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STATUS REPORT ON MALARIA PROGRAMS IN THE AMERICAS
(Based on 2002 data)

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Malaria was one of the prevalent infectious diseases that provoked a resolution of the Second International Conference of American States held in Mexico, January 1902, which recommended that "a general convention of representatives of the health organizations of the different American republics" be convened. The convention held in Washington, D.C., U.S.A; on 2-4 December 1902, was the predecessor of the current Pan American Health Organization (PAHO).

Subsequent quadrennial Pan American Sanitary Conferences discussed a wide range of malaria related topics. Among these were recommendations to member countries on free quinine distribution and exemption of taxes on products used in prevention and control of the disease.

During the early years of the twentieth century, malaria transmission occurred throughout the Americas from Canada to Argentina. In the United States, after identifying malaria as a serious health problem in the country, the Rockefeller Foundation funded four malaria experiments in Mississippi and Arkansas as of 1915, as well as Cooperative Malaria Control Demonstrations by the United States Public Health Service as of 1920.

The experience and knowledge gained by efforts in the U.S.A., Cuba and Panama in the Americas, as well as those in endemic areas of Europe, Africa and India, inter alia, were the bases on which malaria control activities were developed and strengthened in the Region.

Nevertheless, malaria was still identified as "the disease that causes most harm to the greater number of nations of the Continent" by the XI Pan American Sanitary Conference in 1942. It recommended that the Malaria Committee of the Pan American Sanitary Bureau be considered the consulting organization for carrying out survey and malaria control programs in the Americas.

PAHO undertook that role and has continued monitoring and supporting efforts in the Region. With its development, testing and confirmed insecticide effectiveness demonstrated in 1941-42, DDT began being used in the Region. By 1948, it had shown great success in reducing malaria and even eliminating transmission in large areas of two South American countries, Guyana and Venezuela, a result of the efforts led by Drs. George Giglioli and Arnoldo Gabaldon in the respective countries. There was additional information on successes in resolution of the malaria problem in Argentina, the U.S.A. and marked progress in Brazil and Ecuador. These were some of the examples used in promoting the call for eradication of the disease.

As a result, in 1954, the XIV Pan American Sanitary Conference in Chile gave the Pan American Sanitary Bureau responsibility for support and coordination of malaria eradication from the Americas. These efforts were strongly supported by UNICEF.

The World Health Organization (WHO), functioning as an Interim Commission in 1946, had identified malaria, tuberculosis and venereal diseases as the major health problems and named an expert committee on malaria in 1947. In spite of successes reported from the Americas and Sri Lanka and reservations about its potential for success in other geographical areas, the Global Malaria Eradication Campaign was approved at the Eight World Health Assembly held in Mexico in May 1955.

In undertaking the eradication strategy that focused on combating mosquitoes, efforts in the Americas were supported by PAHO. This support included technical cooperation in training, provision of supplies and equipment, execution, monitoring and evaluation until the eradication strategy was abandoned and replaced by the Global Malaria Control Strategy in 1992.

One of the basic tenets of the control strategy is to ensure accessibility to prompt diagnosis and opportune treatment of the disease through strengthening provision of such attention by the general health service. Additionally, it calls for the implementation of selective and sustainable preventive methods including vector control.

Application of the global malaria control efforts have resulted in a marked reduction of disease related mortality but morbidity continues to have a negative impact on health and development in the Region. It is worth noting that, although areas in some countries where disease elimination was achieved and continue being free of transmission, increases in other areas have been associated with population movement to new districts where socio-economic and environmental factors favor transmission.

In 1998, after recognizing the global burden associated with malaria, the WHO and partners launched a Roll Back Malaria (RBM) Initiative to strengthen efforts within the control strategy. The Initiative aims at reducing morbidity and mortality associated with the disease and advocates building technical malaria control capacity at decentralized levels of the health system, monitoring and evaluation of drug efficacy, promotion of resource networks and control of transmission. PAHO has provided leadership in establishing and promoting the RBM Initiative in the endemic countries. This has also occurred in the non-endemic Caribbean territories where the focus is on preventing re-establishment of transmission.

In the 100 years of PAHO's existence, malaria transmission has been interrupted in Canada, the U.S.A. and all the Caribbean Islands with the exception of Hispaniola. Transmission is still reported from 21 of the 37 territories in the Region. Among those where transmission occurs, over 80% of the currently reported cases originate in the nine countries that share the Amazon Rainforest in South America. In recent years, incidence

in Mexico, the seven Central American countries, Haiti and the Dominican Republic has decreased and it is minimal in Argentina and Paraguay. This report on malaria in the Americas during PAHO's centennial year coincides with the sixtieth anniversary since PAHO's Malaria committee was requested to monitor the malaria situation in the Americas. Having produced its first report in 1942, a report based on malaria information received from national programs in member countries has been produced annually by PAHO since 1956.

Introduction

Malaria transmission continues to be reported in twenty-one countries of the Region of the Americas and those countries estimate that 175 million people live in areas with some risk of transmission. In the countries where transmission no longer occurs, it is estimated that approximately 87 million persons live in areas where transmission previously occurred and where there is extremely low risk of transmission at present. The 262 million people living in areas with some potential risk of transmission represent approximately 31% of the 849 million inhabitants of the Region. This information provided by the countries contrasts with that provided in 2001 in which suggested that 35% of the 835 million inhabitants of the Region lived in areas with some risk of malaria transmission.

Among the 175 million persons who live in areas at risk within the 21 countries where transmission occurs, 58% live in areas of low risk, 24% in areas of moderate risk and 18% in areas of high risk, percentages similar to those reported the previous year. In those countries without risk of transmission 11 of 18 countries reported detecting 1285 imported cases in 2002, a 20% increase of imported cases reported by 16 countries in 2001. Canada reported a 76% increase in imported cases while there was an 18% reduction in the U.S.A., the two countries with the greatest number of imported cases. (Table 2a).

The countries continue following the tenets of the global malaria control strategy adopted in 1992 and strive to provide prompt diagnosis and immediate treatment of the disease, the application of preventative and protection measures, to develop the capacity to predict and contain epidemics, strengthen local capacity in basic and applied research to permit and promote monitoring and evaluation of the malaria situation.

The RBM Initiative in the Region of the Americas was launched in October 1999 in the nine countries which share the Amazon Rainforest in South America: Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname and Venezuela, and in "Mesoamerica" comprising Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama, Mexico, Haiti and the Dominican Republic in November 2000. With the aim of preventing the reestablishment of malaria transmission and strengthening diagnosis and clinical management of imported cases in the Caribbean basin, the initiative was launched in Barbados in 2002.

Having proposed the establishment of a Network to Monitor Resistance to Antimalaria Drugs in the Amazon Region (Spanish acronym RAVREDA) at a meeting in Bahia, Brazil in February 2001, the project was initiated in October 2001 as part of the US Agency for International Development (USAID) Latin American and Caribbean Bureau's infectious disease grant to PAHO and the Centers for Disease Control (CDC) to support the USAID's Amazon Malaria Initiative (AMI), to support efforts to RBM in the Amazon Basin. Funds became available at the end of January 2002, and implementation of Regional and National activities began in eight Amazon Basin target countries.

PAHO headquarters has provided overall technical cooperation and coordination and through PAHO country offices has overseen implementation of activities in six of the eight Amazon Basin target countries (Brazil, Colombia, Ecuador, Guyana, Suriname and Venezuela). Support to Peru and Bolivia is provided through USAID field mission programs in those countries, in coordination with PAHO. CDC has provided technical assistance to support implementation of regional and country level activities. During 2002, new partners, RPM Plus (MSH) and USPDQI (United States Pharmacopoeia) were invited to assist with issues related to drug access and management, and drug quality.

Since 1956, the countries of the Region have submitted annual data to PAHO on malaria occurrence due to domestic transmission or imported cases. This information has been used to produce annual reports on the malaria situation. The information provided for 2002 is the source used to prepare this report. Unfortunately, information was not received from Haiti; the data from Peru was received from the General Epidemiology Office and not the Malaria program.

Analysis of the epidemiological situation

Among the 21 countries where malaria transmission occurs, 15% of the population lives in areas of high and moderate transmission and 21% in low risk areas. The percentage of the national population at any risk varies from an estimated 9% in Argentina, to 100% in the Dominican Republic and El Salvador. Honduras, Mexico, Ecuador and Panama reported that more that 15% of their populations live in high risk areas (Table 2b).

The cases reported by the countries was lowest in the past decade as was the number of slides examined. The index of positive slides and case detection in the malarious areas were higher than in the previous year (Table 3).

Of the twenty one countries where transmission occurs, eleven are in South America: Argentina, Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Paraguay, Peru, Suriname and Venezuela. The other ten endemic countries are in Mesoamerica: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua and Panama along with the Dominican Republic and Haiti, the only two countries in the Caribbean basin where transmission occurs.

A small number of cases were reportedly detected in areas with no malaria transmission. Almost 50% of the smears were examined in high risk areas and 17% were positive; there were an almost equal number of slides taken in the moderate and low risk areas with higher percentage positivity in the moderate risk areas.

Of the 885,000 cases reported in the Americas in 2002, Brazil reported 349,873 cases, a 10% decline from the previous year whilst there was an 8% increase in the cases in Colombia and of 47% in Venezuela.

The cases reported by Brazil represented 40% of the total in the Region, as was the case in the previous year. Colombia accounted for 22% of the cases, followed by 10% in both Ecuador and Peru. These four countries accounting for 82% of the cases and together with Guatemala, Guyana, Honduras, Suriname and Venezuela, accounted for 95% of all cases in 2002 (Table 4).

The risk of malaria transmission is related to the social, economic and ecological characteristics of the area in which people live. The Annual Parasite Index (API) is the number of reported cases among every thousand people living in a geographical area and is used to estimate the level of risk.

Among the 175 million people reportedly living in areas with some risk of transmission, it is estimated that 5.05 per 1000 were infected during the year. Of these, 1.43 per 1000 were infected by *Plasmodium falciparum* and 3.6 per 1000 by *Plasmodium vivax*. Transmission of *P. vivax* occurs in all countries with the exception of the Haiti and the Dominican Republic. Infections due to a third parasite, *P. malariae,* were reported in the Region. Of the cases, 65% were reported in Suriname and 33% in Brazil. Suriname is the only country in the Region with a higher risk of infection by *P. malariae than P. vivax* (Table 5a).

For the first time, information was received on case distribution by age group and sex in the Region. Thirteen of the 21 endemic countries provided information by age group of cases and 12 of them also provided information by gender. The information reflected on average 60.5% of the cases occurred in persons between 15 and 49 years of age. Additionally, in three countries the percentage of cases in this group was less than 50%, corresponding to Guatemala which reported 38.3%, Suriname 41.1%, and Honduras 41.4%. On average 10.5% of the cases occurred in children between one and four years of age in the Region; the percentage in this group was greater in Guatemala 16.9% and Suriname 21.4%. At the same time, the percentage of cases in this group was 5% or less in Argentina, Ecuador and the Dominican Republic. The majority of cases were among males in all countries with the exception of Suriname and Honduras (Figure 5).

Sub Regions

Approximately 70 million people live at risk of malaria in the nine South American countries which share the Amazon rainforest and it was in these countries: Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname and Venezuela, where 91% of the malaria cases in the Region were reported in 2002 (Tables 2b & 4).

In Mesoamerica, among Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua and Panama, of the approximately 68,000 cases reported, 88% occurred in Honduras, Guatemala and Nicaragua. In comparison with the previous year, with the exception of Honduras, reduced numbers of cases were reported by all countries. Data from the Dominican Republic reflected a 25% increase in the number of cases with respect to 2001.

The malaria control programs in Argentina and Paraguay, respectively, estimate that 9% and 41% of their populations live in malaria risk areas. In 2002, Argentina reported detecting 215 cases among 5045 samples examined, while 2778 cases were diagnosed among 99,338 slides examined in Paraguay. This represents positivity rates of 4.3% and 2.3% respectively.

As a group, the Andean countries accounted for the highest percentage of cases followed by Brazil and the Central American territories (Figure 4).

