 935 | 57.0 | 11 396 | 28.3 |
| Monserrat | 12a) | - | - | - | - | - | - | - | - |
| Netherland Antilles | 273a) | - | - | - | - | - | - | - | - |
| Nicaragua | 3 165 | 3 165 | 100.0 | - | - | - | - | 3 165 | 100.0 |
| Panama | 2 002 | 1 923 | 96.0 | - | - | 1 773 | 92.2 | 150 | 7.8 |
| Paraguay | 3 102 | 2 635 | 85.0 | 719 | 27.3 | 1 274 | 48.3 | 642 | 24.4 |
| Peru | 18 707 | 6 193 | 33.1 | 1 708 | 27.6 | 2 863 | 46.2 | 1 622 | 26.2 |
| Puerto Rico | 3 186 | 3 186 | 100.0 | 3 186c) | 100.0 | - | - | - | - |
| San Kitts, Nevis,Anguilla | 52a) | - | - | - | - | - | - | - | - |
| Saint Lucia | 124 | 105 | 85.0 | 105c) | 100.0 | - | - | - | - |
| San Pierre & Miquelon | 6a) | - | - | - | - | - | - | - | - |
| San Vicent | 100a) | - | - | - | - | - | - | - | - |
| Suriname | 352 | 281 | 80.0 | 249 | 88.6 | 3 | 1.1 | 29 | 10.3 |
| Trinidad & Tobago | 1 220a) | 1 159b) | 95.0 | 1 159c) | 100.0 | - | - | - | - |
| Turks and Caicos | 6a) | - | - | - | - | - | - | - | - |
| United States of America | 226 575 | 64 687 | 28.5 | 64 687c) | 100.0 | - | - | - | - |
| Uruguay | 2 966a) | - | - | - | - | - | - | - | - |
| Venezuela | 15 150 | 11 264 | 74.4 | 10 594d) | 94.0 | - | - | 670 | 6.0 |
| Virgin Islands (USA) | 96 | 96 | 100.0 | 96c) | 100.0 | - | - | - | - |
| TOTAL | 639 212 | 249 327 | 39.0 | 119 175 | 47.8 | 66 970 | 26.9 | 63 182 | 25.3 |

a) Mid-year estimated (1983).
b) Estimated.
c) Population living in areas where malaria eradication has been registered by PAHO/WHO.
d) Includes an area with inhabitants where malaria eradication has been registered by PAHO/WHO.

Table 4

STATUS OF THE MALARIA PROGRAMS IN THE AMERICAS, BY AREA, 1983
(Area in $Km^2$)

| Country or other political or administrative unit | Total Area | Originally malarious areas | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Total Malarious Area | | Maintenance phase | | Consolidation phase | | Attack phase | |
| | | Total | % | Total | % | Total | % | Total | % |
| Antigua | 280 | - | - | - | - | - | - | - | - |
| Argentina | 4 024 458 | 349 051 | 8.7 | 334 527 | 95.8 | 3 249 | 1.0 | 11 275 | 3.2 |
| Bahamas | 11 396 | - | - | - | - | - | - | - | - |
| Barbados | 430 | - | - | - | - | - | - | - | - |
| Belize | 22 965 | 22 965 | 100.0 | 300 | 1.3 | - | - | 22 665 | 98.7 |
| Bermuda | 53 | - | - | - | - | - | - | - | - |
| Bolivia | 1 098 581 | 821 346 | 75.0 | - | - | - | - | 821 346 | 100.0 |
| Brazil | 8 511 965 | 6 898 045 | 81.0 | 190 469 | 2.8 | 1 181 274 | 17.1 | 5 526 302 | 80.1 |
| 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 | - | - | 27 832 | 78.5 | 7 614 | 21.5 |
| Cuba | 110 922 | 37 502 | 33.8 | 37 502a) | 100.0 | - | - | - | - |
| Dominica | 751 | 152 | 20.2 | 152a) | 100.0 | - | - | - | - |
| Dominican Republic | 48 442 | 47 562 | 98.2 | 44 281 | 93.1 | 1 096 | 2.3 | 2 185 | 4.6 |
| Ecuador | 291 906 | 175 462 | 60.1 | - | - | 27 797 | 15.8 | 147 665 | 84.2 |
| El Salvador | 21 041 | 19 153 | 91.0 | - | - | - | - | 19 153 | 100.0 |
| Falkland Islands | 11 961 | - | - | - | - | - | - | - | - |
| French Guiana | 90 000 | 90 000 | 100.0 | 50 | 0.1 | 82 350 | 91.5 | 7 600 | 8.4 |
| Grenada | 344 | 103 | 30.0 | 103a) | 100.0 | - | - | - | - |
| Guadeloupe | 1 950 | 1 244 | 63.8 | 1 244a) | 100.0 | - | - | - | - |
| Guatemala | 108 889 | 80 350 | 73.8 | - | - | - | - | 80 350 | 100.0 |
| Guyana | 215 025 | 215 025 | 100.0 | 7 012 | 3.2 | - | - | 208 013 | 96.8 |
| Haiti | 27 750 | 23 545 | 84.8 | - | - | - | - | 23 545 | 100.0 |
| Honduras | 112 088 | 101 351 | 90.4 | - | - | - | - | 101 351 | 100.0 |
| Jamaica | 11 428 | 10 028 | 87.7 | 10 028a) | 100.0 | - | - | - | - |
| Martinica | 1 080 | 300 | 27.8 | 300a) | 100.0 | - | - | - | - |
| Mexico | 1 967 183 | 1 150 000 | 58.5 | 190 952 | 16.6 | 546 433 | 47.5 | 412 615 | 36.0 |
| Monserrat | 84 | - | - | - | - | - | - | - | - |
| Netherlands Antilles | 961 | - | - | - | - | - | - | - | - |
| Nicaragua | 127 358 | 118 358 | 93.0 | - | - | - | - | 118 358 | 100.0 |
| Panama | 77 082 | 71 272 | 92.5 | - | - | 34 838 | 48.9 | 36 434 | 51.1 |
| Paraguay | 406 752 | 406 552 | 100.0 | 271 010 | 66.6 | 80 749 | 19.9 | 54 793 | 13.5 |
| Peru | 1 285 215 | 961 171 | 74.8 | 195 418 | | 222 330 | | 543 423 | - |
| Puerto Rico | 8 899 | 8 899 | 100.0 | 8 899a) | 100.0 | - | - | - | - |
| St. Kitts,Nevis, Anguilla | 396 | - | - | - | - | - | - | - | - |
| Saint Lucia | 620 | 510 | 82.3 | 510a) | 100.0 | - | - | - | - |
| St. Pierre & Miquelon | 240 | - | - | - | - | - | - | - | - |
| St. Vicent | 389 | - | - | - | - | - | - | - | - |
| Suriname | 163 820 | 163 750 | 100.0 | 43 705 | 26.7 | 45 | 0.1 | 120 000 | 73.2 |
| Trinidad y Tabago | 5 630 | 5 449 | 97.0 | 5 449a) | 100.0 | - | - | - | - |
| Turks and Caicos | 522 | - | - | - | - | - | - | - | - |
| United States of America | 9 365 604 | 2 309 876 | 24.7 | 2 309 876a) | 100.0 | - | - | - | - |
| Uruguay | 186 926 | - | - | - | - | - | - | - | - |
| Venezuela | 915 741 | 600 000 | 65.5 | 460 054b) | 76.7 | - | - | 139 946 | 23.3 |
| Virgin Islands (USA) | 345 | 345 | 100.0 | 345a) | 100.0 | - | - | - | - |
| TOTAL | 40 405 285 | 15 753 734 | 39.0 | 4 170 259 | 26.5 | 2 364 856 | 15.0 | 9 218 619 | 58.5 |

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

Table 5

MALARIA CASES REGISTERED, 1979 - 1983

| GROUP | | Population 1983 in originally malarious areas (in thousands) | Casos Registrados | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1979 | 1980 | 1981 | 1982 | 1983 |
| GROUP I | 12 countries or territories in which malaria eradication has been certified | 75 084a) | 1 162 | 2 249 | 1 599 | 972 | 810b) |
| GROUP II | SUB-GROUP A: | | | | | | |
| | Argentina | 3 656 | 936 | 341 | 323 | 567 | 535 |
| | Costa Rica | 697 | 307 | 376 | 168 | 110 | 245 |
| | French Guiana | 73 | 604 | 831 | 769 | 1 143 | 1 051 |
| | Panama | 1 923 | 316 | 310 | 340 | 334 | 341 |
| | Paraguay | 2 635 | 116 | 140 | 73 | 66 | 49 |
| | Sub-total - A | 8 984 | 2 279 | 1 998 | 1 673 | 2 220 | 2 221 |
| | SUB-GROUP B: | | | | | | |
| | Belize | 159 | 1 391 | 1 529 | 2 041 | 3 868 | 4 595 |
| | Dominican Rep. | 5 922 | 3 080 | 4 780 | 3 596 | 4 654 | 3 801 |
| | Guyana | 836 | 2 294 | 3 202 | 2 065 | 1 700 | 2 102 |
| | Sub-total - B | 6 917 | 6 765 | 9 511 | 7 702 | 10 222 | 10 498 |
| | Sub-Total | 15 901 | 9 044 | 11 509 | 9 375 | 12 442 | 12 719 |
| GROUP III | Brazil | 55 623 | 144 215 | 169 871 | 197 149 | 221 939 | 297 687 |
| | Ecuador | 5 126 | 8 207 | 8 748 | 12 745 | 14 633 | 51 606 |
| | Mexico | 40 247 | 20 983 | 25 734 | 42 104 | 49 993 | 74 172 |
| | Suriname | 281 | 903 | 4 445 | 2 479 | 2 805 | 1 943 |
| | Venezuela | 11 264 | 4 705 | 3 901 | 3 377 | 4 269 | 8 388 |
| | Sub-Total | 112 541 | 179 013 | 212 699 | 257 854 | 293 639 | 433 796 |
| GROUP IV | Bolivia | 2 172 | 14 712 | 16 619 | 9 774 | 6 699 | 14 441 |
| | Colombia | 18 101 | 60 957 | 57 346 | 60 972 | 78 601 | 105 360 |
| | El Salvador | 4 683 | 75 657 | 95 835 | 93 187 | 86 202 | 65 377 |
| | Guatemala | 3 002 | 69 657 | 62 657 | 67 994 | 77 375 | 64 024 |
| | Haiti | 4 729 | 41 252 | 53 478 | 46 703 | 65 354 | 53 954 |
| | Honduras | 3 756 | 25 297 | 43 009 | 49 377 | 57 482 | 37 536 |
| | Nicaragua | 3 165 | 18 418 | 25 465 | 17 434 | 15 601 | 12 907 |
| | Peru | 6 193 | 17 127 | 14 982 | 14 812 | 20 483 | 28 563 |
| | Sub-Total | 45 801 | 322 459 | 369 391 | 360 253 | 407 797 | 382 162 |
| | TOTAL | 249 327 | 511 678 | 595 848 | 629 081 | 714 850 | 829 487 |

a) Some population figures are estimated. b) Cuba information up to September.