Malaria classification

Estimating malaria risk in malarious areas is through use of the API. The standard, used by most countries, classifies areas with over 10 cases per 1000 persons living in a given geographic area as high risk, areas with less than one case per thousand people as low risk areas and areas with intermediate rates as medium risk. Brazil classifies areas with an API less than 10 as being of low risk and areas with an API above 50 as high risk areas. Based on the number of cases reported and the estimated populations, the average API was 9.96 in the areas classified by the respective countries as being of high and moderate risk. Although Brazil, Colombia, Peru and Ecuador reported the highest numbers of cases in 2002, the countries with the highest overall rates were Guyana and Suriname, followed by Colombia, Brazil, Venezuela, Ecuador and Guatemala. The *P. falciparum* infection rates were highest in Suriname, Guyana, Colombia and Brazil. The rates for *P. vivax* were highest in Guyana, Brazil, Venezuela and Suriname (Table 5 and Figure 2).

Detection, management and prevention of malaria

P. vivax is the predominant malaria parasite in the Region, representing 71% of the almost 884,000 cases in the countries with transmission (Table 5a). The majority of the other cases were due to *P. falciparum* with almost all of these cases occurring in the nine countries that share the Amazon rainforest along with Haiti and the Dominican Republic. *P. falciparum* was also the cause of 15% of the cases in Panama, 13% in Nicaragua, 5% in Guatemala and 3.5% of those in Honduras. Mortality due to malaria is generally associated with *P. falciparum* and 150 deaths were reported in Brazil, Colombia, Peru, Bolivia, Dominican Republic and Nicaragua, an average fatality rate of 8 deaths per 10,000 cases in those countries. A similar calculation using data from these countries in 2001 revealed a fatality rate of approximately 10 per 10,000 cases. With the

highest *P. falciparum* rates reported in Guyana and Suriname, it can be assumed that malaria associated deaths also occurred in those countries and that there may be underreporting of deaths due to malaria. If the fatality rates, previously calculated from data for the six countries over the past two years, are applied as an average for the entire Region, it could be postulated that there may have been between 200-250 malaria deaths among the 251,000 *P. falciparum* cases in 2002.

In Brazil, the percentage of cases due to *P. vivax* was 76.7%. In Mexico and the Central American countries, Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama this parasite accounted for 95% of the 68,828 cases reported in those countries.

All cases in Argentina and Paraguay are due to *P. vivax*, while in the Andean countries (Bolivia, Colombia, Ecuador, Peru and Venezuela) it was the cause of 67.9% of their cases in 2002.

In Haiti and the Dominican Republic, the only two countries in the Caribbean basin where transmission occurs, all cases are caused by *P. falciparum*.

The highest rates for both parasites were in Guyana and Suriname. Of the countries where both parasites are prevalent, it is only in these countries where *P. vivax* was not the predominant species, being the cause of 36.7% of the cases in 2002 (Figure 3).

With the exception of data on case detection from Brazil, French Guiana, Haiti and Peru, 54% of case detection was done by the general health services and hospitals, 21% by volunteers and the remainder through active case detection. In El Salvador, Panama and the Dominican Republic, the majority of smears taken were by active case detection while most of those taken in Guatemala and Honduras were by voluntary collaborators whilst the activity appears to be increasingly undertaken by the general health services in the other countries (Table 6).

A number of countries provided information on case distribution by age group and gender with the majority of cases being in the 15-49 years age group. Data from Guatemala, Honduras and Suriname reflect a high proportion of cases in the younger age groups.

Most countries have national treatment guidelines but many indicate that various antimalarial drugs are easily accessible through private pharmacies and/or informal suppliers. The commonly used antimalarials in the Region are chloroquine, primaquine, sulfadoxine-pyrimethamine, mefloquine and quinine. Some countries also report using derivatives of artemisinine in their treatment regimens (Table 7). Assuming that all cases receive first line treatment with either chloroquine or amodiaquine, there are large

variations in the availability of treatments per reported case with Mexico and Nicaragua, respectively, reporting more than 220 and 130 treatments available per diagnosed case (Table 8).

In keeping with the initiative to RBM, the countries that share the Amazon Rainforest requested PAHO/WHO to assist with establishment of an Amazon Network for Monitoring Antimalarial Drug Resistance (Spanish acronym RAVREDA) at a meeting in Bahia, Brazil in 2001. A major objective of the network is to obtain and use information on antimalarial efficacy in the decision making process on drug utilization policies. The First Technical Coordination Meeting of the Amazon Network for Monitoring Antimalarial Drug Resistance (PAHO/WHO) and the Amazon Malaria Initiative (AMI) of USAID took place in Santa Cruz, Bolivia, from 19 to 20 March 2002. The meeting was attended by representatives from PAHO, WHO, USAID and CDC and the eight Amazon countries which form the surveillance network and participate in the AMI project. Among agreements and recommendations were the establishment of a steering committee with participation of USAID, PAHO and CDC to guide and coordinate the regional project financed by USAID to the amount of approximately US$ 2 million annually, for five years. Activities during the first year at country level included establishment of national coordinating committees, identification of sentinel sites, use of a common protocol developed by WHO/PAHO in initiating efficacy trials with Chloroquine and Sulfadoxine-Pyrimethamine and in some countries with Mefloquine, and combinations of Mefloquine-Artesunate. By the end of the year, preliminary results were being obtained in a number of countries.

The principal vectors in Central America are *Anopheles albimanus* and *Anopheles pseudopuntipennis* and in the countries which share the Amazon rainfall are *Anopheles darlingi* and *Anopheles albitarsis*. The main vector control activities reported by countries include environmental sanitation, use of pyrethroids and larviciding. Four countries reported use of biological control methods and two use larvivorous fish. Use of mosquito nets and personal protective measures is encouraged for persons living in risk areas (Table 9).

Financial Resources

Efforts have been made in most countries to integrate and/or increase collaboration between the malaria control program and the local health service with the objective of increasing an intersectoral approach and to promote community participation in malaria control. In 2002, the countries which share the Amazon rainforest received financing through the RAVREDA project while some Central American countries received financing for malaria control from the British government through DFID. A number of countries developed and presented proposals to the Global Fund for AIDS Tuberculosis and Malaria in 2002. The proposals from Honduras and Nicaragua were successful and the first disbursement of funds was expected in 2003. With technical

cooperation from PAHO, Mexico and the Central American countries submitted a proposal to the Global Environmental Facility for malaria control in 2001 which was approved but funds were not available in 2002. Data on financing of national programs was provided by some countries (Table 10).

Highlights of country programs

The following observations were provided by country programs:

Argentina indicated that there are two areas of moderate risk (Oran and San Martin) in the Department of Salta and low risk areas in the northern region of the country bordering, Bolivia. Transmission is associated with migration between the two countries and this is corroborated by the fact that the number of cases reported in 2002 was the lowest in the past 26 years and a reduction in transmission in Tarija, Department in Bolivia, which forms the border with the endemic departments in Salta Province. During the year, efforts focused on intensifying surveillance and vector control activities in the border areas with Bolivia.

Belize reported a reduction in the number of cases, a trend which started since 1999. Vector control activities include environmental sanitation, use of larvicides (temephos), house spraying with deltamethrin and space spraying with Malathion.

Bolivia pointed out that the malaria epidemiological situation in the country has improved continuously over the past four years, a result of the epidemiologic shield strategy which supports the national malaria control program and places priority on malaria control in the national territory. As part of the strategy, the national malaria program is decentralized and integrated into the network of health services and the deconcentration of human resources into priority municipalities and localities. They work closely with voluntary collaborators from the communities in ensuring prompt diagnosis and opportune treatment of cases. In comparison with the previous year, a 10% reduction in the number of cases was reported and *P. vivax* accounted for 95% of the cases in the country. Financial support for malaria control activities from the Canadian International Development Agency and UNICEF ended during the first half of the year, but it was expected that financial support would be available in 2003, including support from USAID as part of the RAVREDA/AMI project. Joint activities aimed at strengthening epidemiological surveillance in the border areas with Brazil and Argentina were carried out. Brazil provided technical cooperation through residual and space spraying in critical border areas. Technical support in undertaking an efficacy trial using Mefloquine and Artesunate was received from Peru. Bolivia made a donation of first line antimalarials (Chloroquine and Primaquine) to Ecuador.

Brazil highlighted the fact that, since reporting 610,878 cases in 2000, there was a 36.4% reduction in the number of cases in 2001, and further, 6.3% reduction in 2002 when 349,873 cases were reported among 2.12 million slides examined, representing a

16.5% smear positive rate. This improvement in the epidemiologic situation is related to an action plan for intensification of control measures in the Amazon (PICAM) which was initiated in June 2000, as part of the country's effort to Roll Back Malaria. Environmental sanitation efforts are undertaken as well as house and space spraying with Cypermethrin. Studies were initiated in Amapa, Pará, Amazonas, Rondonia, Mato Grosso, Maranhão and Acre include efficacy trials with antimalarials, rapid diagnostic kits, anopheline resistance to insecticides and evaluation of risk factors associated with transmission in urban areas.

Colombia indicated that, in comparison with the previous year, in 2002 there was a 17% reduction in the number of cases and a 40% reduction in mortality related to malaria. High malaria transmission risk exists in 97 municipalities where 96.5% of the cases were registered. *P. vivax* accounted for 55% of the cases in the country and the principal control activities were focused on prompt diagnosis and opportune treatment of cases through expanded coverage through health services in the endemic areas. The principal problems included a reduction in personnel both at the local and central levels. Additionally, there is little technical and administrative expertise at the departmental and municipal levels compounded by an intensification of social conflict in the regions with high transmission. A new Ministry of Social Protection was created and the priority of the program is to strengthen and expand diagnostic and treatment capacity as well as that of the surveillance system and the promotion of integrated and selective vector control. Within the Amazon Network for Monitoring Antimalarial Drug Resistance, Colombia provided support in quality control of blood smears to Suriname. Joint surveillance and control activities were also carried out with Brazil and Peru in the Amazon trapezium.

Costa Rica reported 1021 cases in 2002, a 25% reduction in comparison with the previous year and 46% less than the number reported in 2000. By species, *P. vivax* accounted for 99.8% of the cases and 0.2% due to *P. falciparum*. Although the Huetar Atlántica Region accounted for 69.5% of the cases in the country in comparison with the previous year, the 710 cases detected was a 21% reduction. There was also a 25% reduction in the number of cases reported in Matina canton. Approximately 66% of the cases in the country occur in Matina, Limón and Talamanca cantons. In Huetar North Region occur in San Carlos and Los Chiles cantons. An integrated malaria control project initiated in 1996, in Huetar North Region, includes strengthening of diagnosis and treatment capability at the local level, epidemiologic stratification and participation of the health services in surveillance have facilitated mobilization of resources at the local level resulting in a 93% reduction in malaria incidence from 1503 cases in 1998 to 108 cases in 2002. In comparison with 2001, the annual parasite index reduced from 1.05 to 0.74 per thousand inhabitants. Decentralization of parasitological diagnosis of the disease is being undertaken by the Costa Rican Social Security Fund in the majority of the regions and it is expected to be implemented in the entire country. Within the context of the RBM Initiative, a pilot project aimed at reducing and preventing malaria in Talamanca canton was evaluated. At the national level, from reported 5148 cases in 1998 there has been a 80% reduction in malaria incidence to 1021 cases reported in 2002.

The *Dominican Republic* reported 1296 cases in 2002, representing a 25% increase with respect to the previous year. With technical cooperation and financial support from PAHO, important progress was made in developing malaria control capacity at the local and national levels. Activities focused in Monte Cristi province resulted in a marked reduction in malaria incidence. Approximately 30% of the cases at national level were reported annually in Monte Cristi over the past seven years but 8.5% of the cases occurred there in 2002. The main problem in 2002 was increased incidence in Bahoruco Province and to a lesser degree in Santo Domingo. The increase is related to movement of sugar cane and construction workers and limited financial resources for undertaking integrated control activities. A pilot project similar to that undertaken in Monte Cristi was considered a possible solution of the problem in Bahoruco.