MAP 1

MALARIA SITUATION - GROUP I

COUNTRIES WITH NO EVIDENCE OF MALARIA TRANSMISSION

| GROUP I | Population (1983)* Originally malarious areas | Cases registered | | | |
|---|---|---|---|---|---|
| | | 1980 | 1981 | 1982 | 1983 |
| Chile | 257 | 0 | 0 | 0 | 0 |
| Cuba | 3 350 | 307 | 573 | 335 | 194 a) |
| Dominica | 18 | 0 | 0 | 0 | 0 |
| Grenada | 40 | 0 | 0 | ... | 0 |
| Guadalupe | 295 | 1 | 0 | 1 | 1 |
| Jamaica | 1 686 | 0 | 1 | 1 | 4 |
| Martinique | 205 | 0 | 1 | 7 | 1 |
| Saint Lucia | 105 | 0 | 0 | 0 | 0 |
| Trinidad & T. | 1 159 | 3 | 3 | 4 | 3 |
| United States | 64 687 | 1 933 | 1 010 | 622 | 605 |
| Puerto Rico | 3 186 | 5 | 11 | 2 | 2 |
| Virgin Isl. | 96 | 0 | 0 | 0 | 0 |
| TOTAL | 75 084 | 2 249 | 1 599 | 972 | 810 |

* Population in thousands.

a) Information up to September.

MAP 2

MALARIA SITUATION - GROUP II

COUNTRIES WHERE MALARIA TRANSMISSION WAS ONCE INTERRUPTED OR REDUCED TO INSIGNIFICANT LEVEL: A) FAVORABLE SITUATION MAINTAINED. B) REESTABLISHED TRANSMISSION

| GROUP II | Population (1983)* Originally malarious areas | Cases registered | | | |
|---|---|---|---|---|---|
| | | 1980 | 1981 | 1982 | 1983 |
| Sub-Group A: | | | | | |
| Argentina | 3 656 | 341 | 323 | 567 | 535 |
| Costa Rica | 697 | 376 | 168 | 110 | 245 |
| French Guiana | 73 | 831 | 769 | 1 143 | 1 051 |
| Panama | 1 923 | 310 | 340 | 334 | 341 |
| Paraguay | 2 635 | 140 | 73 | 66 | 49 |
| Sub-total A: | 8 984 | 1 998 | 1 673 | 2 220 | 2 221 |
| Sub-Group B: | | | | | |
| Belize | 159 | 1 529 | 2 041 | 3 868 | 4 595 |
| Dominican Rep. | 5 922 | 4 780 | 3 596 | 4 654 | 3 801 |
| Guyana | 836 | 3 202 | 2 065 | 1 700 | 2 102 |
| Sub-total B: | 6 917 | 9 511 | 7 702 | 10 222 | 10 498 |
| TOTAL | 15 901 | 11 509 | 9 375 | 12 442 | 12 719 |

* Population in thousands.

MAP 3

MALARIA SITUATION - GROUP III

COUNTRIES WHERE MALARIA TRANSMISSION INCREASED IN ATTACK PHASE AREAS

| GROUP III | Population (1983)* Originally malarious areas | Cases registered | | | |
|---|---|---|---|---|---|
| | | 1980 | 1981 | 1982 | 1983 |
| Brasil | 55 623 | 169 871 | 197 149 | 221 939 | 297 687 |
| Ecuador | 5 126 | 8 748 | 12 745 | 14 633 | 51 606 |
| Mexico | 40 247 | 25 734 | 42 104 | 49 993 | 74 172 |
| Suriname | 281 | 4 445 | 2 479 | 2 805 | 1 943 |
| Venezuela | 11 264 | 3 901 | 3 377 | 4 269 | 8 388 |
| TOTAL | 112 541 | 212 699 | 257 854 | 293 639 | 433 796 |

*Population in thousands.

## MAP 4

MALARIA SITUATION - GROUP IV

COUNTRIES WITH SERIOUS SOCIO-ECONOMIC, POLITICAL, TECHNICAL, ADMINISTRATIVE AND FINANCIAL PROBLEMS

| GROUP IV | Population (1983) Originally malarious areas* | Cases registered | | | |
|---|---|---|---|---|---|
| | | 1980 | 1981 | 1982 | 1983 |
| Bolivia | 2 172 | 16 619 | 9 774 | 6 699 | 14 441 |
| Colombia | 18 101 | 57 346 | 60 972 | 78 601 | 105 360 |
| El Salvador | 4 683 | 95 835 | 93 187 | 86 202 | 65 377 |
| Guatemala | 3 002 | 62 657 | 67 994 | 77 375 | 64 024 |
| Haiti | 4 729 | 53 478 | 46 703 | 65 354 | 53 954 |
| Honduras | 3 756 | 43 009 | 49 377 | 57 482 | 37 536 |
| Nicaragua | 3 165 | 25 465 | 17 434 | 15 601 | 12 907 |
| Peru | 6 193 | 14 982 | 14 812 | 20 483 | 28 563 |
| TOTAL | 45 801 | 369 391 | 360 253 | 407 797 | 382 162 |

* Population in thousands.

Table 6

CASE DETECTION BY COUNTRY AND PHASE OF PROGRAM, 1983

| Country or other political or administrative unit | T O T A L | | Maintenance phase | | Consolidation phase | | Attack phase | | Non-malarious Area | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Slides examinated | Positive | Slides examinated | Positive | Slides examinated | Positive | Slides examinated | Positive | Slides examinated | Positive |
| Argentina | 27 020 | 535 | 16 406 | 301 | 1 481 | 4 | 9 132 | 229 | 1 | 1 |
| Bahamas | 10 | 10 | - | - | - | - | - | - | 10 | 10 |
| Barbados | 3 | 3 | - | - | - | - | - | - | 3 | 3 |
| Belize | 31 889 | 4 595 | 3 469 | 108 | - | - | 28 420 | 4 487 | - | - |
| Bolivia | 151 187 | 14 441 | - | - | - | - | 150 863 | 14 334 | 324 | 107 |
| Brazil | 2 881 660 | 297 687 | 131 035 | 1 056 | 701 681 | 3 272 | 2 010 135 | 289 404 | 38 809 | 3 955 |
| Canada | 219 | 219 | - | - | - | - | - | - | 219 | 21 |
| Cayman Islands | 5 | 5 | - | - | - | - | - | - | 5 | 5 |
| Colombia | 535 962 | 105 360 | - | - | 187 290 | 7 142 | 346 192 | 97 860 | 2 480 | 358 |
| Costa Rica | 120 116 | 245 | - | - | 65 230 | 84 | 53 303 | 108 | 1 583 | 53 |
| Cuba a) | 399 839 | 194 | 399 839 | 194 | - | - | - | - | - | - |
| Dominica | 2 | 0 | 2 | 0 | - | - | - | - | - | - |
| Dominican Republic | 321 589 | 3 801 | 284 391 | 2 593 | 7 571 | 256 | 29 627 | 952 | - | - |
| Ecuador | 453 067 | 51 606 | - | - | 121 870 | 6 616 | 330 131 | 44 904 | 1 066 | 86 |
| El Salvador | 306 648 | 65 377 | - | - | - | - | 306 648 | 65 377 | - | - |
| French Guiana | 10 391 | 1 051 | 5 944 | 552 | 2 815 | 206 | 1 632 | 293 | - | - |
| Grenada | 3 376 | 0 | 11 | 0 | - | - | - | - | 3 365 | 0 |
| Guadaloupe | 1 | 1 | 1 | 1 | - | - | - | - | - | - |
| Guatemala | 442 745 | 64 024 | - | - | - | - | 427 504 | 61 800 | 15 241 | 2 224 |
| Guyana | 59 940 | 2 102 | 18 322 | 273 | - | - | 41 618 | 1 829 | - | - |
| Haiti | 308 075 | 53 954 | - | - | - | - | 308 075 | 53 954 | - | - |
| Honduras | 336 879 | 37 536 | - | - | - | - | 334 837 | 37 272 | 2 042 | 264 |
| Jamaica | 5 162 | 4 | 5 162 | 4 | - | - | - | - | - | - |
| Martinique | 1 | 1 | 1 | 1 | - | - | - | - | - | - |
| Mexico | 1 605 030 | 74 172 | 28 054 | 123 | 547 546 | 10 456 | 1 019 199 | 63 324 | 10 231 | 269 |
| Nicaragua | 412 858 | 12 907 | - | - | - | - | 412 858 | 12 907 | - | - |
| Panama | 380 135 | 341 | - | - | 198 728 | 17 | 181 407 | 324 | - | - |
| Paraguay | 84 630 | 49 | 7 558 | 0 | 36 271 | 4 | 37 227 | 40 | 3 574 | 5 |
| Peru | 224 650 | 28 563 | 41 860 | 780 | 129 169 | 19 233 | 53 621 | 8 550 | - | - |
| Puerto Rico | 2 | 2 | 2 | 2 | - | - | - | - | - | - |
| Saint Lucia | 0 | 0 | 0 | 0 | - | - | - | - | - | - |
| Suriname | 58 538 | 1 943 | 7 023 | 236 | 3 095 | 63 | 36 767 | 1 342 | 11 653 | 302 |
| Trinidad & Tobago | 7 776 | 3 | 7 776 | 3 | - | - | - | - | - | - |
| United States of Am. | 605 | 605 | 605 | 605 | - | - | - | - | - | - |
| Uruguay | 3 | 3 | - | - | - | - | - | - | 3 | 3 |
| Venezuela | 225 690 | 8 388 | 116 287 | 3 154 | - | - | 107 765 | 4 771 | 1 638 | 463 |
| T O T A L | 9 395 703 | 829 727 | 1 073 748 | 9 986 | 2 002 747 | 47 353 | 6 226 961 | 764 061 | 92 247 | 8 327 |

a) Information up to September.

Cuadro 7

EPIDEMIOLOGICAL SITUATION OF THE 21 COUNTRIES WITH ACTIVE MALARIA PROGRAMS, 1983

| COUNTRY | Malarical population (in thousands) | Blood Slides | | Specie of Parasite | | | | Epidemiological Indicators * | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Examined | Positives | P.falciparum | P. Vivax | P. Malar. | Mixed Infect. | ABER | SPR | API | % of P.falc. |
| Argentina | 3 656 | 27 020 | 535 | 0 | 534 | - | 1 | 0.74 | 1.98 | 0.15 | 0.00 |
| Belize | 159 | 31 889 | 4 595 | 634 | 3 961 | - | - | 20.06 | 14.41 | 28.90 | 13.80 |
| Bolivia | 2 172 | 151 187 | 14 441 | 1 662 | 12 728 | - | 51 | 6.96 | 9.55 | 6.65 | 11.51 |
| Brazil | 55 623 | 2 881 660 | 297 687 | 143 832 | 150 169 | 14 | 3,672 | 5.18 | 10.33 | 5.35 | 48.32 |
| Colombia | 18 101 | 535 962 | 105 360 | 47 615 | 57 362 | 41 | 342 | 2.96 | 19.66 | 5.82 | 45.19 |
| Costa Rica | 697 | 120 116 | 245 | 10 | 235 | - | - | 17.23 | 0.20 | 0.35 | 4.08 |
| Dominican Republic | 5 922 | 321 589 | 3 801 | 3 801 | - | - | - | 5.43 | 1.18 | 0.64 | 100.00 |
| Ecuador | 5 126 | 453 067 | 51 606 | 16 513 | 35 091 | - | 2 | 8.84 | 11.39 | 10.07 | 32.00 |
| El Salvador | 4 683 | 306 648 | 65 377 | 9 418 | 55 681 | - | 278 | 6.55 | 21.32 | 13.96 | 14.41 |
| French Guiana | 73 | 10 391 | 1 051 | 963 | 87 | | 1 | 14.23 | 10.11 | 14.40 | 91.63 |
| Guatemala | 3 002 | 442 745 | 64 024 | 4 184 | 59 668 | - | 172 | 14.75 | 14.46 | 21.33 | 6.24 |
| Guyana | 836 | 59 940 | 2 102 | 179 | 1 912 | 2 | 9 | 7.17 | 3.51 | 2.51 | 8.52 |
| Haiti | 4 729 | 308 075 | 53 954 | 53 954 | - | - | - | 6.51 | 17.51 | 11.41 | 100.00 |
| Honduras | 3 756 | 336 879 | 37 536 | 2 263 | 35 160 | - | 113 | 8.97 | 11.14 | 14.36 | 6.03 |
| Mexico | 40 247 | 1 605 030 | 74 172 | 1 327 | 72 742 | 3 | 100 | 3.99 | 4.62 | 1.84 | 1.79 |
| Nicaragua | 3 165 | 412 858 | 12 907 | 988 | 11 889 | - | 30 | 13.04 | 3.13 | 4.08 | 7.65 |
| Panama | 1 923 | 380 135 | 341 | 147 | 187 | - | 7 | 19.77 | 0.09 | 0.18 | 43.11 |
| Paraguay | 2 635 | 84 630 | 49 | 10 | 39 | - | - | 3.21 | 0.06 | 0.02 | 20.41 |
| Peru | 6 193 | 224 650 | 28 563 | 51 | 28 511 | 1 | - | 3.63 | 12.71 | 4.61 | 0.18 |
| Suriname | 281 | 58 538 | 1 943 | 1 604 | 339 | - | - | 20.83 | 3.32 | 6.91 | 82.55 |
| Venezuela | 11 264 | 225 690 | 8 388 a) | 880 | 7 463 | 6 | 38 | 2.00 | 3.72 | 0.74 | 10.49 |
| Total | 174 243 | 8 978 699 | 828 677 | 290 035 | 533 758 | 67 | 4816 | 5.15 | 9.23 | 4.76 | 35.00 |

* ABER: Annual Blood Examination Rate.
SPR: Slide Positive Rate.
API: Annual Parasite Incidence.

a) Includes one case of P. ovale.

Table 8

SLIDES EXAMINED AND POSITIVES, BY SPECIE AND CLASSIFICATION

MAINTENANCE PHASE, 1983

| Country or other political or administrative unit | Blood slides examined | Total positives | Specie of Parasite | | | | Classification of cases | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | P.falciparum | P.vivax | P.malariae | Mixed Infections | Autochthonous | Relapsing | Imported from abroad | Imported from areas within country | Induced | Introduced | Criptic and unclassified | No investigated |
| Argentina | 16 406 | 301 | - | 300 | - | 1 | 278 | 7 | 10 | - | 1 | 2 | 3 | - |
| Belize | 3 469 | 108 | 53 | 55 | - | - | - | - | 1 | 43 | - | - | 4 | 60 |
| Brazil | 131 035 | 1 056 | 319 | 688 | 1 | 48 | 44 | 8 | 7 | 962 | 1 | 2 | 1 | 31 |
| Cuba a) | 399 839 | 194b) | 39 | 145 | 4 | - | - | - | 193 | - | - | 1 | - | - |
| Dominica | 2 | 0 | - | - | - | - | - | - | - | - | - | - | - | - |
| Dominican Republic | 284 391 | 2 593 | 2 593 | - | - | - | 842 | - | 73 | 1 | - | - | - | 1 677 |
| French Guiana | 5 944 | 552 | 523 | 28 | - | 1 | 362 | - | 49 | 122 | - | - | 7 | 12 |
| Grenada | 11 | 0 | - | - | - | - | - | - | - | - | - | - | - | - |
| Guadaloupe | 1 | 1 | - | - | 1 | - | - | - | 1 | - | - | - | - | - |
| Guyana | 18 322 | 273 | 5 | 265 | 2 | 1 | - | 1 | 7 | 111 | - | - | - | 154 |
| Jamaica | 5 162 | 4 | 1 | 3 | - | - | - | - | 4 | - | - | - | - | - |
| Martinique | 1 | 1 | 1 | - | - | - | - | - | 1 | - | - | - | - | - |
| Mexico | 28 054 | 123 | 2 | 121 | - | - | 103 | 1 | 2 | 12 | 1 | - | 4 | - |
| Paraguay | 7 558 | 0 | - | - | - | - | - | - | - | - | - | - | - | - |
| Peru | 41 860 | 780 | 1 | 779 | - | - | - | 1 | 6 | 145 | 1 | - | - | 17 |
| Puerto Rico | 2 | 2 | 1 | 1 | - | - | - | - | 2 | - | - | - | - | - |
| Saint Lucia | 0 | 0 | - | - | - | - | - | - | - | - | - | - | - | - |
| Suriname | 7 023 | 236 | 236 | - | - | - | 3 | - | 5 | - | - | 54 | - | 174 |
| Trinidad & Tobago | 7 776 | 3 | 1 | 2 | - | - | - | - | 3 | - | - | - | - | - |
| United States of Amer. | 605 | 605c) | 182 | 334 | 27 | 1 | - | - | 600 | - | 3 | - | 1 | - |
| Venezuela | 116 287 | 3 154 | 339 | 2 809 | 2 | 4 | 539 | 3 | 120 | 205 | 1 | 2 268 | 4 | 14 |
| T O T A L | 1 073 748 | 9 986 | 4 296 | 5 530 | 37 | 56 | 2 851 | 21 | 1 084 | 1 601 | 8 | 2 327 | 24 | 2 139 |

a) Information up to September. b) Included 6 cases without diagnostic of specie. c) Includes 12 P. ovale & 49 without diagnostic of specie. One case was classified as congenital.

Table 9

SLIDES EXAMINED AND POSITIVES, BY SPECIE AND CLASSIFICATION,
CONSOLIDATION PHASE, 1983

| Country or other political or administrative unit | Population (thousands) | Blood slides examined | Total Cases | API* | Specie of Parasite | | | | Origin of Infections | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | P. falciparum | P. vivax | P. malariae | Mixed Infections | Autochthonous | Relapsing | Imported from abroad | Imported from areas within country | Induced | Introduced | cryptic | Unclassified or not investigated |
| Argentina | 76 | 1 481 | 4 | 0.05 | - | 4 | - | - | - | 1 | 2 | 1 | - | - | - | - |
| Brazil | 21 978 | 701 681 | 3 272 | 0.1 | 1 341 | 1 858 | 1 | 72 | 296 | 2 | 32 | 2 572 | 1 | 32 | 5 | 332 |
| Colombia | 13 150 | 187 290 | 7 142 | 0.5 | 2 013 | 5 109 | - | 20 | 428 | 10 | 32 | 4 241 | 6 | 41 | 334 | 2 050 |
| Costa Rica | 601 | 65 230 | 84 | 0.1 | 3 | 81 | - | - | 21 | - | 58 | 1 | - | - | - | 4 |
| Dominican Republic | 50 | 7 571 | 256 | 5.1 | 256 | - | - | - | 41 | - | 1 | - | - | 1 | - | 213 |
| Ecuador | 2 237 | 121 870 | 6 616 | 3.0 | 1 148 | 5 467 | - | 1 | 2 432 | 3 | 7 | 618 | - | 5 | 5 | 3 546 |
| French Guiana | 30 | 2 815 | 206 | 7.0 | 196 | 10 | - | - | 172 | - | 11 | 9 | - | - | 4 | 10 |
| Mexico | 22 935 | 547 546 | 10 456 | 0.5 | 214 | 10 224 | - | 18 | 2 180 | 151 | 32 | 340 | 6 | 41 | 70 | 7 636 |
| Panama | 1 773 | 198 728 | 17 | 0.01 | 4 | 13 | - | - | - | - | 10 | 6 | - | - | 1 | - |
| Paraguay | 1 274 | 36 271 | 4 | 0.00 | - | 4 | - | - | ... | ... | ... | ... | ... | ... | ... | ... |
| Peru | 2 863 | 129 169 | 19 233 | 6.7 | 6 | 19 226 | 1 | - | 4 853 | - | - | 586 | - | - | - | 13 794 |
| Suriname | 3 | 3 095 | 63 | 21.0 | 63 | - | - | - | - | - | 6 | 30 | - | 5 | - | 22 |
| TOTAL | 66 970 | 2 002 747 | 47 353 | 0.7 | 5 244 | 41 996 | 2 | 111 | 10 423 | 167 | 191 | 8 404 | 13 | 125 | 419 | 27 607 |

* Annual parasite incidence.