Ecuador indicated that the 86,742 cases reported in 2002 represented an 18.6% reduction in overall incidence and that there was a 43% reduction in the number of cases of *P. falciparum* in the high risk areas. Among possible factors associated with reduction in transmission were unfavorable climatic conditions and applied control measures. The latter included use of Deltamethrin, Malathion and Cyperthrin for residual and space spraying as well as use of temephos for larviciding. Among problems identified by the malaria control program were the lacks of financial resources, logistic and labour problems. Efficacy trials with Chloroquine against *P. falciparum* were initiated in five provinces: Esmeraldas, Manabi, El Oro, Guayas and Pichincha and therapeutic failures over 25% were reported. The results of the studies would be used in determining antimalarial drug policy. A joint cooperation program with Peru focusing on information exchange and technical cooperation as well as logistic support for the program is ongoing.

El Salvador reported 753 cases in 2000 but there was a reduction to 362 cases in 2001 with a further reduction to 117 cases in 2002. Although they are all low risk localities, 86% of the cases were detected in Sonsonate, La Paz, Usulután, La Unión and Ahuachapan.

Guatemala registered a similar number of cases as in the previous year, a reduction in comparison with the number reported in 2000. Ixcán, Alta Verapaz, Petén, Baja Verapaz, Izabal and Costa Sur are the departments with the greatest incidence of malaria. *A. albimanus* and *A. pseudopuntipennis* are the principal vectors and *P. vivax* is responsible for 95% of the cases and an Annual Parasite Index of 7.37 per thousand population. The majority of the cases occurred among those in the 15-49 years age group. Factors associated with malaria transmission in the country include cultural problems, poor environmental conditions, migration, favorable climatic conditions, insufficient human and financial resources, limited community participation and health promotion. Among possible solutions identified are consolidated efforts at control, prevention, education, monitoring and evaluation of interventions. Having prepared a successful proposal to the global fund in 2003, it is expected that financing of malaria control interventions would be available in 2003. A number of operational studies were

undertaken in 2002 including a study in the Aldea El Zapote and Jícaro, El Progreso, which indicated that deltamethrin was not highly efficacious against the vectors. Another study with Neem was begun in 2002 and activities aimed at strengthening surveillance and control of Malaria were being undertaken in a number of localities in Petén Province.

Guyana highlighted the fact that activities to RBM continued in 2002 and these focused on expansion and improvement of diagnostic and treatment facilities through an active surveillance system as well as a viable health awareness and education program on malaria prevention and control. Additionally, the program sought to incorporate personnel of the primary health care system such as medex, community health workers and the Regional Health System. Mining and logging workers were most affected by the disease, accounting for over 85% of the cases in the country. It was pointed out that there were large numbers of Brazilians working alongside Guyanese in inaccessible areas of the dense rainforest in Guyana. Non-compliance and non-adherence to treatment regimens as well as self-medication were identified as major problems facing the program. Two of the countries ten regions, 7 and 8 accounted for 67% of the cases in the country in 2002. There was a significant reduction in the number of cases in Region 9, reportedly due to a sustained and viable health awareness and education campaign promoting community participation supported by UNICEF. As part of the RAVREDA activities, sentinel sites were selected in 2002 and efficacy trials were expected to begin in 2003. *A. darlingi* is the main vector and control activities include use of Malathion.

French Guiana did not provide any comments.

Haiti did not provide data or comments.

Honduras reported a 2.3% increase in the number of smears examined in comparison with a 29% reduction in the number of cases. By parasite, there was a 35% reduction in the number of *P. falciparum* cases while *P. vivax* accounted for 95% of the cases. Approximately 86% of the cases in the country occur in Regions II, III, VI and VII. Factors associated with transmission include movement of persons in search of employment in agriculture, inadequate housing and poor environmental sanitation. The principal vector control activities are use of deltamethrin for space spraying, biolarvicides and environmental control interventions.

Mexico reported a 14.1% reduction in the number of cases in comparison with the previous year, a trend which begun over the past few years. There was a 75.4% in the number of cases of *P. falciparum* between 2001 and 2002. Cases of *P. falciparum* are related to migration principally from Guatemala and Belize and the situation requires vector control and strengthening surveillance in the frontier states. The "Focal treatment" model includes epidemiological stratification by risk factor, treatment of cases and household members, elimination of breeding sites through community participation and residual spraying of houses where positive cases reside, once annually in areas with *A. psuedopuntipennis* and twice in areas with *A. albimanus*. Additionally, in areas where

transmission occurs among mobile populations, space spraying is carried out using Permethrin. The program has suffered from a reduction in human resources through retirement and attempts are made to contract and train temporary workers but financial difficulties result in high rotation among these workers. The "focal treatment" plan aimed at eliminating the transmission areas is focused in the states of Sinaloa, Sonora, Chihuahua, Durango, Jalisco, Nayarit, Michoacan, Oaxaca, Chiapas and the Yucatan Peninsula where elimination of anopheline breeding sites was undertaken in 3000 localities in 2002. It is expected that dependence on use of insecticides will be reduced as a result of elimination of *A. pseudopuntipennis* breeding sites through removal of algae. Reduced use of insecticides is expected to result in a 25% reduction in expenditure for the national malaria budget. The southern states of Chiapas, Tabasco, Campeche and Quintana Roo cooperation with the Central American countries is being coordinated. The national level will provide support to the Federal entities in development of the focal treatment strategy in high risk areas, strengthen participation of epidemiology and health promotion, provide technical support, training, monitoring and evaluation. Support will also be provided in mobilizing funds for two demonstration projects in Oaxaca and Quintana Roo involving participation of the United Nations Environmental Program. All these activities being undertaken in the most endemic states, within the context of the RBM Initiative launched by PAHO/WHO in Mesoamerica.

Nicaragua indicated that there was a 25.3% reduction in incident in comparison with the previous year but by parasite there was not a significant reduction in the number of cases of *P. falciparum*. Two SILAIS (Comprehensive Health Service Systems): Northern Authonomous Atlantic Region (RAAN) and Southern Authonomous Atlantic Region (RAAS), respectively, reported 53.1% and 28.4% of the cases of P. falciparum in the country. This represented a 104% increase in RAAN and a 13% increase in RAAS. The eight malaria deaths in 2002 represented a four-fold increase over the previous year. By SILAIS, the deaths were distributed as follows: RAAN: 2; RAAS: 3; and one each in Managua, Masaya and Chontales. It was reported that the majority of the deaths were associated with a delays in obtaining diagnosis and treatment. The SILAIS reporting the highest number of cases were Matagalpa, RAAN, Jinotega, RAAS and Nueva Segovia. These five SILAIS accounted for 80% of all cases reported in the country and for 92% of those due to *P. falciparum*. The principal vector is *A. albimanus* and control activities include use biological control with Bacillus sphaericus and *B. thuringiensis* as well as environmental sanitation including drainage, elimination of aquatic vegetation and clearing of breeding sites and use of insecticide for residual and space spraying. Problems identified by the program include limitations in the budget, the lack of human resources, logistical problems and the shortage of insecticides until the month of August when vector control activities began. During the year, advances were made in the epidemiological stratification of municipalities and localities. As a result, priority areas were identified and use of human and material resources optimized. Training programs were undertaken for personnel in RAAN, RAAS, Rio San Juan, Nueva Segovia and Jinotega. Boats and motorcycles were acquired for use in RAAN, RAAS, Chontales,

Jinotega, Matagalpa and Chinandega. Plans for 2003 include improvement in accessibility to prompt diagnosis and immediate treatment, detection and prevention of outbreaks; undertaking of anthropological studies among ethnic groups in the Atlantic Coast in collaboration with local universities; further stratification of municipalities and localities; identification and classification of breeding sites aimed at defining appropriate intervention methods; distribution of impregnated mosquito nets in localities with high *P. falciparum* indices; increased monitoring and evaluation by the National program with the aim of strengthening technical and operational vector control activities by the SILAIS and municipalities. The program received financial assistance from Sweden and England.

Panama reported 2244 cases in 2002, representing a 141% increase in the number of cases in comparison with the previous year and represents one of the greatest public health challenges in the country. The majority of cases occur among indigenous groups in Bocas del Toro, Darien, San Blas and Panama Este regions. Among principal factors associated with transmission were population movement, inaccessibility to health services as well as to diagnosis and treatment and the presence of *A. albimanus* breeding sites. Activities aimed at reducing the burden of the disease include improved access to diagnosis and treatment in transmission areas, residual spraying and community participation in environmental sanitation activities aimed at vector reduction. Within the context of the RBM Initiative, the national program is promoting integration of governmental and non governmental efforts to control malaria.

Peru No information received from malaria program.

Paraguay indicated that the 2,777 cases was almost identical to the number detected in 2001. There were small outbreaks in Caazapa and Caaguazu departments. These outbreaks occurred among highly mobile indigenous communities. This mobility was identified as a factor affecting diagnosis and treatment of the disease. Additionally, economic difficulties suffered by the program were identified as factors which limited malaria surveillance and control activities.

Suriname reported 13,091 cases, a 23% reduction with respect to 2001 but there were a number of areas where outbreaks of *P. falciparum* occurred, affecting indigenous communities in the south of the country as well as near the Afobaka Lake. These epidemics were associated with increased population movements related to gold mining activities. In 2002, as part of the RAVREDA/AMI project, antimalarial resistance monitoring activities were initiated and will be continued in 2003. Efficacy trials were conducted for several drugs and combinations including combinations with artemisinin based derivates. The results of the trials will be used in definition of drug policy for treatment of *P. falciparum*. Trials using Rapid Diagnostic Tests were also carried out with favorable results. With support of PAHO a technical cooperation agreement with Brazil permitted strengthening of the entomological capacity of the Bureau of Public

Health in Suriname. Through support of the RBM Initiative, this activity was initiated with the Evandro Chagas Institute in Belem. A joint project aimed at strengthening surveillance of infectious diseases in the Marowijne border area between Suriname and French Guiana was approved by both governments in June 2002.

Venezuela indicated that the 29,337 cases detected in 2002 represented a 29% increase over those in reported in 2001. Sucre, Bolivar and Amazonas status were most affected followed by Zulia, Barinas, Portuguesa, Apure and Anzoátegui. Problems identified during the year were associated with migration in mining areas; limited sprayable surfaces in mining areas, administrative problems related to decentralization of the malaria program as well as suspected resistance by strains of *P. falciparum* to the first line antimalarials. An action plan for malaria control in Sucre State was carried out between October and December 2002 which resulted in a reduction of the incidence rate in the municipalities of Marino, Benitez, A. E. Blanco, Ribero, Libertador and Cajigal. As part of RAVREDA, efficacy trials were initiated towards the end of 2002. The principal vector is *A. darlingi*. Vector control activities included residual and space spraying with Fenitrothion, Malathion and Lambdacyhalotrin as well as use of the larvicidal, Temephos.

Perspectives

With its launch in 1998, the RBM Initiative has been a catalyst for malaria control activities in the Region. Activities have been carried out at both the national and regional levels. Two sub regional RBM advisors have been providing technical cooperation in each of the Mesoamerican and Amazon sub regions. In 2002, funds were made available by USAID to support the RBM Initiative in the countries which share the Amazon rainforest. Known as the Amazon Malaria Initiative, USAID will provide approximately 2 million dollars annually to the sub region. A technical meeting with participation of representatives of all participating countries, USAID, CDC and PAHO was held to present the first year work plans for all project partners. Participating countries agreed to use the PAHO/WHO protocol for evaluating efficacy of antimalarial drugs. In an effort to facilitate planning and implementation of efficacy studies, a generic protocol was prepared and agreed upon by implementing partners and target countries. All countries identified and selected sentinel sites where malarial drug efficacy studies will be conducted. Ethics committees in Colombia, Ecuador, Guyana, Suriname and Venezuela approved in vivo studies. Surveillance sentinel site staff were trained in the application of the standardized protocol in Brazil, Colombia, Ecuador, Guyana, Suriname, and Venezuela, and malaria microscopy and parasite density determination in Ecuador and Suriname. Preliminary results were available in Bolivia, Suriname and Ecuador where studies initiated prior to the AMI project. Studies completed prior to the AMI project in Peru resulted in use of two different combinations, Artesunate plus Mefloquine and Artesunate plus Sulfadoxine/Pyrimethamine for treatment of *P. falciparum* in different localities. The project also has a technical coordinator.

Technical cooperation was provided to all countries in Mesoamerica and a 2001 proposal to the Global Environmental Facility to support malaria prevention and control activities in Mexico and Central America was approved. Funding is expected to become available in 2003. In 2002, the RBM Initiative was launched among the Caribbean countries at a meeting in Barbados. The Caribbean countries, vulnerable and susceptible to malaria, agreed to strengthen surveillance for imported cases as well as to improve diagnostic and treatment availability.

PAHO provided technical cooperation to countries in developing proposals to the global fund for AIDS, Tuberculosis and Malaria. The proposals from Honduras and Nicaragua were successful and funds are expected to be available in 2003.

The 885,000 cases reported by the endemic countries in 2002 was the lowest by the 21 endemic countries since 1983 as was the number of blood slides reportedly examined. The relatively high positive rate could reflect a concentration of efforts in endemic areas. The reduced number of malaria associated deaths correlates with the reduction in the percentage of *P. falciparum* cases reported in the Region. Problems with adherence to lengthy treatment regimens for *P. vivax* infections will likely provide a challenge to the programs in reducing incidence in the future and vector control activities will probably need strengthening.

REPORT ON THE STATUS OF MALARIA PROGRAMS IN THE AMERICAS
(Based on 2002 data)

TABLES AND FIGURES

TABLE 1

POPULATION LIVING IN MALARIA ENDEMIC AREAS IN THE AMERICAS, 1993-2002
(in thousands)

	POPULATION IN AREAS WITH ECOLOGICAL RISK OF MALARIA TRANSMISSION				
	MALARIA TRANSMISSION RISK			Total Population at	Total Population
Year	Low*	Moderate	High	Ecological Risk	of Countries
1993	202,329	41,030	46,225	289,584	739,561
1994	160,947	32,967	37,409	231,323	763,305
1995	169,643	36,881	42,454	248,978	774,712
1996	210,519	41,332	46,277	298,128	786,055
1997	221,341	54,358	30,822	306,521	793,582
1998	220,702	48,537	39,084	308,323	803,546
1999	221,680	41,444	35,329	298,453	818,273
2000	207,099	44,999	41,098	293,196	832,863
2001	204,307	49,124	40,129	293,560	835,814
2002	**187,972**	**41,814**	**32,596**	**262,382**	**849,361**

* Information includes population in United States, Puerto Rico, Caribbean Region with historical ecological risk.

TABLE 2a

IMPORTED CASES OF MALARIA IN COUNTRIES WITH NO ACTIVE MALARIA TRANSMISSION, 2002

(population in thousands)

Countries	Total Population	Population at Low Risk*	Blood slides (number)	
			Examined	Positive
Anguilla	11	…	…	0
Antigua & Barbuda	70	…	2	0
Aruba	98	…	…	…
Bahamas	301	…	…	…
Barbados	269	…	…	…
Bermuda	64	…	…	…
Canada	31,000	…	…	370
Cayman Islands	37	…	…	…
Cuba	11,254	3,797	338,713	29
Chile	15,589	202	18	5
Curaçao	215	…	…	…
Dominica	72	…	0	0
Grenada	103	…	…	…
Guadaloupe	422	…	…	12
Jamaica	2,625	…	725	7
Martinique	381	…	122	11
Montserrat	5	…	0	0
Puerto Rico	3,859	3,839	…	1
St. Kitts & Nevis	45	…	0	0
St.Vincent & Grenadines	109	…	0	0
St. Lucia	159	…	2	2
Trinidad & Tobago	1,234	1,230	11,268	8
Turks and C. Islands	16	14	0	…
United States	288,369	78,171	…	446
Uruguay	3,350	…	…	24
Virgin Islands (U.K.)	20	…	…	0
Virgin Islands (USA)	122	…	…	…
Subtotal	**359,799**	**87,253**	**350,850**	**915**

*Population living in areas where historically malaria is known to have occurred or with possibility of occuring. (…) Information not available

TABLE 2b

RISK OF MALARIA TRANSMISSION IN THE AMERICAS BY POPULATION, 2002

(in thousands)

Countries and Territories by Geographic Subregion	Total Population*	POPULATION IN AREAS WITH ECOLOGICAL RISK OF MALARIA TRANSMISSION							
		Low risk		Moderate risk		High risk		Total at risk	
		Total	%	Total	%	Total	%	Total	%
Mexico	102,055	16,941	16.60	18,034	17.67	19,673	19.28	54,648	53.55
Belize	250	0	0.00	0	0.00	0	0.00	0	0.00
Costa Rica	4,025	1,057	26.26	281	6.98	36	0.89	1,374	34.14
El Salvador	6,430	3,789	58.93	2,641	41.07	0	0.00	6,430	100.00
Guatemala	11,184	2,582	23.09	1,715	15.33	521	4.66	4,818	43.08
Honduras	6,854	2,421	35.32	1,407	20.53	2,661	38.82	6,489	94.67
Nicaragua	5,342	5,038	94.31	303	5.67	0	0.00	5,341	99.98
Panama	2,963	2,428	81.94	0	0.00	435	14.68	2,863	96.63
Haiti (2001)	8,000	3,242	40.53	4,758	59.48	0	0.00	8,000	100.00
Dominican Republic	8,919	8,803	98.70	98	1.10	18	0.20	8,919	100.00
French Guiana	157	139	88.73	0	0.00	15	9.58	154	98.31
Guyana (2001)	764	468	61.26	88	11.52	63	8.25	619	81.02
Suriname	450	2	0.44	22	4.93	24	5.29	48	10.67
Brazil	174,632	13,553	7.76	4,929	2.82	1,926	1.10	20,407	11.69
Bolivia	8,501	2,377	27.96	666	7.84	294	3.46	3,338	39.27
Colombia	43,778	18,333	41.88	1,358	3.10	2,713	6.20	22,403	51.17
Ecuador	12,475	4,717	37.81	1,056	8.47	2,131	17.08	7,904	63.36
Peru (2001)	25,662	4,068	15.85	2,442	9.52	1,627	6.34	8,137	31.71
Venezuela	25,123	6,783	27.00	236	0.94	460	1.83	7,479	29.77
Argentina	36,224	3,143	8.68	222	0.61	0	0.00	3,365	9.29
Paraguay	5,774	834	14.44	1,557	26.97	0	0.00	2,391	41.42
21 countries with active malaria programs	**489,562**	**100,718**	**20.57**	**41,814**	**8.54**	**32,596**	**6.66**	**175,129**	**35.77**
T O T A L (incl. countries with no active malaria transmission)	**849,361**	**187,972**	**22.13**	**41,814**	**4.92**	**32,596**	**3.84**	**262,382**	**30.89**

* Source: questionnaires provided by countries to PAHO

Brazil: Low Risk IPA< 10, Mod Risk 10>IPA<50, High Risk IPA>50

Most other countries: Low Risk IPA < 1/1000, Mod. Risk 1/1000 > IPA< 10/1000, High Risk IPA > 10/1000

TABLE 3

MALARIA MORBIDITY IN THE AMERICAS, 1993-2002

	POPULATION (in thousands)		BLOOD SLIDES			CASE DETECTION (per 100,000 inhabitants)	
Year	Total Countries	Risk Areas *	Examined	Positive	Slide Positivity Rate (SPR)	Total Americas	Malarious Areas
1993	739,561	289,584	9,633,125	983,536	10.21	132.99	339.64
1994	763,305	231,323	8,261,090	1,114,147	13.49	145.96	481.64
1995	774,712	248,978	9,022,226	1,302,791	14.44	168.16	523.26
1996	786,055	298,128	8,601,272	1,139,776	13.25	145.00	382.31
1997	793,582	306,521	9,037,999	1,075,445	11.90	135.52	350.86
1998	803,546	308,323	9,148,633	1,289,741	14.10	160.51	418.31
1999	818,273	298,453	10,174,427	1,207,479	11.87	147.56	404.58
2000	832,863	293,196	10,210,730	1,140,329	11.17	136.92	388.93
2001	835,814	293,560	9,456,093	960,792	10.16	114.95	327.29
2002	**849,361**	**262,382**	**7,785,398**	**884,374**	**11.36**	**104.12**	**337.06**

* Population in areas of the Americas ecologically propitious for transmission includes areas without active transmission

TABLE 4

TOTAL BLOOD SLIDES EXAMINED AND NUMBER OF POSITIVE SLIDES BY LEVEL OF MALARIA TRANSMISSION, 2002

Countries and Territories by Geographic Subregion	LOW RISK OF TRANSMISSION		MODERATE RISK OF TRANSMISSION		HIGH RISK OF TRANSMISSION		ORIGINALLY NON-MALARIOUS AREAS		TOTAL		
	Blood slides examined	Positive	Blood slides examined	Positive	Blood slides examined	Positive	Blood slides examined	Positive	Blood slides examined	Positive	Percent of all cases
Mexico	97,796	28	431,801	682	1,048,050	3,579	0	0	1,577,647	4,289	0.49%
Belize	7,167	353	8,313	575	0	0	0	0	15,480	928	0.11%
Costa Rica	11,779	155	2,633	478	2,326	377	1,010	11	17,748	1,021	0.12%
El Salvador	226,602	117	0	0	0	0	0	0	226,602	117	0.01%
Guatemala	76,450	1,558	48,914	9,663	71,218	24,299	531	20	197,113	35,540	4.02%
Honduras	45,870	549	39,290	4,070	93,456	12,604	0	0	178,616	17,223	1.95%
Nicaragua	442,651	4,769	35,348	2,697	0	0	0	0	477,999	7,466	0.85%
Panama	0	0	36,415	254	129,616	1,990	0	0	166,031	2,244	0.25%
Haiti (2001)	0	0	51,067	9,837	0	0	…	…	51,067	9,837	1.11%
Dominican Republic	348,270	498	35,720	480	7,226	318	0	0	391,216	1,296	0.15%
French Guiana	…	14	-	433	…	3,214	…	…	…	3,661	0.41%
Guyana	…	767	…	…	…	21,128	…	…	175,966	21,895	2.48%
Suriname	…	5	0	0	68,409	13,086	…	…	68,409	13,091	1.48%
Brazil	367,278	31,769	785,316	109,253	965,628	208,781	268	70	2,118,490	349,873	39.60%
Bolivia	1,588	87	66,136	6,756	69,785	7,433	…	…	137,509	14,276	1.62%
Colombia	8,350	1,380	19,367	4,966	818,345	189,373	…	…	846,062	195,719	22.15%
Ecuador	…	8,642	…	6,861	…	71,254	…		403,225	86,757	9.82%
Peru	…	…	…	…	…	…	…	…	…	85,742	9.71%
Venezuela	48,755	3,445	18,764	1,057	210,686	24,895	2,780	94	280,985	29,491	3.34%
Argentina	2,801	32	2,242	91	0	0	2	2	5,045	215	0.02%
Paraguay	11,394	193	81,971	2,563	0	0	5,973	22	99,338	2,778	0.31%
21 Country Subtotal	**1,696,751**	**54,361**	**1,663,297**	**160,716**	**3,484,745**	**582,331**	**10,564**	**219**	**7,434,548**	**883,459**	**100.00%**
T O T A L (incl. countries with no active malaria transmission)	**2,047,601**	**54,361**	**1,663,297**	**160,716**	**3,484,745**	**582,331**	**361,414**	**1,134**	**7,785,398**	**884,374**	