... No information available.

Table 10

SLIDE EXAMINED AND POSITIVES BY SPECIE,
ATTACK PHASE, 1983

| Country or other political or administrative unit | Slides examined | | | Species found | | | |
|---|---|---|---|---|---|---|---|
| | Total | Positive | | *P. falciparum* | *P. vivax* | *P. malariae* | Mixed Infections |
| | | Number | Percentage | | | | |
| Argentina | 9 132 | 229 | 2.5 | - | 229 | - | - |
| Belize | 28 420 | 4 487 | | 581 | 3 906 | - | - |
| Bolivia | 150 863 | 14 334 | 9.5 | 1 657 | 12 626 | - | 51 |
| Brazil | 2 010 135 | 289 404 | 14.4 | 140 660 | 145 287 | 12 | 3 445 |
| Colombia | 346 192 | 97 860 | 28.3 | 45 519 | 51 979 | 41 | 321 |
| Costa Rica | 53 303 | 108 | 0.2 | 2 | 106 | - | - |
| Dominican Rep. | 29 627 | 952 | 3.2 | 952 | - | - | - |
| Ecuador | 330 131 | 44 904 | 13.6 | 15 363 | 29 540 | - | 1 |
| El Salvador | 306 648 | 65 377 | 21.3 | 9 418 | 55 681 | - | 278 |
| French Guiana | 1 632 | 293 | 18.0 | 244 | 49 | - | - |
| Guatemala | 427 504 | 61 800 | 1.5 | 4 121 | 57 509 | - | 170 |
| Guyana | 41 618 | 1 829 | 4.4 | 174 | 1 647 | - | 8 |
| Haiti | 308 075 | 53 954 | 17.5 | 53 954 | - | - | - |
| Honduras | 334 837 | 37 272 | - | 2 376 | 34 896 | - | - |
| Mexico | 1 019 199 | 63 324 | 6.2 | 1 108 | 62 134 | - | 82 |
| Nicaragua | 412 858 | 12 907 | 3.1 | 988 | 11 889 | - | 30 |
| Panama | 181 407 | 324 | 0.2 | 143 | 174 | - | 7 |
| Paraguay | 37 227 | 40 | 0.1 | 8 | 32 | - | - |
| Peru | 53 621 | 8 550 | 16.0 | 44 | 8 506 | - | - |
| Suriname | 36 767 | 1 342 | 3.6 | 1 013 | 329 | - | - |
| Venezuela | 107 765 | 4 771 | 4.4 | 518 | 4 219 | 4 | 30 |
| Total | 6 226 961 | 764 061 | 12.5 | 278 843 | 480 738 | 57 | 4 423 |

Table 11

SLIDES EXAMINED AND POSITIVES BY SPECIE,
NON-MALARIOUS AREAS, 1983

| Country or other political or administrative unit | Slides examined | | | Species found | | | |
|---|---|---|---|---|---|---|---|
| | Total | Positive | | *P. falciparum* | *P. vivax* | *P. malariae* | Mixed Infections |
| | | Number | Porcentage | | | | |
| Argentina | 1 | 1 | - | - | 1 | - | - |
| Bahamas | 10 | 10 | - | ... | ... | ... | ... |
| Barbados | 3 | 3 | - | ... | ... | ... | ... |
| Bolivia | 324 | 107 | 33.0 | 5 | 102 | - | - |
| Brazil | 38 809 | 3 955 | 10.2 | 1 512 | 2 336 | - | 107 |
| Canada | 219 | 219 | - | ... | ... | ... | ... |
| Cayman Islands | 5 | 5 | - | ... | ... | ... | ... |
| Colombia | 2 480 | 358 | 14.4 | 83 | 274 | 1 | - |
| Costa Rica | 1 583 | 53 | 3.3 | 5 | 48 | - | - |
| Ecuador | 1 066 | 86 | 8.1 | 2 | 84 | - | - |
| Guatemala | 15 241 | 2 224 | 14.6 | 63 | 2 159 | - | 2 |
| Grenada | 3 365 | 0 | - | - | - | - | - |
| Honduras | 2 042 | 264 | 13.0 | - | 264 | - | - |
| Mexico | 10 231 | 269 | 2.6 | 3 | 262 | 4 | - |
| Paraguay | 3 574 | 5 | 0.1 | 2 | 3 | - | - |
| Suriname | 11 653 | 302 | 2.6 | 292 | 10 | - | - |
| Uruguay | 3 | 3 | - | ... | ... | ... | ... |
| Venezuela | 1 638 | 463 a) | 28.3 | 23 | 435 | 4 | - |
| Total | 92 247 | 8 327 | 9.0 | 1 990 | 5 978 | 9 | 109 |

a) includes one case of *P. ovale* .

Table 12
COMPARATIVE RESULTS OF ACTIVE AND PASSIVE CASE DETECTION IN MALARIA PROGRAMS IN THE AMERICAS, 1983

| Country or other political or administrative unit | Average number of evaluators | Active case detection | | | Pasive case detection | | | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Blood Slides | | | Average of productive Notification post per month | Blood Slides | | | Average of slides per month per productive notification posts | Blood Slides | | |
| | | Examined | Positive | Percent | | Examined | Positive | Percent | | Examined | Positive | Percent |
| Argentina | 95 | 19 970 | 352 | 1.8 | 94 | 7 050 | 183 | 2.6 | 6.3 | 27 020 | 535 | 2.0 |
| Bahamas | - | - | - | - | - | 10 | 10 | - | - | 10 | 10 | - |
| Barbados | - | - | - | - | - | 3 | 3 | - | - | 3 | 3 | - |
| Belize | 14 | 11 181 | 865 | 7.7 | 152 | 20 708 | 3 730 | 18.0 | 11.3 | 31 889 | 4 595 | 14 4 |
| Bolivia | 94 | 124 395 | 6 547 | 5.3 | 1 283 | 26 792 | 7 894 | 29.5 | 1.7 | 151 187 | 14 441 | 9.5 |
| Brazil | ... | 1 497 543 | 31 334 | 2.1 | 16 751 | 1 384 117 | 266 353 | 19.2 | 7.0 | 2 881 660 | 297 687 | 10.3 |
| Canada | - | - | - | - | - | 219 | 219 | - | - | 219 | 219 | - |
| Cayman Islands | - | - | - | - | - | 5 | 5 | - | - | 5 | 5 | - |
| Colombia | 263 | 172 078 | 24 363 | 14.2 | 4 668 | 363 884 | 80 997 | 22.2 | 6.5 | 535 962 | 105 360 | 19.7 |
| Costa Rica | 109 | 117 779 | 160 | 0.1 | 495 | 2 337 | 85 | 3.6 | 0.4 | 120 116 | 245 | 0.2 |
| Cuba a) | - | 528 | - | - | - | 399 311 | 194 | 0.05 | - | 399 839 | 194 | 0.05 |
| Dominica | - | - | - | - | - | 2 | 0 | - | - | 2 | 0 | - |
| Dominican Republic | 182 | 240 101 | 2 256 | 1.0 | 1 123 | 81 488 | 1 545 | 1.9 | 6.1 | 321 589 | 3 801 | 1.2 |
| Ecuador | 142 | 135 300 | 6 806 | 1.0 | 4 122 | 317 767 | 44 800 | 14.1 | 6.4 | 453 067 | 51 606 | 11.4 |
| El Salvador | 79 | 44 183 | 5 586 | 12.6 | ... | 262 465 | 59 791 | 23.0 | - | 306 648 | 65 377 | 21.5 |
| French Guiana | ... | 3 871 | 70 | 2.0 | 32 | 6 520 | 981 | 15.1 | 17.0 | 10 391 | 1 051 | 10.1 |
| ( enada | - | - | - | - | - | 3 376 | 0 | - | - | 3 376 | 0 | - |
| Guadaloupe | - | - | - | - | - | 1 | 1 | - | - | 1 | 1 | - |
| Guatemala | 84 | 41 616 | 4 277 | 10.3 | 3 770 | 401 129 | 59 747 | 15.0 | 9.0 | 442 745 | 64 024 | 14.5 |
| Guyana | 37 | 41 486 | 1 563 | 3.8 | 54 | 18 454 | 539 | 3.0 | 28.5 | 59 940 | 2 102 | 3.5 |
| Haiti | ... | 35 367b | 1 996b | 5.6 | 3 280 | 272 708b | 51 958b | 19.1 | 7.0 | 308 075 | 53 954 | 17.5 |
| Honduras | 89 | 9 769b | 263b | 2.7 | ... | 327 110b | 37 273 | 11.4 | ... | 336 879 | 37 536 | 11.1 |
| Jamaica | - | - | - | - | - | 5 162 | 4 | 0.1 | ... | 5 162 | 4 | 0.1 |
| Martinique | - | - | - | - | - | 1 | 1 | - | - | 1 | 1 | - |
| Mexico | 2 127 | 1 026 901 | 27 366 | 2.7 | 12 805 | 578 129 | 46 806 | 8.1 | 4.0 | 1 605 030 | 74 172 | 4.6 |
| Nicaragua | ... | 48 297 | 253 | 0.5 | 3 213 | 364 561 | 12 654 | 3.5 | 9.5 | 412 858 | 12 907 | 3.1 |
| Panama | 267 | 350 710 | 265 | 0.1 | 199 | 29 425 | 76 | 0.3 | 12.3 | 380 135 | 341 | 0.1 |
| Paraguay | ... | 44 492 | 23 | 0.1 | 725 | 40 138 | 26 | 0.1 | 4.6 | 84 630 | 49 | 0.1 |
| Peru | 179 | 127 596 | 11 353 | 9.0 | 718 | 97 054 | 17 210 | 17.7 | 11.3 | 224 650 | 28 563 | 12.7 |
| Puerto Rico | - | - | - | - | - | 2 | 2 | - | - | 2 | 2 | - |
| Saint Lucia | - | - | - | - | - | 0 | 0 | - | - | 0 | 0 | - |
| Suriname | 7 | 24 952 | 325 | 1.3 | 63 | 33 586 | 1 618 | 5.0 | 44.4 | 58 538 | 1 943 | 3.3 |
| Trinidad & Tobago | - | 2 543 | 3 | 0.1 | - | 5 233 | 0 | - | - | 7 776 | 3 | 0.04 |
| United States | - | - | - | - | - | 605 | 605 | - | - | 605 | 605 | - |
| Uruguay | - | - | - | - | - | 3 | 3 | - | - | 3 | 3 | - |
| Venezuela | 456 | 145 237 | 2 412 | 1.7 | 512 | 80 453 | 5 976 | 9.1 | 7.1 | 225 690 | 8 388 | - |
| TOTAL | - | 4 265 895 | 128 438 | 3.0 | - | 5 126 808 | 701 289 | 13.7 | - | 9 395 703 | 829 727 | 8.8 |