... No information available
- Not applicable
*Provisional data

TABLE 5 a

EPIDEMIOLOGICAL STATUS FOR 21 COUNTRIES WITH ACTIVE MALARIA PROGRAMS, 2002

Countries and Territories by Geographic Subregion	Population* in risk Areas	PERSONS AT RISK			PARASITE SPECIES					MORTALITY
		Examined	Positive	API	*P.falciparum* & mixed	AFI	*P.vivax*	AVI	*P.malariae*	Preliminary Data
Mexico	54,648	1,577,647	4,289	0.08	17	0.00	4,272	0.08	0	0
Belize	0	15,480	928	0.00	0	0.00	928	0.00	0	0
Costa Rica	1,374	16,738	1,021	0.74	2	0.00	1,008	0.73	0	0
El Salvador	6,430	226,602	117	0.02	0	0.00	117	0.02	0	…
Guatemala	4,818	196,582	35,540	7.38	1,825	0.38	33,695	6.99	0	-
Honduras	6,489	178,616	17,223	2.65	606	0.09	16,617	2.56	0	0
Nicaragua	5,341	477,999	7,466	1.40	992	0.19	6,474	1.21	0	8
Panama	2,863	166,031	2,244	0.78	337	0.12	1,907	0.67	0	2
Haiti (2001 data)	8,000	51,067	9,837	1.23	9,837	1.23	0	0.00	0	16
Dominican Rep.	8,919	391,216	1,296	0.15	1,292	0.14	4	0.00	0	11
French Guiana	154	0	3,661	23.72	2,547	16.50	954	6.18	160	0
Guyana	619	175,966	21,895	35.37	10,599	17.12	11,296	18.25	0	-
Suriname	48	68,409	13,091	272.73	9,906	206.38	1,535	31.98	1,650	…
Brazil	20,407	2,118,222	349,873	17.14	80,437	3.94	268,607	13.16	829	75
Bolivia	3,338	137,509	14,276	4.28	727	0.22	13,549	4.06	0	4
Colombia	22,403	846,062	195,719	8.74	89,753	4.01	105,931	4.73	35	40
Ecuador	7,904	403,225	86,757	10.98	20,015	2.53	66,742	8.44	0	0
Peru	8,137	0	85,742	10.54	19,154	2.35	66,588	8.18	0	12
Venezuela	7,479	278,205	29,491	3.94	2,572	0.34	26,907	3.60	12	…
Argentina	3,365	5,043	215	0.06	0	0.00	125	0.04	0	0
Paraguay	2,391	93,365	2,778	1.16	0	0.00	2,777	1.16	1	0
T O T A L	**175,129**	**7,423,984**	**883,459**	**5.04**	**250,618**	**1.43**	**630,033**	**3.60**	**2,687**	**168**

* Population in thousands (All risk areas)

TABLE 5

EPIDEMIOLOGICAL STATUS IN HIGH AND MODERATE RISK AREAS FOR 21 COUNTRIES WITH ACTIVE MALARIA PROGRAMS, 2002

Countries and Territories by Geographic Subregion	Population* in Mod./High risk Areas	PERSONS AT RISK			PARASITE SPECIES					MORTALITY
		Examined	Positive	API	*P.falciparum* & mixed	AFI	*P.vivax*	AVI	*P.malariae*	Preliminary Data
Mexico	37,707	1,479,851	4,261	0.11	17	0.00	4,244	0.11	-	0
					-				-	-
Belize	153	8,313	575	3.76	0	0.00	575	3.76	-	-
Costa Rica	317	4,959	855	2.70	0	0.00	855	2.70	0	0
El Salvador	2,641	0	0	0.00	0	0.00	0	0.00	0	0
Guatemala	2,236	-	33,962	15.19	1,788	0.80	32,174	14.39	0	-
Honduras	4,068	132,746	16,674	4.10	606	0.15	16,068	3.95	0	0
Nicaragua	303	35,348	2,697	8.90	809	2.67	1,888	6.23	0	8
Panama	435	166,031	2,244	5.16	337	0.77	1,907	4.38	0	2
Haiti (2001 data)	4,758	51,067	9,837	2.07	9,837	22.61	0	0.00	-	16
Dominican Rep.	116	42,946	798	6.88	798	6.88	0	0.00	-	11
French Guiana ('01)	15	0	3,647	242.50	2,543	169.09	945	62.84	159	0
Guyana	151	…	21,128	139.92	10,179	67.41	10,926	72.36	-	-
Suriname	46	68,409	13,086	284.48	9,904	215.30	1,533	33.33	1,649	…
									-	
Brazil	6,854	1,750,944	318,034	46.40	75,397	11.00	241,825	35.28	812	75
Bolivia	961	135,921	14,189	14.77	724	0.75	12,606	13.12	0	4
Colombia	4,071	837,712	194,339	47.74	89,496	21.99	104,808	25.75	35	40
Ecuador	3,187	0	78,115	24.51	16,735	5.25	61,380	19.26	-	…
Peru (2001 data)	4,069	0	0	0.00	19,027	4.68	64,436	15.84	-	12
Venezuela	696	229,450	25,952	37.29	1,961	2.82	23,980	34.46	11	0
Argentina	222	2,242	91	0.41	0	0.00	91	0.41	-	-
Paraguay	1,557	81,971	2,563	1.65	0	0.00	2,777	1.78	0	0
T O T A L	**74,564**	**5,027,910**	**743,047**	**9.97**	**240,158**	**3.22**	**583,018**	**7.82**	**2,666**	**168**

* Population in thousands (moderate and high risk areas only)

*** Cases not discriminated by risk area

- No information

TABLE 6

COMPARISON BETWEEN PASSIVE AND ACTIVE CASE DETECTION, 2002

Countries and Territories by Geographic Subregion	PASSIVE CASE DETECTION						ACTIVE CASE DETECTION		
	General health services & hospitals			Volunteer Collaborators			Epidemiologic investigations and follow-ups		
	Blood slides			Blood slides			Blood slides		
	Examined	Positive	SPR	Examined	Positive	SPR	Examined	Positive	SPR
Mexico	736,422	2,253	0.31	506,476	790	0.16	334,749	1,246	0.37
Belize	0	0	…	11,183	…..	…	4,297	…	…
Costa Rica	1,893	382	20.18	458	104	22.71	15,397	535	3.47
El Salvador	60,551	55	0.09	50,673	59	0.12	115,378	117	0.10
Guatemala	42,967	5,466	…	129,444	27,412	…	24,702	2,662	...
Honduras	…	…	…	178,616	17,223	…	…	…	…
Nicaragua	306,481	3,872	1.26	147,022	3,277	2.23	24,496	317	1.29
Panama	25,395	646	2.54	499	148	29.66	140,137	1,450	1.03
Haiti (2001)	51,067	9,837	19.26	…	…	…	…	…	…
Dominican Rep.	71,134	369	0.52	14,471	86	0.59	305,611	841	0.28
French Guiana	…	…	…	…	…	…	…	…	…
Guyana	97,540	19,217	19.70	…	…	…	78,426	2,678	3.41
Suriname	68,409	13,091	19.14	-	-	-	…	…	...
Brazil	…	…	…	…	…	…	…	…	…
Bolivia	52,548	9,134	17.38	14,346	2,186	15.24	70,615	2,956	4.19
Colombia	833,681	195,719	23.48	…	…	…	…	…	…
Ecuador	390,810	80,446	20.58	12,415	6,311	50.83	-	-	-
Peru (2001)	…	…	…	-	-	-	-	-	-
Venezuela	145,359	18,651	12.83	-	-	-	135,626	10,840	7.99
Argentina	1,289	78	6.05	112	7	6.25	3,645	40	1.10
Paraguay	4,360	433	9.93	38,576	1,635	4.24	56,402	710	1.26
T O T A L	**2,889,906**	**359,649**	**12.45**	**1,104,291**	**59,238**	**5.36**	**1,309,481**	**24,392**	**1.86**

- Not applicable
... No information available
SPR = Slide Positivity Rate

TABLE 7

ANTIMALARIAL DRUGS USED IN 21 COUNTRIES IN 2002

(number of tablets)

Countries and Territories by Geographic Subregion	Chloroquine and/or Amodiaquine 150 mg	Primaquine 15mg	Sulfa/ Pyrimethamine @ 500/25 mg	Mefloquine @ 250 mg	Artemisine derivatives number of treatments*	Quinine @ 300 mg
Mexico	9,447,260	2,352,553	-	-	-	-
Belize	62,135	17,483	-	-	-	-
Costa Rica	101,000	55,700	-	-	-	-
El Salvador	…	…	-	-	-	-
Guatemala	2,058,929	1,290,659	-	-	-	-
Honduras	1,106,086	749,164	-	-	-	-
Nicaragua	9,850,000	7,583,394	-	-	-	-
Panama	266,000	161,000	221	-	-	-
Haiti (2001)	250,000	…	…	…	…	…
Dominican Republic	1,000,224	851,657	-	-	-	1,050
French Guiana	…	…	…	…	…	…
Guyana	…	…	…	-	-	…
Suriname	66,000	145,000	…	…	-	…
Brazil	3,880,630	6,243,401	-	54,020	185,962	1,661,520
Bolivia	476,330	334,410	-	3,620	8,748	1,380
Colombia	2,403,250	2,335,500	470,100	15,506	-	186,690
Ecuador	1,770,530	179,825	12,000	-	-	1,340
Peru	…	…	…	…	…	…
Venezuela	780,237	556,461	1,550	-	-	39,938
Argentina	2,634	1,257	-	-	-	-
Paraguay	251,775	51,341	-	-	-	-

* Artesunate and Artemeter @ 724 mg/treatment; Artemisinin @ 4,800 mg./treatment

... No Information available

- Not applicable

TABLE 8

ANTIMALARIAL TREATMENT COMPLETED IN 2002

Countries and Territories by Geographic Subregion	Treatments complete @ 1,500 mg of 4-amino quinolines	Number of reported cases	Number of first-line treatments available per case reported	Number of *P. falciparum* and mixed cases reported	Number of second-line treatments available per case *P. falciparum*
Mexico	944,726	4,289	220.30	17	…
Belize	6,214	928	6.70	0	0.00
Costa Rica	10,100	1,021	9.89	2	0.00
El Salvador	…	117	…	0	0.00
Guatemala	205,893	35,540	5.79	1,825	0.00
Honduras	110,609	17,223	6.42	606	0.00
Nicaragua	985,000	7,466	131.93	992	0.00
Panama	26,600	2,244	11.85	337	0.68
Haiti (2001)	…	9,837	…	9,837	…
Dominican Rep.	100,022	1,296	77.18	1,292	1.02
French Guyana	…	3,661	…	2,547	…
Guyana	…	21,895	…	10,599	…
Suriname	6,600	13,091	0.50	9,906	1.02
Brazil	388,063	349,873	1.11	80,437	1.38
Bolivia	47,633	14,276	3.34	727	1.48
Colombia	240,325	195,719	1.23	89,753	1.51
Ecuador	177,053	86,757	2.04	20,015	0.07
Peru	…	85,742	0.00	19,154	…
Venezuela	78,024	29,491	2.65	2,572	0.46
Argentina	263	215	1.23	0	0
Paraguay	25,178	2,778	9.06	0	0.00

... No information available

TABLE 9

MALARIOUS AREAS AT HIGH RISK OF TRANSMISSION AND CONTROL PRIORITIES, 2002

COUNTRIES	POPULATION	km2	REPORTED CASES	API	P. Falc. + MIXED	AFI	CONTROL MEASURES APPLIED IN DIFFERENT AREAS	MAIN VECTORS	CAUSES OF PERSISTENCE OF TRANSMISSION
ARGENTINA									
Attack phase	222,238	…	91	0.41	-	-	Epidemiological surveillanc and spraying	*A. pseudopunc.*	Heavy internal and international migration; areas difficult to reach due to climatic factors; economic and financial constraints on program activities
BELIZE									
Toledo	23,202	…	355	15.30	0	0.00			
Stann Creek	24,444	…	220	9.00	0	0.00			
BOLIVIA									
6/9 departments:									
Pando	22,381	…	1,212	54.15	213	9.52	Chemical vector control - second semester coverage = 98%; supervised case finding and treatment; health education on prevention and control; Impregnation of bed net	*A. darlingi*	Delays in approval and execution of the Amazon Project
Beni	134,689		5,826	43.30	506	3.80			
Santa Cruz	65,544	…	2,064	31.49	3	0.05			
Cochabamba	16,240	…	455	28.02	0	0.00			
Tarija	15,544	…	337	21.68	0	0.00			
Chuquisaca	39,997	…	741	18.53	0	0.00			
BRAZIL*									
A) Very High Risk (API≥ 50/1000)									
State (# municipalies at very hight risk/total # municipalities)									
Acre (3/22)	28,632	32,184.0	1,784	62.31	441	15.40	Case detection and treatment; house spraying; health education; elimination of breeding site	*A. darlingi* *A. albitarsis*	All of the epidemiological ris factors that determine malaria transmission in ecological areas of rain forests with remote farms, mining areas, and intense internal migration
Amazonas (12/62)	268,274	1,171,761.0	26,052	97.11	3,711	13.83			
Amapá (8/16)	65,545	128,118.0	7,534	114.94	2,827	43.13			
Maranhão (1/217)	10,403	38,922.0	838	80.55	17	1.63			
Mato Grosso (2/126)	26,991	46,980.0	3,452	127.89	95	3.52			
Pará (26/143)	870,829	655,732.0	100,839	115.80	29,398	33.76			
Rondonia (15/52)	603,269	53,400.0	63,355	105.02	20,061	33.25			
Roraima (6/15)	51,571	192,060.0	4,154	80.55	660	12.80			
Sub-total	**1,925,514**	**2,319,157**	**208,008**	**108.03**	**57,210**	**29.71**			
BRAZIL* (Continued)									
B) High Risk (API≥ 10/1000 up to 49.9/1000)									
State (# municipalies at hight risk/total # municipalities									
Acre (8/22)	162,139	48,154.0	4,552	28.07	1,014	6.25	Case detection and treatment; house spraying; health education; elimination of breeding sites Diagnosis and treatment integrated t Primary Health Care System (PHC) structure of the State of Amazonas	*A. darlingi* *A. albitarsis*	All of the epidemiological risk factor that determine malaria transmission in ecological areas of rain forest. Lack of basic sanitation in human settlements in the periphery of urban centers Circulatory/migratory movement of people t and from cities.
Amazonas (27/62)	2,160,179	308,408.0	42,569	19.71	5,407	2.50			
Amapá (6/16)	434,351	6,562.0	8,305	19.12	2,048	4.72			
Maranhão (309/217)	497,351	44,052.0	8,326	16.74	605	1.22			
Mato Grosso (6/126)	43,963	138,672.0	1,104	25.11	45	1.02			
Pará (35/143)	1,293,479	415,698.0	36,500	28.22	6,754	5.22			
Rondonia (13/52)	247,177	91,090.0	5,279	21.36	1,654	6.69			
Roraima (8/15)	80,754	20,957.0	2,364	29.27	645	7.99			
Tocantins (2/139)	9,456	7,701.0	215	22.74	15	1.59			
Sub-total	**4,928,849**	**1,081,294**	**109,214**	**22.16**	**18,187**	**3.69**			
COLOMBIA									
18/33 Departments:									
Amazonas (2/11 municipalities)	6,355	…	561	88.28	284	44.69	Physical and chemical control; community participation; community participation; community participation;	*A. albimanus* *A. nuneztovari* *A. nuneztovari* *A. nuneztovari* *A. albitarsis* *A. evanse*	Sociopolitical factors; mining; migration and displacement; lack migration and displacement; lack migration and displacement; lack
Anitoquia (23/62 municipalities)	763,389	…	50,812	66.56	17,600	23.06			
Arauca (1 municipality)	37,023	…	460	12.42	0	0.00			
Boyaca (1 municipality)	6,709	…	103	15.35	0	0.00			
Caqueta (5/16 municipalities)	96,905	…	5,519	56.95	1,233	12.72			
Casanare (1 municipality)	1,624		43	26.48	0	0.00			
Cauca (6/19 municipalities)	96,613	…	7,064	73.12	6,302	65.23			

TABLE 9 (*cont.*)

MALARIOUS AREAS AT HIGH RISK OF TRANSMISSION AND CONTROL PRIORITIES, 2002

COUNTRIES	POPULATION	km2	REPORTED CASES	API	P. Falc. + MIXED	AFI	CONTROL MEASURES APPLIED IN DIFFERENT AREAS	MAIN VECTORS	CAUSES OF PERSISTENCE OF TRANSMISSION
Choco (19/22 municipalities)	349,094	…	27,576	78.99	19,910	57.03			
Cordoba (4/19 municipalities	162,328	…	37,971	233.92	13,396	82.52			
Guaviare (4/4 municipalities)	114,083	…	13,374	117.23	3,393	29.74			
Meta (9/27 municipalities)	146,562	…	5,975	40.77	1,425	9.72			
Narino (10/10 municipalities)	360,832	…	22,945	63.59	18,643	51.67			
Norte de Santander (1 municipality	39,977	…	707	17.69	4	0.10			
Putumayo (6/10 municipalities)	191,606	…	5,652	29.50	482	2.52			
Risaralda (1 municipality)	14,617		1,334	91.26	36	2.46			
Valle (1/27 municipalities)	263,137	…	7,584	28.82	4,847	18.42			
Vaupes (3 municipalities)	6,692		518	77.41	182	27.20			
Vichada (1 municipality)	55,312	…	1,140	20.61	453	8.19			
Sub-Total	**2,712,858**	**…**	**189,338**	**69.79**	**88,190**	**32.51**			
COSTA RICA									
1/81 Cantons:							Stratification of risk areas; radical treatment;		Border areas with heavy illegal migratory
							focal and aerial spraying; social participation;	*A. albimanus*	movements; asymptomatic infections;
Cantón Matina	36,389	773	377	10.36	0	0.00	education and health promotion programs		increasing number of susceptibles; high precipitatio
Sub-Total	**36,389**	**773**	**377**	**10.36**	**0**	**0.00**			
DOMINICAN REPUBLIC									
1/154 Municipalities									
Bahoruco (Uvilla)	18,071	…	318	17.60	318	17.60			
							Intramural spraying and spacial fogging	*A. albimanus*	Migration between Dominican Republi
							treatment of positive cases		and Haiti; favorable conditions fo
							active and passive case detectio		mosquito vector; rice cultivatio
Sub-Total	**18,071**	**0**	**0**	**0.00**	**318**	**17.60**			
ECUADOR									
12/22 Provinces:									
Bolivar (1 municipality)	16,491	…	230	13.95	81	4.91			
Canar (1 municipalities)	47,079	…	581	12.34	261	5.54	House spraying;	*A. albimanus*	Climatic phenomenons
Cotopaxi (1 municipality)	27,061	…	1,315	48.59	84	3.10	House spraying;	*A. albimanus*	Climatic phenomenons
Esmeraldas (6 municipalities)	396,769	…	20,782	52.38	5,552	13.99	destruction of breeding site		insufficient spraying
Guayas (5 municipalities)	278,336	…	6,784	24.37	1,382	4.97			insufficient fumigation
Los Rios (5 municipalities)	494,622	…	15,876	32.10	2,817	5.70			
Manabi (9 municipalities)	323,286	…	7,425	22.97	1,429	4.42			
Morona (1 municipality)	13,664		284	20.78	16	1.17			
Pastaza (2 municipalities)	63,953		900	14.07	92	1.44			
Pichincha (2 municipalities)	272,732	…	9,659	35.42	2,703	9.91			
Sucumbios (4 municipalities)	128,803	…	4,555	35.36	273	2.12			
Orellana (4 municipalities)	68,254	…	2,863	41.95	246	3.60			
Sub-Total	**2,131,050**	**…**	**71,254**	**33.44**	**14,936**	**7.01**			
EL SALVADOR (Datos 2001)							Intra (residual action insecticide) and		Migration; commerce between neighboring countrie
5/5 Provinces:							peri-domiciliar spraying; larvicide use	*A. Albimanus*	border visits.
Ahuachapan (12 municipalities)	326,437		21	0.06	1	0.00			
La Paz (23 municipalities)	296,145		79	0.27	0	0.00			
La Union (17 municipalities)	275,986		74	0.27	0	0.00			
Sonsonate (16 municipalities)	460,894		83	0.18	0	0.00			
Usulutan (23 municipalities)	364,227		37	0.10	0	0.00			
Subt-Total	**1,723,689**		**294**	**0.17**	**1**	**0.00**			
							curative and preventive treatmen		

TABLE 9 (*cont*.)

MALARIOUS AREAS AT HIGH RISK OF TRANSMISSION AND CONTROL PRIORITIES, 2002

COUNTRIES	POPULATION	km2	REPORTED CASES	API	P. Falc. + MIXED	AFI	CONTROL MEASURES APPLIED IN DIFFERENT AREAS	MAIN VECTORS	CAUSES OF PERSISTENCE OF TRANSMISSION
FRENCH GUIANA									
5/5 Regions									
Camopi	1,033	…	448	433.69	219	212.00			
Maripasoula	3,652	…	1023	280.12	835	228.64			
Grand Santi	2,844	…	642	225.74	637	223.98	…	…	…
Regina	765	…	138	180.39	52	67.97			
Papaichton	1,652	…	232	140.44	222	134.38			
Sub-Total	**9,946**	**83,544**	**2,483**	**249.65**	**1,965**	**197.57**			
GUATEMALA *									
7/25 Departments									
Peten sur Oriente	104,633	6,300	4,673	44.66	91	0.87			
Coban Alta Verapaz	292,760	7,814	12,602	43.05	700	2.39	Diagnosis and radical	*A. albimanus*	
Peten sur Occidente	119,107	7,014	4,958	41.63	761	6.39	treatment of suspected and	*A. vestitipecnis*	Lack of political commitment to implement Global Malaria
Ixcan	67,309	…	2,030	30.16	110	1.63	confirmed cases; contro		Control Strategy in local health services; lack of budgetary
Baja Verapaz	228,741	…	1,935	8.46	3	0.01	of breeding sites; house		resources allotted to malaria; limited coverage of General Healtl
Peten Norte	117,074	…	943	8.05	62	0.53	spraying; larvicides		Services in malaria endemic areas; priority given to dengue
Huehuetenango	266,660	…	1,489	5.58	3	0.01			programs; little education in malaria prevention and control;
Izabal	346,981	…	1,832	5.28	17	0.05			migratory population; little intersectorial co-operation
Sub-Total	**1,543,265**	**21,128**	**30,462**	**19.74**	**1,747**	**2.55**			
GUYANA									
Region 1	20,000	…	5,606	280.30	2,650	132.50	Increased surveillance; decreased lag tim	*A. darlingi*	Delay in the release of funds; lack of experienced staff
Region 7	16,200	…	4,145	255.86	2,678	165.31	between visits to unstable populations		lack of appropriate transportation; itinerant population of
Region 8	10,500	…	10,224	973.71	4,599	438.00	introduction of 7 day treatment program of		miners and loggers; high rate of non-compliance with dru
Region 9	16,200	…	1,130	69.75	252	15.56	Quinine + Primaquine; selective spraying		regimens; makeshift housing of itinerant groups offers little
Sub-Total	**62,900**	**…**	**21,105**	**335.53**	**10,179**	**161.83**	with DDT		to no insectiside sprayable surfaces
HAITI							*No Information Available*		
HONDURAS									
5/9 Regions:	Population *at risk*								
Region II (57 municipalities)	697,608		1,261	1.81	1	0.00			
Region III (46 municipalities)	1,839,293	14,766	1,842	1.00	3	0.00	Selected intradomiciliary spraying	*A. albimanus*	Lack of stratification in control strategies;
Region IV (29 municipalities)	710,052	16,159	393	0.55	0	0.00	treatment;	*A. darlingi*	lack of supervision due to budgetary
Region VI (25 municipalities)	746,246	23,821	9,777	13.10	546	0.73	biological control of breeding sites	Note: *A. darlingi*	constraints; lack of funds and resources;
Region VII (23 municipalities)	440,582	23,821	1,956	4.44	24	0.05			
Region VIII (6 municpalities)	76,078	16,630	985	12.95	32	0.42	physical control measures;	found only in	unsustainable actions; lack of personne
Sub-Total	**4,509,859**	**95,197**	**16,214**	**3.60**	**606**	**0.13**	insecticide applied by ULV	Region VI	in high risk areas

TABLE 9 (*cont*.)