a) Information up to September.
b) Estimated

Table 13

INSECTICIDES USED IN THE MALARIA PROGRAMS
1983 AND ESTIMATED 1984

| Country or other political or administrative unit | DDT (Kg.) | | | | DDT (Liters) | | Propoxur 50% (Kg.) | | Fenitrothion 40% (Kg) | | O t h e r | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1983 | | 1984 (Est.) | | | | | | | | | |
| | 100% | 75% | 100% | 75% | 1983 | 1984 (Est.) | 1983 | 1984 (Est.) | 1983 | 1984 (Est.) | 1983 | 1984 (Est.) |
| Argentina | 155 | 2 323 | - | 10 000 | - | - | - | - | - | - | 3 092a) | - |
| Belize | 8 000 | - | 8 000 | 16 000 | - | - | - | - | - | - | - | - |
| Bolivia | - | 73 241 | - | 100 000 | - | - | - | - | - | - | - | 10 000b) |
| Brazil | 102 999 | 1 178 128 | 184 000 | 2 000 000 | 15 980 | 40 000 | - | - | - | ... | - | - |
| Colombia | 2 776 | 156 975 | 17 750 | 455 000 | - | - | 1 462 | - | - | 6 200 | 3 984c) | - |
| Cost_ Rica | 444 | 6 258 | 1 000 | 10 000 | - | - | 168 | 2 500 | - | - | - | - |
| Dominican Rep. | 326 | 14 096 | 8 183 | 121 180 | - | - | - | - | - | - | - | - |
| Ecuador | - | 9 486 | 5 000 | 280 000 | - | - | - | - | 62 609d) | 220 000d) | 41 989b) | - |
| El Salvador | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| French Guiana | 740 | 460 | 800 | 500 | 14 800 | 15 000 | - | - | 762 | 1 500 | 2 950b) | 3 000b) |
| Guatemala | - | 2 139 | - | - | - | - | 9 695 | 12 000 | 179 530 | 275 000 | 23 971e) | - |
| Guyana | - | 2 461 | - | 4 000 | 2 569 | 3 500 | - | - | - | - | - | - |
| Haiti | - | - | - | - | - | - | - | - | - | 159 000 | - | - |
| Honduras | 3 372 | 72 246 | - | - | - | - | - | - | 303 878 | 379 496f) | - | - |
| Mexico | 6 142 | 373 602 | 16 640 | 556 340 | - | - | 3 632 | 23 980 | 1 870 | 50 000 | 2 690g) | 18 080h) |
| Nicaragua | - | 7 256 | - | 12 000 | - | - | - | 59 477 | - | - | 13 761i) | 90 780j) |
| Panama | 1 608 | 25 823 | 1 500 | 25 000 | 32 400 | 30 000 | 9 273 | 9 000 | 757 | 1 000 | - | - |
| Paraguay | - | 22 682 | ... | ... | 258 | ... | 60 | ... | 4 191 | ... | - | - |
| Peru | - | - | - | 500 000 | - | - | - | 10 000 | 2 600 | 300 | - | 2 000k) |
| Suriname | 1 501 | 1 440 | 2 000 | 2 000 | - | - | - | - | - | - | - | - |
| Venezuela | 68 | 116 538 | 710 | 213 792 | 42 015 | 99 219 | 2 532 | 4 700 | 4 842 | 115 000 | 17 656l) | 34 835l) |
| TOTAL..... | 128 131 | 2 065 154 | 245 583 | 4 305 812 | 108 022 | 187 719 | 26 822 | 121 657 | 561 039 | 1 207 496 | 110 093 | 158 695 |

... Information not available.

a) 3,092 Kg. DDT, 50%. b) Malathion 96%. c)1,448 Kg. Malathion 50% and 2,536 Kg. Carbaryl 85%. d) In 1983 includes 13,000 Lt. Fenitrothion concentrated and in 1984 an estimated of 20,000 Lt. e) Chlorphoxim 50%. f) It is also estimated to use 18,975 Lt. of Fenitrothion. g) Includes 1,447 Lt. of Malathion 96%, and 243 Lt. Abate 50%. h) Includes 3,530 Lt. Malathion 96%, 13,680 Kg. Deltamethrine 2.5% and 870 Lt. Abate.
i) Includes 12,315 Kg. Chlorphoxim and 1,446 Kg. Deltamethrine 2.5%. j) Includes 87,780 Kg. Chlorphoxim and 3,000 Kg. Deltamethrine.
k) Kilograms of K-)trine 2.5%. l) Includes HCH, Pencotion, Lindane and Folition.

Table 14

SPRAYINGS WITH RESIDUAL INSECTICIDES APPLIED IN 1982 AND 1983 IN THE MALARIA PROGRAMS OF THE AMERICAS

| Country or other political or administrative unit | Sprayings applied in 1982 | | | | Sprayings applied in 1983 | | | |
|---|---|---|---|---|---|---|---|---|
| | DDT | Propoxur | Fenitrothion | Others | DDT | Propoxur | Fenitrothion | Others |
| Argentina | 11 393 | - | - | - | 8 057 | - | - | - |
| Belize | 15 954 | - | - | - | 8 046 | - | - | - |
| Bolivia | 122 384 | - | - | - | 89 551a) | - | - | - |
| Brazil | 2 334 628 | - | - | - | 1 900 883 | - | - | - |
| Colombia | 506 585b) | - | - | - | 378 055b) | 1 988 | - | - |
| Costa Rica | 19 868 | 1 953 | - | - | 13 592 | 563 | - | - |
| Dominican Rep. | 33 206 | - | - | - | 37 048 | - | - | - |
| Ecuador | 30 206 | - | - | - | 11 592 | - | 48 234 | 40 404c) |
| El Salvador | - | 41 500 | 12 500 | - | ... | ... | ... | ... |
| French Guiana | 8 925 | - | - | - | ... | ... | ... | ... |
| Guatemala | 17 227 | - | 658 948 | 129 793d) | 4 539 | - | 543 614 | 147 780d) |
| Guyana | 5 905 | - | - | - | 5 777 | - | - | - |
| Haiti | - | - | 27 683 | - | - | - | 253 177 | - |
| Honduras | 150 405 | 2 902 | 80 395 | - | 61 544 | - | 182 125 | - |
| Mexico | 724 059 | - | - | - | 613 267 | - | - | - |
| Nicaragua | 8 560 | 29 028 | - | 110 915d) | 28 402 | - | - | 27 869e) |
| Panama | 45 272 | 10 465 | - | - | 47 937 | 11 391 | - | - |
| Paraguay | 51 793 | - | - | - | 45 656 | - | - | - |
| Peru | 132 393 | - | - | - | 95 441 | - | - | - |
| Suriname | 17 191 | - | - | - | 98 761 | - | - | - |
| Venezuela | 305 179 | - | - | 16 717f) | 180 940 | - | - | - |
| TOTAL..... | 4 541 133 | 85 848 | 779 526 | 257 425 | 3 629 088 | 13 942 | 1 027 150 | 216 053 |

a) Sprayings up to November. b) Includes sprayings with DDT, Malathion, Propoxur, Fenitrothion and Carbaryl. c) Sprayings with Malathion. d) Sprayings with Deltamethrine and Chlorphoxim. e) 19,191 sprayings with Chlorphoxim and 8,678 with K-Othrine. f) Sprayings with HCH.

Table 15

INTRADOMICILIARY SPRAYINGS WITH RESIDUAL INSECTICIDES
APPLIED IN 21 COUNTRIES

1980 - 1983

| Insecticide | 1980 | | 1981 | | 1982 | | 1983 | |
|---|---|---|---|---|---|---|---|---|
| | Number of Countries | Number of sprayings | Number of Countries | Number of sprayings | Number of Countries | Number of sprayings | Number of Countries | Number of sprayings |
| DDT | 19 | 9 166 577 | 19 | 7 525 457 | 19 | 4 541 133 | 18 | 3 629 088 |
| FENITROTHION | 1 | 80 244 | 3 | 388 223 | 5 | 810 753 | 5 | 1 027 150 |
| PROPOXUR | 4 | 68 218 | 4 | 62 605 | 6 | 85 848 | 4 | 13 942 |
| CHLORPHOXIM | 1 | 68 971 | 1 | 109 301 | 2 | 135 721 | 2 | 52 863 |
| MALATHION | 2 | 8 633 | 2 | 25 075 | - | - | 2 | 40 404 |
| CARBARYL | 1 | ... | 2 | 12 973 | 1 | ... | 1 | ... |
| DELTAMETHRINE | - | - | - | - | 1 | 104 987 | 1 | 114 108 |
| HCH | 1 | 27 514 | 1 | 16 549 | 1 | 16 717 | 1 | ... |
| K-OTHRINE | - | - | - | - | - | - | 1 | 8 678 |
| TOTAL | - | 9 420 157 | - | 8 140 183 | - | 5 695 159 | - | 4 886 233 |

... No information available.

Table 16

ANTIMALARIAL DRUGS USED IN THE MALARIA PROGRAMS IN 1983

AND ESTIMATED FOR 1984

(In Thousands of Tablets)

| Country or other political or administrative unit | Chloroquine 150 mg. | | Primaquine 15 mg. | | Primaquine 0.5 mg. | | Chloroquine/Primaquine Combined Tablets | | | | Pyrimetamine 25 mg. | | O t h e r s | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Adult dose | | Infant dose | | | | | |
| | 1983 | 1984* | 1983 | 1984 | 1983 | 1984 | 1983 | 1984 | 1983 | 1984 | 1983 | 1984 | 1983 | 1984 |
| Argentina | 11.1 | 10.0 | 6.8 | 5.0 | 4.2 | 5.0 | - | - | - | - | - | - | - | - |
| Belize | 180.0 | 145.0 | 45.0 | 80.0 | 35.0 | 53.0 | - | - | - | - | - | - | - | - |
| Bolivia | 649.2 | 1 400.0 | 100.0 | 840.0 | 42.0 | 420.0 | 15.0 | 95.0 | 3.0 | 45.0 | 5.0 | 52.0 | - | 104.0a) |
| Brazil | 12 075.0b) | 12 000.0b | 2 552.0 | 2 500.0 | 500.0 | 700.0 | 858.0 | 500.0 | 223.0 | 200.0 | 42.0 | - | 616.0c) | 500.0c) |
| Colombia | 1 388.3b) | 2 000.0b | 549.8 | 500.0 | 15.0 | 60.0 | 1 000.0 | 1 500.0 | - | - | 368.7 | 800.0 | 1 556.9d) | 1 880 0d) |
| Costa Rica | 800.0 | 1 000.0 | 90.0 | 100.0 | 50.0 | 50.0 | 100.0 | 300.0 | 60.0 | 100.0 | - | - | - | - |
| Dominican Rep. | 967.0 | 1 500.0 | 205.0 | 10.0 | - | 10.0 | - | 1 750.0 | 5.0 | 500.0 | 0.2 | - | - | - |
| Ecuador | 1 252.0 | 2 050.0 | 368.4 | 350.0 | 161.6 | 150.0 | 299.0 | 500.0 | 29.2 | 100.0 | 4.0 | 5.0 | 9.6e) | 30.0e) |
| El Salvador | 1 029.7 | ... | 453.8 | ... | 247.2 | ... | 4 790.9 | ... | 1 541.0 | ... | - | - | - | - |
| French Guiana | 11.9b) | - | - | - | - | - | 1 650.0 | 2 000.0 | 1 085.0 | 2 000.0 | 21.0 | - | 21.0f) | 50.0f) |
| Guatemala | 1 795.3 | 3 000.0 | 294.3 | 800.0 | 183.0 | 500.0 | 98.1 | 115.0 | 20.3 | 45.3 | - | - | - | - |
| Guyana | 30.0 | 94.7 | 32.0 | 42.5 | 27.0 | 12.4 | - | 2.0 | 2.0 | - | 16.0 | 38.0 | 10.0e) | 23.2e) |
| Haiti | - | 8 130.0 | - | 4 500.0 | - | - | - | - | - | - | - | - | - | - |
| Honduras | 1 827.6 | 3 500.0 | 324.9 | 1 085.0 | 356.4 | 945.0 | 2.5 | - | 2.9 | 1 500.0 | - | - | - | - |
| Mexico | 5 250.0 | 7 000.0 | 1 100.0 | 1 600.0 | 1 400.0 | 1 230.0 | 730.0 | 1 500.0 | 1 850.0 | 1 000.0 | - | - | - | - |
| Nicaragua | 1 102.3 | 5 423.0 | 519.7 | 1 327.8 | 106.2 | 591.2 | - | - | - | - | - | - | - | - |
| Panama | 248.3b) | 346.9 | 2.6 | 2.8 | 1.3 | 1.4 | 244.0 | 249.5 | 59.0 | 26.4 | 0.3 | 0.2 | 1.4e) | 1.2e) |
| Paraguay | 470.0 | 517.0 | 1.0 | 1.1 | 0.2 | 0.2 | - | - | - | - | - | - | - | - |
| Peru | 994.0 | 1 153.0 | 261.0 | 400.0 | 126.0 | 100.0 | 7.0 | - | - | - | 35.0 | - | 1.8g) | 2.0g) |
| Suriname | 200.0 | 200.0b) | 31.0 | 30.0 | 30.6 | 20.0 | 2.0 | 3.0 | - | 2.0 | 108.0 | - | 208.0h) | 1 552.0h) |
| Venezuela | 975.0 | 2 500.0 | 160.0 | 250.0 | 55.0 | 60.0 | 910.0 | 1 250.0 | 110.0 | 200.0 | 50.0 | 75.0 | 0.4i) | 7.0i) |
| T O T A L | 31 256.7 | 51 969.6 | 7 097.3 | 14 424.2 | 3 340.7 | 4 908.2 | 10 706.5 | 9 764.5 | 4 990.2 | 5 718.7 | 650.2 | 970.2 | 2 425.1 | 4 149.4 |

a) 100,000 Tabs. of Sulphate of Quinine of 250 mg. 2,000 Tabs. Fanasil & 2,000 of Fansidar. b) Includes Tabs. of Amodiaquine of 150 mg. c) Includes 45,000 Tabs. of Fanasil, 327,000 Tabs. Fansidar & 244,000 Tabs. of Sulphate of Quinine in 1983 & 300,000 Tabs. of Fansidar & 200,000 Tabs. of Quinine in 1984. d) in 1983 includes: 112,000 Tabs. of Fanasil, 25,500 of Quinine, 59,300 of Fansidar, 1,360,000 Tabs. of Camoprim & in 1984: 200,000 Tabs. of Fanasil, 80,000 of Quinine, 100,000 of Fansidar, 1,500.000 Tabs. of Camoprim. e) Includes Tabs. of Fanasil & Fansidar. f) Includes Fanasil & Nivaquine of 100 mg. g) Includes Tabs. of Fanasil & Quinine Hidrochloride of 300 mg. h) Includes Tabs. of Darachlor, Paludrine, Fansidar & Quinine. i) Includes Tabs. of Fansidar & Sulphate of Quinine.

Table 17

ANTIMALARIAL DRUGS USED IN 21 COUNTRIES
OF THE AMERICAS 1980 - 1983

| DRUGS | | QUANTITIES | | | |
|---|---|---|---|---|---|
| | | 1980 | 1981 | 1982 | 1983 |
| 4-aminoquinolines | | | | | |
| Chloroquine 150 mg. | Tabs. | 39 557 700 | 49 965 200 | 26 945 700 | 24 677 900 |
| Amodiaquine 150 mg. | Tabs. | 45 000 | - | 6 018 400 | 6 628 800 |
| 8-aminoquinolines: | | | | | |
| Primaquine 15 mg. | Tabs. | 4 962 400 | 7 697 600 | 4 623 900 | 7 097 300 |
| Primaquine 0.5 mg. | Tabs. | 2 893 100 | 6 295 800 | 3 921 400 | 3 340 700 |
| Chloroquine/Primaquine(150/15) | Tabs. | 8 287 200 | 7 742 300 | 9 340 200 | 10 706 500 |
| Chloroquine/Primaquine(75/7.5) | Tabs. | 502 700 | 1 585 600 | 5 779 400 | 4 990 200 |
| Pyrimethamine 25 mg. | Tabs. | 1 101 300 | 970 000 | 1 617 100 | 650 200 |
| Sulphadoxine 500 mg. | Tabs. | 229 100 | 301 000 | 425 600 | 181 100 |
| Sulphadoxine/Pyrimethamine | Tabs. | 27 800 | 60 000 | 104 400 | 464 100 |
| Chloroquine/Pyrimethamine | Tabs. | 289 000 | 121 000 | 187 400 | 143 000 |
| Quinine - Sulphate | Tabs. | - | - | - | 272 600 |
| Quinine - Sulphate | Kilos | - | - | 10 | - |
| Quinine-Chlorhidrate | Kilos | - | - | 25 | 100 |
| Chloroquine - 1 ml. | Amp. | - | - | 350 | - |
| Chloroquine - 3 ml. | Amp. | - | - | 550 | - |
| Camoprime | Tabs. | - | - | - | 1 360 000 |
| Paludrine | Tabs. | - | - | - | 4 000 |

Table 18

PERSONNEL EMPLOYED IN THE MALARIA PROGRAMS IN THE AMERICAS
31 DECEMBER 1982 AND 1983 a)

| Title | 1982 | | 1983 | |
|---|---|---|---|---|
| Ingineers | 70 | | 72 | |
| Spraying Chiefs | 431 | | 440 | |
| Sector Chief | 559 | | 596 | |
| Squad Chief | 1 650 | | 1 459 | |
| Spraymen | 6 752 | b) | 7 328 | b) |
| Draftsmen | 89 | | 89 | |
| Medical Officers | 170 | | 159 | |
| Entomologists | 52 | | 51 | |
| Assistant Entomologists | 281 | | 298 | |
| Statisticians & Statiscians Assistants | 373 | | 381 | |
| Evaluation Inspector | 2 812 | b) | 2 235 | b) |
| Evaluators | 8 352 | b) | 8 855 | b) |
| Microscopists | 953 | | 1 016 | |
| Administrators | 53 | | 56 | |
| Administrative Assistants | 781 | | 690 | |
| Accountants | 46 | | 29 | |
| Disbursing Officers | 45 | | 45 | |
| Storekeepers | 62 | | 63 | |
| Storekeepers Assistants | 76 | | 62 | |
| Secretaries | 386 | | 367 | |
| Others | 465 | | 606 | |
| Transport Chief, Mechanics and Assistant Mechanics | 408 | | 366 | |
| Drivers | 920 | | 908 | |
| Motorboat Operators | 297 | | 289 | |
| Boatment | 88 | | 59 | |
| TOTAL | 26 171 | | 26 519 | |