MALARIOUS AREAS AT HIGH RISK OF TRANSMISSION AND CONTROL PRIORITIES, 2002

COUNTRIES	POPULATION	km2	REPORTED CASES	API	P. Falc. + MIXED	AFI	CONTROL MEASURES APPLIED IN DIFFERENT AREAS	MAIN VECTORS	CAUSES OF PERSISTENCE OF TRANSMISSION
MEXICO									
8/32 States:									
Chiapas (111 municipalities)	4,236,781	24,000	2,333	0.55	13	0.00	House, larvicide, and aerial	*A. pseudopunct.*	Migration from malarious areas of Central America
Oaxaca (560 municipalities)	3,647,666	17,584	260	0.07	0	0	spraying; individual and mass	*A. albimanus*	poor housing conditions
Campeche (11 municipalities)	799,251	15,550	54	0.07	0	0	radical treatments; entomological	*A. vestitipennis*	sociopolitical factors;
Sinaloa (18 municipalities)	2,574,072	11,618	592	0.23	0	0	studies; active case surveillance;		late detection and treatment of cases
Michoacán (113 municipalities)	3,986,296	8,596	21	0.01	0	0	monthly follow-up of cases		
Guerrero (76 municipalities)	3,016,258	9,407	23	0.01	0	0			
Q. Roo (8 municipalities)	911,554	7,552	162	0.18	0	0.00			
Tabasco (17 municipalities)	1,928,706	4,932	134	0.07	4	0.00			
Sub-Total	**21,100,584**	**99,239**	**3,579**	**0.17**	**17**	**0.00**			
NICARAGUA									
5/17 Departments:									
Raan (1 municipality)	200,374	32,159	1,894	9.45	527	2.63			
Raas (1 municipality)	103,081	26,935	803	7.79	282	2.74			Technical deficiencies
Matagalpa (2 municipalities)	569,702	3,341	1,882	3.30	75	0.13			Inadequate drug supply
Jinotega (1 municipality)	291,848	9,576	872	2.99	15	0.05			
Nueva Segovia(1 municipality)	207775	…	661	3.18	18	0.09			
Sub-Total	**1,372,780**	**72,011**	**6,112**	**4.45**	**917**	**0.67**			
PANAMA									
9 Provinces:									
Bocas Del Toro (3 municipalities)	91,054		351	3.85	0	0.00			
Chiriqui (4 municipalities)	97,421		12	0.12	0	0.00			
C. Embera (2 municipalities)	8,750		44	5.03	0	0.00			
Colón (1 municipality)	10,296		1	0.10	0	0.00			
Darien (2 municipalities)	42,153		248	5.88	15	0.36			
Ngobe Bugle (3 municipalities	56,474		657	11.63	0	0.00			
Panama (2 municipalities)	41,436		188	4.54	2	0.05			
Kuna Yala (1 municipality)	33,918		459	13.53	313	9.23			
Veraguas (1 municipality)	12,512		30	2.40	0	0.00			
Sub-Total	**394,014**	**39827.9**	**1990**	**5.05**	**330**	**0.84**			
PARAGUAY									
1/17 Provinces:									
Caazapa	145,033 ,,,		657	4.53	0	0.00			personnel and resourses inadequately placed to
Sub-total	**145,033**	**0**	**657**	**4.53**	**0**	**0.00**			respond to the epidemic
PERU *									
12/34 Health Departments:	(Pop. Year 2001)								
Loreto	627,678	…	51,060	81.35	15,216	24.24	Medication; rotation of anti-malarials in	*A. pseudopunc.*	Climatological factors; inadequate access to health services
Junin	244,099	…	4,305	17.64	0	0.00	areas of resistence; integrated entomological	*A.benarrochi*	increase in breeding sites; expansion in rice production
Piura II	393,822	…	5,994	15.22	1,517	3.85	surveillance and vector control;	*A.albimanus*	internal and external migration
Piura I	361,164	…	3,503	9.70	706	1.95	surveillance and treatment of breeding sites	*A. darlingi*	emergence of drug resistence to *P. falciparum* in
Jaen-bagua	42,437	…	1,045	24.62	177	4.17	distribution of impregnated bednets		endemic areas; decreased vector susceptibility
Tumbes	188,718	…	1,844	9.77	429	2.27	active epidemiological surveillance		to insecticides on the north coas
San Martin	19,997	…	6,288	314.45	745	37.26	community participation		
Cusco	133,047	…	2,432	18.28	0	0.00			
Ayacucho	109,937	…	2,259	20.55	0	0.00			
Lambayeque	121,664	…	600	4.93	33	0.27			
Ucayali	47,122	…	3266	69.31	204	4.33			
Madre de dios	66,352	…	867	13.07	0	0.00			
Sub-total	**2,356,037**	**…**	**83,463**	**35.43**	**19,027**	**10.56**			

TABLE 9 (*cont*.)

MALARIOUS AREAS AT HIGH RISK OF TRANSMISSION AND CONTROL PRIORITIES, 2002

COUNTRIES	POPULATION	km2	REPORTED CASES	API	P. Falc. + MIXED	AFI	CONTROL MEASURES APPLIED IN DIFFERENT AREAS	MAIN VECTORS	CAUSES OF PERSISTENCE OF TRANSMISSION
SURINAME									
6/10 Districts									
Sipaliwini District:									
Upper Suriname	21,503	…	982	45.67	967	44.97	Residual house spraying; use of Permetrin	*A. darlingi*	
Upper Marowijne	8,647	…	3,771	436.11	3,106	359.20	impregnated bed nets in all area:		
Tapanahony	5,430	…	1,013	186.56	919	169.24			
Upper Saramacca	1,048	…	719	686.07	594	566.79			
Brokopondo District	10,023	…	1,383	137.98	1,318	131.50			
Bovenlandse Indianer	2,256		1,372	608.16	329	145.83			
Sub-total	**48,907**	**138,543**	**9,240**	**188.93**	**7,233**	**147.89**			
VENEZUELA									
4/23 States									
Amazonas: (6 Municipios)									
Manapiare	5,770	…	763	132.24	195	33.80	Residual and space spraying	*A. darlingi*	
Rio Negro	1,385	…	96	69.31	28	20.22	Residual and space spraying	*A. darlingi*	
Autana	5,391	…	1,163	215.73	189	35.06			Dispersal of the indigenou:
Atures	79,699	…	1,578	19.80	278	3.49			population; transient miners;
Alto Orinoco	7,445	…	661	88.78	163	21.89			*P. falciparum* resistance to
Atabapo	7,760	…	361	46.52	45	5.80			chloroquine; intense migration in
Subtotal:	**107,450**		**4,622**	**43.02**	**898**	**8.36**			endemic zones;
Bolivar: (5 Municipios)									Endophagic and exophilic vector:
Sucre	2,439	…	758	310.78	81	33.21	Residual and space spraying	*A. darlingi*	Lack of human and financial resource:
Raul Leoni	12,278	…	1,060	86.33	333	27.12			
Sifontes	28,626	…	2,162	75.53	485	16.94			
Cedeno	30,053	…	776	25.82	74	2.46			
Gran Sabana	30,241	…	836	27.64	55	1.82			
Subtotal:	**103,637**		**5,592**	**53.96**	**1,028**	**9.92**			
Sucre: (9 Municipalities)					…	…			
Cajigal	11,095	…	5,208	469.40	0	0.00	Residual and space spraying	*A. aquasalis**	
Marino	14,444	…	1,651	114.30	0	0.00			
Libertador	12,920	…	1,770	137.00	0	0.00			
Benitez	17,998	…	1,889	104.96	0	0.00			
Ribero	32,543	…	1,472	45.23	0	0.00			
Arismendi	22,657	…	1,220	53.85	0	0.00			
Andres E. Blanco	15,018	…	498	33.16	0	0.00			
Andres Mata	12,352	…	830	67.20	0	0.00			
Valdez	26,964	…	289	10.72	0	0.00			
Subtotal:	**165,991**		**4,309**	**25.96**	**0**	**0.00**			
Delta Amacuro: (1 Municipality)									
Pedernales	3,260	…	60	18.40	0	0.00			
Sub-total	**3,260**		**60**	**18.40**	**0**	**0.00**			

… No information available

TABLE 10

NATIONAL BUDGET AND NONBUDGETARY CONTRIBUTIONS TO MALARIA CONTROL PROGRAMS IN THE AMERICAS, 1998-2002

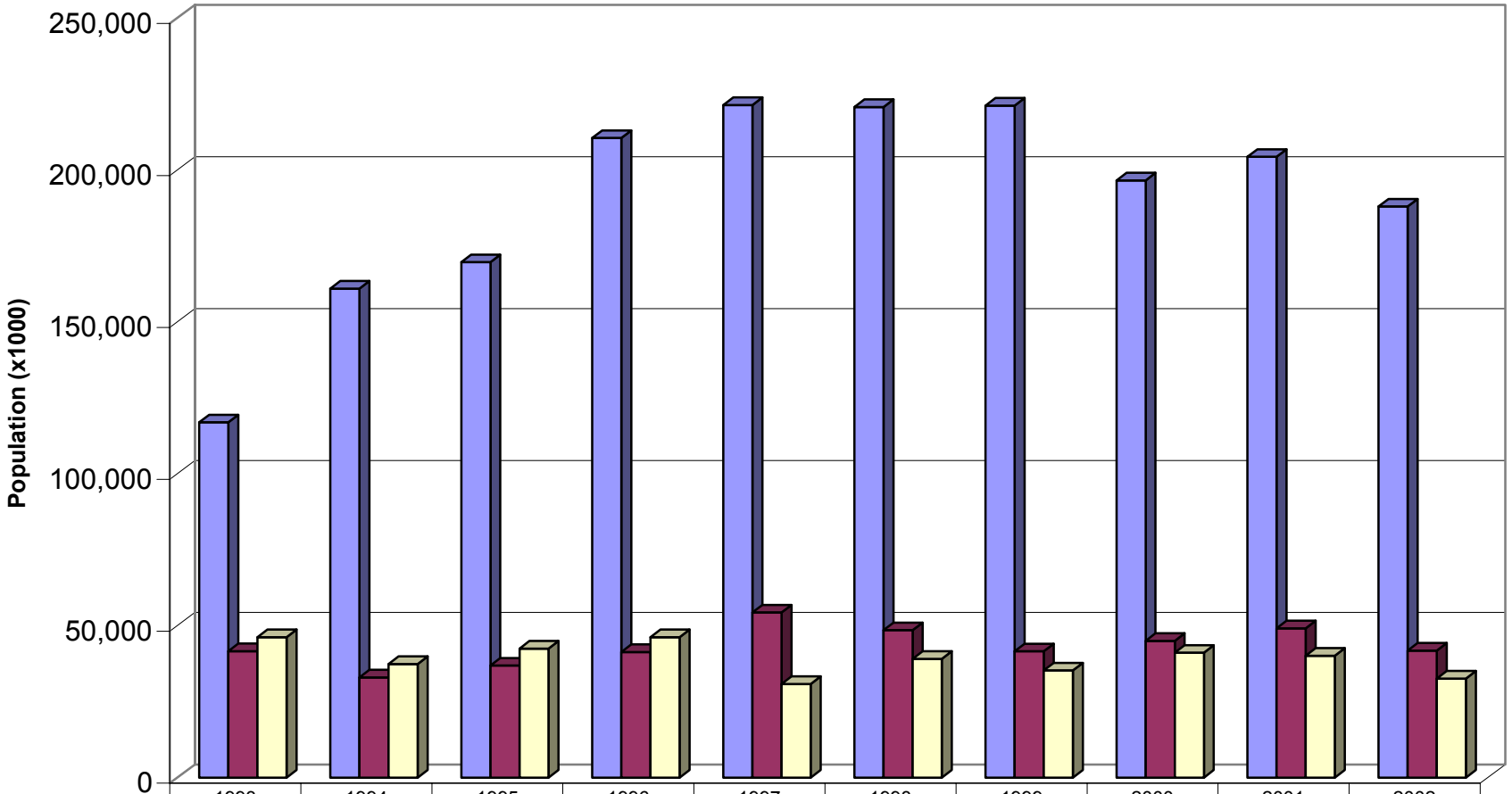
Countries	1998		1999		2000		2001		2002	
	National Malaria Budget	Contributed Funds, Loans Other	National Malaria Budget	Contributed Funds, Loans Other	National Malaria Budget	Contributed Funds, Loans Other	National Malaria Budget	Contributed Funds, Loans Other	National Malaria Budget	Contributed Funds, Loans Other
Argentina	…	…	…	…	…	…	…	…	…	…
Bolivia	660,189	46,898	133,431	122,925	845,764	944,187	935,101	601,656	918,145	550,887
Brazil	30,188,891	…	30,307,650	-	44,766,876	2,477,870	21,517,299	805,197	21,411,765	1,137,503
Colombia	11,661,290	-	9,930,000	-	9,950,000	-	11,363,636	-	11,363,636	225,000
Costa Rica	3,597,000	389	4,750,000	-	3,380,000	-	2,500,000		2,880,000	
Dominican Rep.	1,430,963	208,548	1,495,527	90,722	1,410,013	157,238	1,443,223	29,722	1,220,721	5,000
Ecuador	573,136	…	1,453,583	52,013	…	…	3,155,525	180,000	3,815,603	180,000
El Salvador	4,357,798	…	3,000,000	307,167	…	…	4,555,000	…	…	…
Guatemala*	1,359,775	52,857	730,232	-	702,703	-	…	-	…	-
Haiti	-	41,462	…	…	…	…	…	…	…	…
Honduras	1,859,022	-	149,558	239,398	2,597,868	3,605,010	2,352,572	1,450,000	81,250	54,039
Mexico	14,117,650	-	15,349,724	-	17,652,182	-	17,157,485	-	19,576,235	-
Nicaragua	…	…	4,101,657	1,871,250	333,333	-	333,333	175,500	333,333	175,500
Panama	5,171,984	-	5,161,509	-	5,066,318	-	4,680,289	-	3,986,849	-
Paraguay	7,501,159	-	4,338,457	21,281	1,932,103	-	1,061,490	-	5,411,675	
Peru	2,927,417	…	4,996,471	-	1,900,915	58,572	4,109,728	130,000	…	…
Venezuela	1,632,134	…	761,868	1,032,823	5,411,675	960,000	…	…	2,065,933	200,000
SUB TOTAL	**87,038,408**	**350,154**	**86,659,667**	**3,737,579**	**95,949,750**	**8,202,877**	**75,164,681**	**3,372,075**	**73,065,145**	**2,527,929**
Guyana	640,093	…	772,000	…	1,000,000	-	800,000	10,000	800,000	100,000
Belize	440,174	-	…	…	…	…	…	…	…	…
French Guiana	…	…	…	…	…	…	…	…	…	…
Suriname	106,236	-	…	…	65,778	-	178,363	636,000	160,628	536,000
SUB TOTAL	**1,186,503**	**…**	**772,000**	**…**	**1,065,778**	**…**	**978,363**	**646,000**	**960,628**	**636,000**
TOTAL	**88,224,911**	**350,154**	**87,431,667**	**3,737,579**	**97,015,528**	**8,202,877**	**76,143,044**	**4,018,075**	**74,025,773**	**3,163,929**
Grand Total		**88,575,065**		**91,169,246**		**105,218,405**		**80,161,119**		**77,189,702**
$US Funds/Person in Malarious Areas		**$0.47**		**$0.42**		**$0.45**		**$0.57**		**$0.48**