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

b) In some programs this personnel performs other activities with same categorie

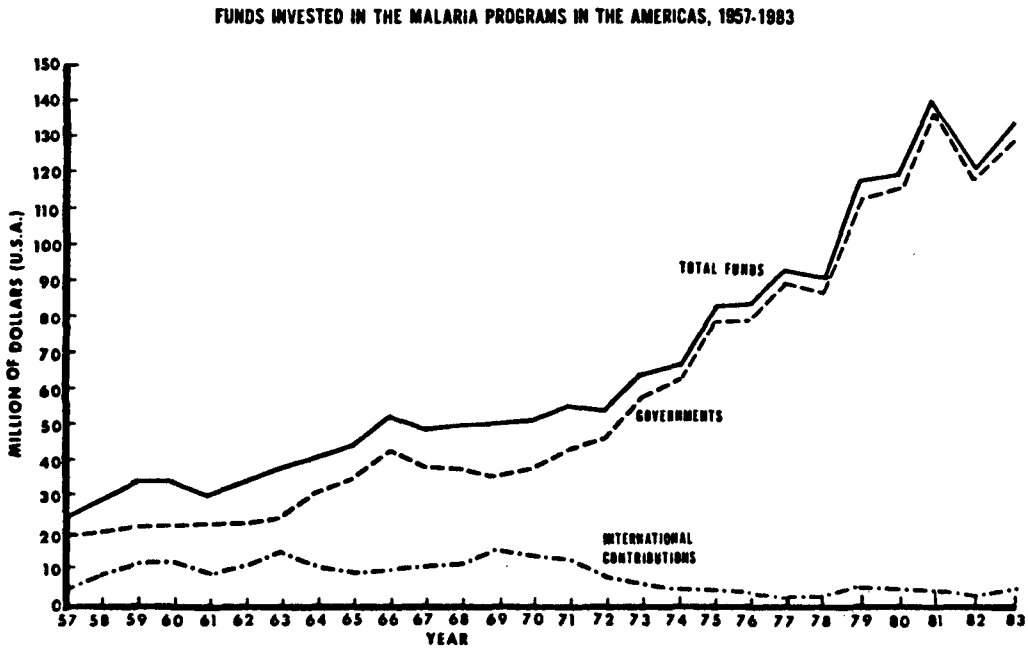
Table 19

NATIONAL AND INTERNATIONAL CONTRIBUTION TO THE MALARIA PROGRAMS OF THE AMERICAS, EXPENDITURE 1982-1983 AND BUDGET 1984

| Country or other Political or administrative unit | National Expenditures a) | | | PAHO/WHO Contributions | | | Grants & Loans | | | T o t a l | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1982 | 1983 | 1984 b) | 1982 | 1983 | 1984 c) | 1982 | 1983 | 1984 | 1982 | 1983 | 1984 |
| Argentina | 38 800 | 61 470 | 128 368 | - | 7 904 | - | | | | 38 800 | 69 374 | 128 368 |
| Belize | 243 030 | 243 030 | 243 030 | 14 580 | 208 314 | 5 550 | | | | 257 610 | 451 344 | 248 580 |
| Bolivia | 44 496 | 310 569 | 71 043 | 65 552 | 75 073 | 63 900 | | | | 110 048 | 385 642 | 134 943 |
| Brazil | 41 449 914 | 51 424 360 | 12 297 666 | 230 553 | 394 399 | 454 300 | 1 369 388 | 8 287 631 | 2 450 000 | 43 049 855 | 60 106 390 | 15 201 966 |
| Colombia | 11 322 481 | 12 857 319 | ... | 204 972 | 328 528 | 299 850 | | | | 11 527 453 | 13 185 847 | 299 850 |
| Costa Rica | 590 475 | 886 694 | 958 620 | 35 306 | 35 306 | - | | | | 625 781 | 922 000 | 958 620 |
| Dom. Rep. | 1 086 204 | 1 207 942 | ... | 17 977 | 29 429 | 35 150 | - | 1 151 000d | | 1 104 181 | 2 388 371 | 35 150 |
| Ecuador | 3 529 412 | 4 109 584 | 3 605 634 | 88 300b) | 88 300b | 51 400 | | | | 3 617 712 | 4 197 884 | 3 657 034 |
| El Salvador | 1 268 429 | 1 136 328 | 1 121 944 | 54 313 | 73 803 | 82 800 | | | | 1 322 742 | 1 210 131 | 1 204 744 |
| F. Guiana | 1 342 517 | 1 377 647 | 1 495 858 | - | - | - | | | | 1 342 517 | 1 377 647 | 1 495 858 |
| Guatemala | 3 589 272 | 3 365 585 | 3 438 320 | 4 266 | 25 744 | 29 950 | | | | 3 593 538 | 3 391 329 | 3 468 270 |
| Guyana | 438 497 | 219 333 | ... | 13 871 | 63 171 | 33 500 | | | | 452 368 | 282 504 | 33 500 |
| Haiti | 1 120 000 | 1 120 000 | 1 176 000 | 298 838 | 307 343 | 344 200 | 900 000e | 900 000e) | 900 000e | 2 318 838 | 2 327 343 | 2 420 200 |
| Honduras | 2 134 950 | 3 633 554 | 3 364 828 | 44 250b) | 48 598b | 56 500 | | | | 2 179 200 | 3 682 152 | 3 421 328 |
| Mexico | 31 518 314 | 16 773 636 | ... | 103 723 | 90 214 | 56 950 | | | | 31 622 037 | 16 863 850 | 56 950 |
| Nicaragua | ... | ... | ... | 18 720 | 57 762 | - | | | | 18 720 | 57 762 | - |
| Panama | 2 136 036 | 2 536 036 | 2 736 137 | 5 993 | 5 993 | - | | | | 2 142 029 | 2 542 029 | 2 736 137 |
| Paraguay | 3 204 681 | 2 885 922 | 1 319 572 | 2 648 | 31 057 | 34 600 | | | | 3 207 329 | 2 916 979 | 1 354 172 |
| Peru | 2 244 | 3 283 | 1 118 | - | - | - | | | | 2 244 | 3 283 | 1 118 |
| Suriname | 422 543 | 874 576 | ... | 61 159 | 68 168 | - | | | | 483 702 | 942 744 | - |
| Venezuela | 12 432 733 | 14 428 176 | 4 163 419 | - | - | - | | | | 12 432 733 | 14 428 176 | 4 163 419 |
| Proyectos inter-país y Oficina Central | - | - | - | 378 432 | 688 705 | 444 500 | - | - | - | 378 432 | 688 705 | 444 500 |
| Total | 117 915 028 | 119 455 044 | 36 121 557 | 1 643 453 | 2 627 811 | 1 993 150 | 2 269 388 | 10 338 631 | 3 350 000 | 121 827 869 | 132 421 486 | 41 464 707 |

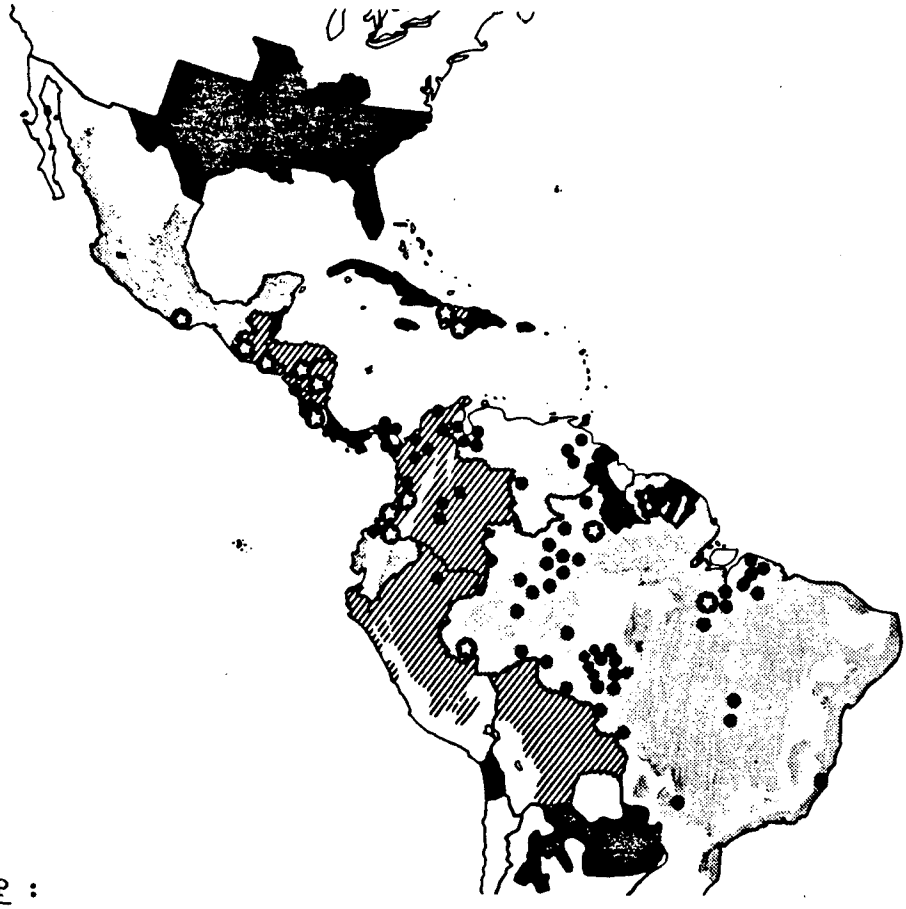
a) Conversion to USA Dollars according to official exchange rate of each year.
b) Estimated.
c) Estimated based on Operating budget, 1984 - 1985.
d) Agreement PL-480.
e) Estimated Grant AID

GRAPH 2


FUNDS INVESTED IN THE MALARIA PROGRAMS IN THE AMERICAS, 1957-1983
MILLION OF DOLLARS (U.S.A.)
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
TOTAL FUNDS
GOVERNMENTS
INTERNATIONAL CONTRIBUTIONS
57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83
YEAR

MAP 5

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



GROUP :

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

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

III - Brazil, Ecuador, Mexico, Suriname and Venezuela.

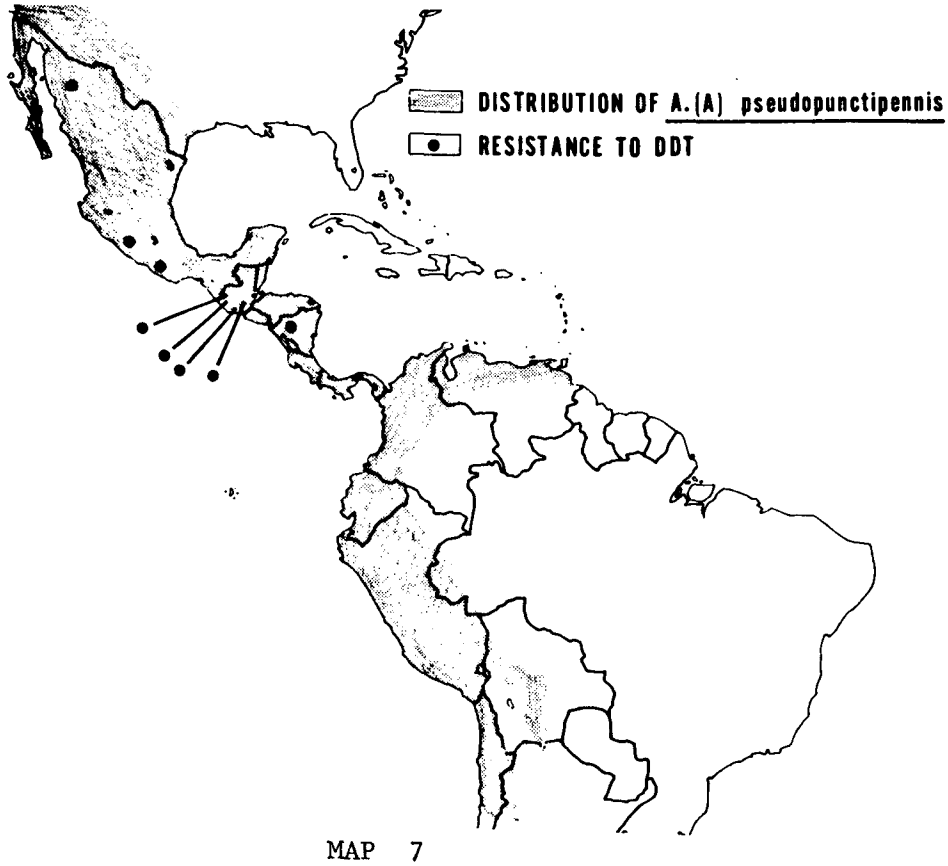
IV - Bolivia, Colombia, El Salvador, Guatemala, Haiti, Honduras, Nicaragua and Peru.

P. falciparum response to chloroquine:

- Sensitive
- Resistant

MAP 6

## DISTRIBUTION OF A. (A) pseudopunctipennis AND RESISTANCE TO DDT (DECEMBER 1983)




MAP 7

## DISTRIBUTION OF A. (N) albimanus AND RESISTANCE TO DDT AND PROPOXUR (DECEMBER 1983)

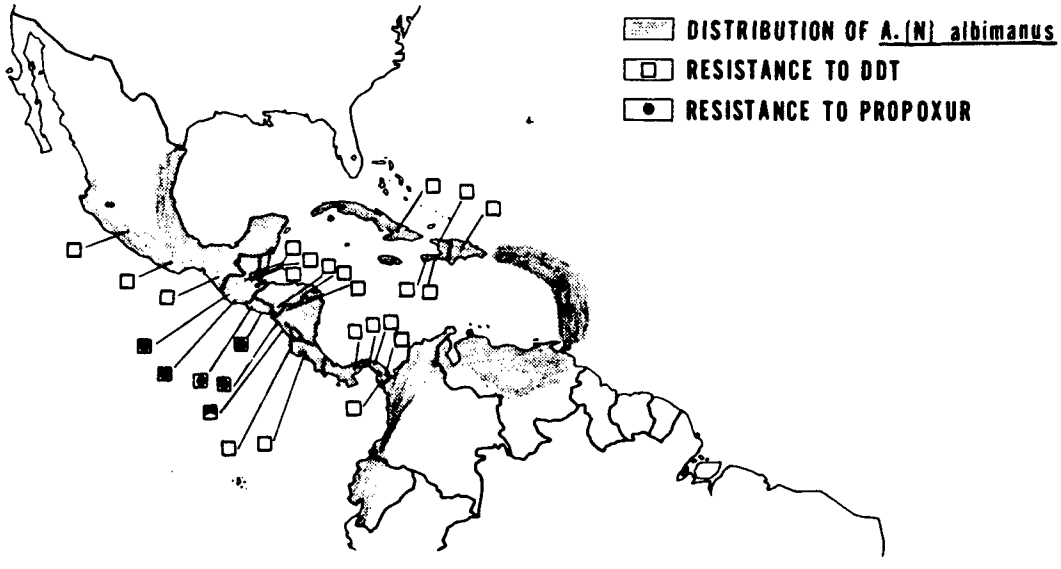


Table 20

GEOGRAPHICAL DISTRIBUTION OF AREAS WITH TECHNICAL PROBLEMS, 1983

| Country and Area | Population of affected Areas | Areas Involved $Km^2$ | Insecticides used | | No. of cases in this area | Principal vectors | Causes of the Problem |
|---|---|---|---|---|---|---|---|
| | | | Type Used | Years of coberage | | | |
| Argentina | | | | | | | |
| 1. Tartagal - Oran | 83 349 | 11 275 | DDT | 24 | 229 | A. pseudopun. | Migration |
| Bolivia | | | | | | | |
| 2. Department Beni Prov. Vaca Díez | 56 706 | 22 434 | DDT | 25 | 4 479 | A. darlingi | Migration, activities of darlingi |
| Brazil | | | | | | | |
| 3. Acre<br>4. Amapá<br>5. Amazonas<br>6. Goais<br>7. Maranhao<br>8. Mato Grosso<br>9. Pará<br>10 Rondonia<br>11. Roraima | 3 115 947 | 1 823 063 | DDT | 16 | 230 777 | A. darlingi | Intensive population movements, poor housing, P. falciparum resistance. |
| Colombia | | | | | | | |
| 12. Bajo Cauca (Nechi) Urabá, Litoral Pacífico, Magdalena, Medio, Catatumbo, Sarare, Ariari-Guejar, Vaupes, Caquetá, Putumayo Guaviare. | 2 308 751 | 354 148 | DDT<br>Propoxur | 9-23 | 76 993 | A. darlingi<br>A. punctimac.<br>A. nuñeztovari<br>A. albimanus<br>A. pseudopun.<br>A. neivae<br>A. albitarsis | Vector behavior; poor housing; colonization; social problems; parasite resistance to chloroquine; refusal to spraying; population movements. |
| Dominican Republic | 85 915 | 2 786 | DDT | ... | 1 003 | A. albimanus<br>A. crucian | ... |
| Ecuador | | | | | | | |
| 13. Esmeraldas | 301 979 | 17 807 | DDT<br>Fenitrothion | 15<br>3 | 16 112 b) | A. punctimac.<br>A. albimanus<br>A. pseudopun. | Operational and administrative problems; colonization; poor housing; parasite resistance to chloroquine. |
| El Salvador | | | | | | | |
| 14. Pacific Coastal | 1 600 000 | 4 819 | DDT<br>Propoxur | 10<br>7 | 49 033 (85% of the total) (c) | A. albimanus | Vector resistance to all insecticides. Population movements poor housing. |

a) Information up to 1982.
b) Cases registered in this area from January throu October.
c) Estimated.

Table 20 (Cont.)

GEOGRAPHICAL DISTRIBUTION OF AREAS WITH TECHNICAL PROBLEMS, 1983

| Country and Area | Population of affected areas | Areas Involved $Km^2$ | Insecticides used | | No. of cases in this area | Principal vectors | Causes of the Problem |
|---|---|---|---|---|---|---|---|
| | | | Type Used | Years of coberage | | | |
| Guatemala | | | | | | | |
| 15. Pacífic Coastal Zone | 3 002 482 | 80 570 | Fenit.<br>Deca-metrine | 4<br>3 | 63 983 | A. albimanus<br>A. vestitipennis<br>A. pseudopun. | Activities interrupted by socio-political problems. Vecto resistance to insecticides. Lack of insecticides. |
| French Guiana | | | | | | | |
| 16. Mariposoula, Grand Santi, Camopi, Trois Sauts, St. George Remiere, Montjoly, Macouria and Montsinery | 10 850 | 188 | DDT | 3-15 | 719 | A. darlingi | External migration; population movement. |
| Guyana | | | | | | | |
| 17. Rupununi, Northwest Zone | 50 000 | 20 200 | DDT | 19 | 1 423 | A. darlingi | Lack or transportation and personnel. |
| Haití a) | | | | | | | |
| 18. Cité Simone O. Duvalier Jacmel; Valle de la Coma; Gross-Morne, Sur este del país; Petit-Goave; Bois Neuf. | 1 332 863 | ... | DDT | De 4 a 17 | 26 717 | A. albimanus | Vector resistance to DDT; population movements. |
| Honduras a) | | | | | | | |
| 19. South Area; Jamastran Valley; Talanga and Cedros Valleys | 237 635 b) | 5 436 a) | Malathion<br>DDT<br>Prop. | 9 | ... | A. albimanus<br>A. pseudopun. | Vector resistance to chlorinated, organophosphorus & Carbamate insecticides. |
| México | | | | | | | |
| 20. Basins of Rivers Fuerte Sinaloa, Humaya and Tamazula;<br>21. Huicot<br>22. Basin of Balsas River<br>23. Costa Chica of Guerrero & Oaxaca Coastal Zone<br>24. South Border of Mexico<br>25. Central part of Chiapas | 4 716 913 | 211 015 | DDT<br>Dieldrin | 27 | 43 300 | A. pseudopun.<br>A. albimanus | Internal migration; poor housing; temporary shelters; modification of houses vector resistance to DDT; action that remove insecticides from surfaces. |

... No information available.
a) Information up to 1980.
b) Information up to 1979.

Table 20 (Cont.)

GEOGRAPHICAL DISTRIBUTION OF AREAS WITH TECHNICAL PROBLEMS, 1982

| Country and Area | population of affected Areas | Areas Involved $Km^2$ | Insecticides used | | No. of cases in this area | Principal vectors | Causes of the Problem |
|---|---|---|---|---|---|---|---|
| | | | Type Used | Years of coberage | | | |
| Nicaragua a) | | | | | | | |
| 26. Dpto. Chinandega, Leon & Managua<br>Dpto. Granada<br>Rivas | 3 165 100 | 118 358 | DDT<br>Mal.<br>Propoxur<br>Delta | 24<br>5<br>8<br>1 | 12 907 | A. albimanus | Vector resistance to DDT, Malathion and Propoxur. |
| Panama | | | | | | | |
| 27. Bocas del Toro<br>Pto. Piña, Tobobe,<br>Pto. Obadía,<br>Tucutí, San Blás. | 9 307 | 4 210 | DDT<br>Propoxur<br>MAL. | 26<br>1 to 5<br>1 | 278 | A. albimanus | Migration; poor housing; parasite resistance; population movements. |
| Peru | | | | | | | |
| 28. Col. San Lorenzo;<br>Bigote, Chinchipe,<br>Bagua<br>Santiago, Ene-Satipo<br>Bajo Marañon | 246 801 | 143 010 | DDT | 19-23 | 4 553 | A. albimanus<br>A. pseudopun.<br>A. rangeli<br>A. benarrochi | High vulnerability; poor housing; migration of laborers; temporary shelters; actions that remove insecticides from surfaces. |
| Venezuela | | | | | | | |
| 29. Western and Southern Areas | 670 020 | 139 946 | DDT | 35 | 3 851 | A. nuñeztovari<br>A. darlingi | Vector exophily; population movement; anthropological problems. |
| TOTAL | 20 994 618 | 2 959 265 | - | - | 536 128a) | - | - |

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, Perú and large extension of Brazil in the 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.

a) Number of cases of some countries are for 1979, 1980 and 1982.