Note: Funds/person derived only from countries reporting National Malaria Budget data. Information incomplete.

… Information not available

Figure 1

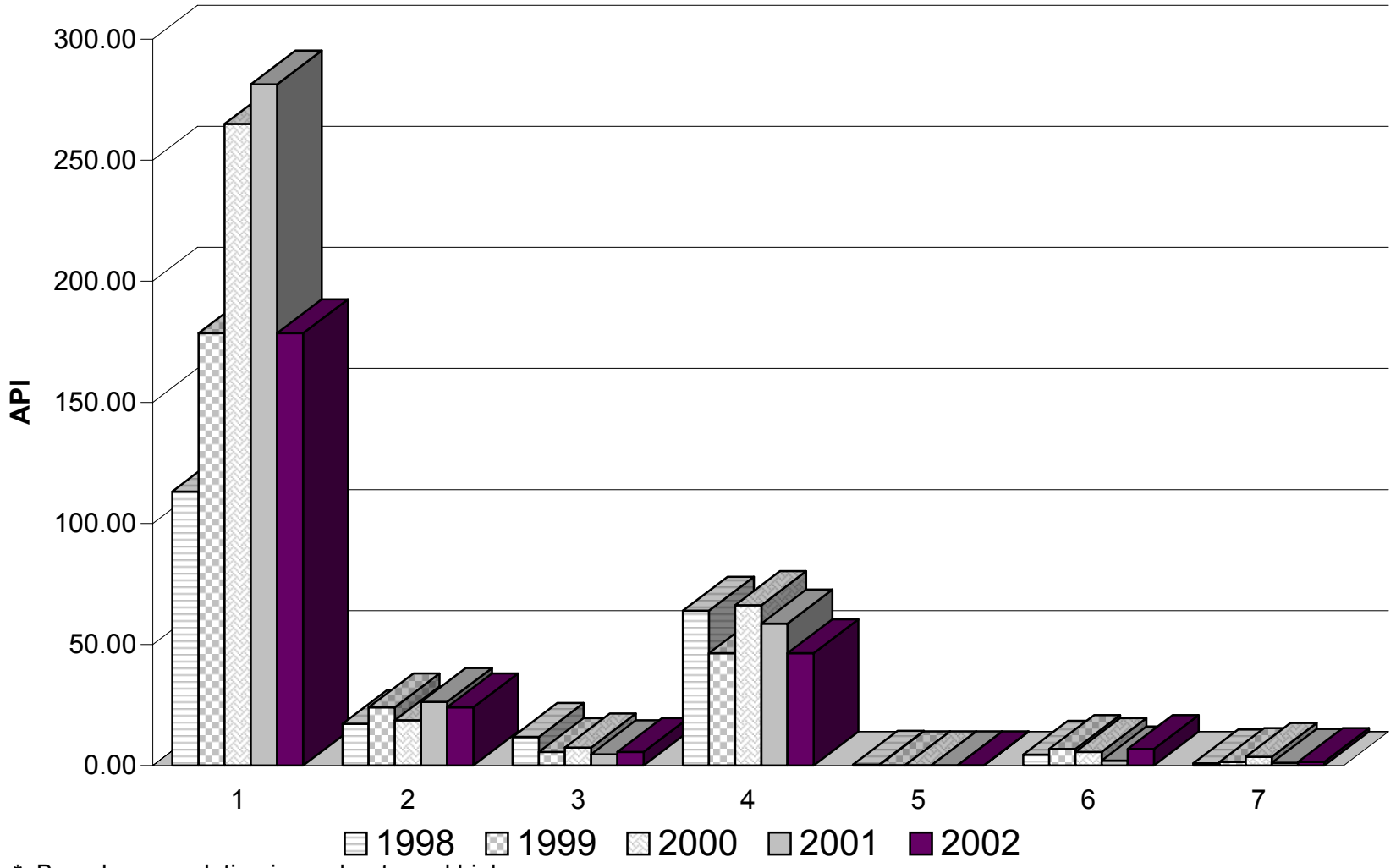
POPULATION LIVING IN MALARIA ENDEMIC-AREAS ACCORDING TO TRANSMISSION LEVEL, 1993-2002



	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Low	116,914	160,947	169,643	210,519	221,341	220,702	221,175	196,542	204307	187972
Mod.	41,631	32,967	36,881	41,332	54,358	48,537	41,554	44,999	49124	41814
High	46,225	37,409	42,454	46,227	30,822	39,084	35,275	41,098	40129	32596

Figure 2

ANNUAL PARASITIC INDICES (API) BY GEOGRAPHIC SUBREGION, 1998-2002



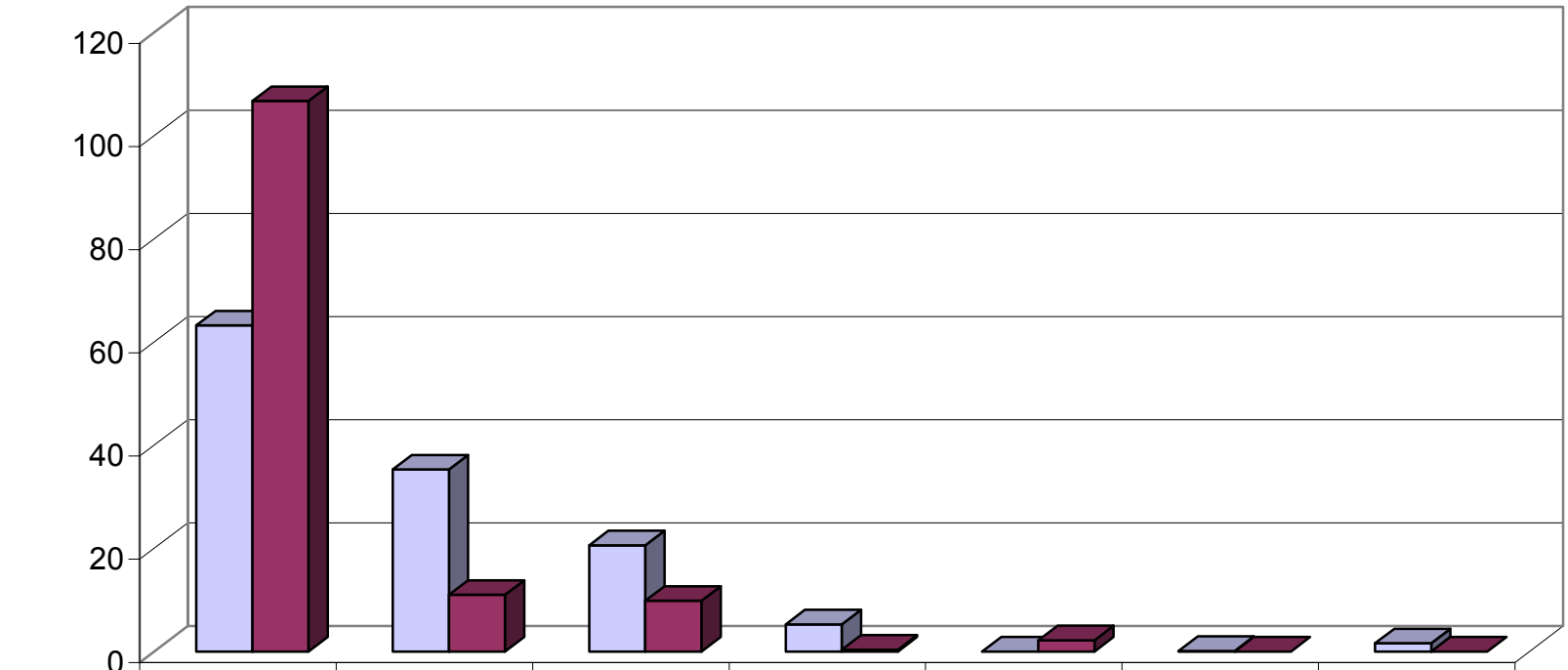
* Based on population in moderate and high risk malarious areas

1. GUY-FGU-SUR = Guyana, French Guiana, Suriname
2. Brazil
3. Andean Area = Bolivia, Colombia, Ecuador, Peru, Venezuela
4. CAPB=Central America, Panama, Belize
5. HAI-DOR=Haiti, Dominican Republic
6. Mexico
7. Southern Cone = Argentina Paraguay

$$\text{API} = \frac{\text{Number of confirmed cases}}{\text{Population at High and Medium Risk}} \times 1000$$

Figure 3

MALARIA PARASITIC INDICES BY GEOGRAPHIC SUBREGION, 2002*



	GUY, FGU, SUR	Brazil	Andean Area	CAPB	HAI-DOR	Mexico	S.Cone
AVI 2002	63.21	35.28	20.58	5.27	0.00	0.11	1.61
AFI 2002	106.71	11	9.85	0.35	2.18	0	0

* Based on cases and population exposed in high/medium risk malarious areas

CAPB=Central America, Panama, Belize

HAI-DOR= Haiti, Republica Dominicana

AFI=Annual *P. falciparum* Index

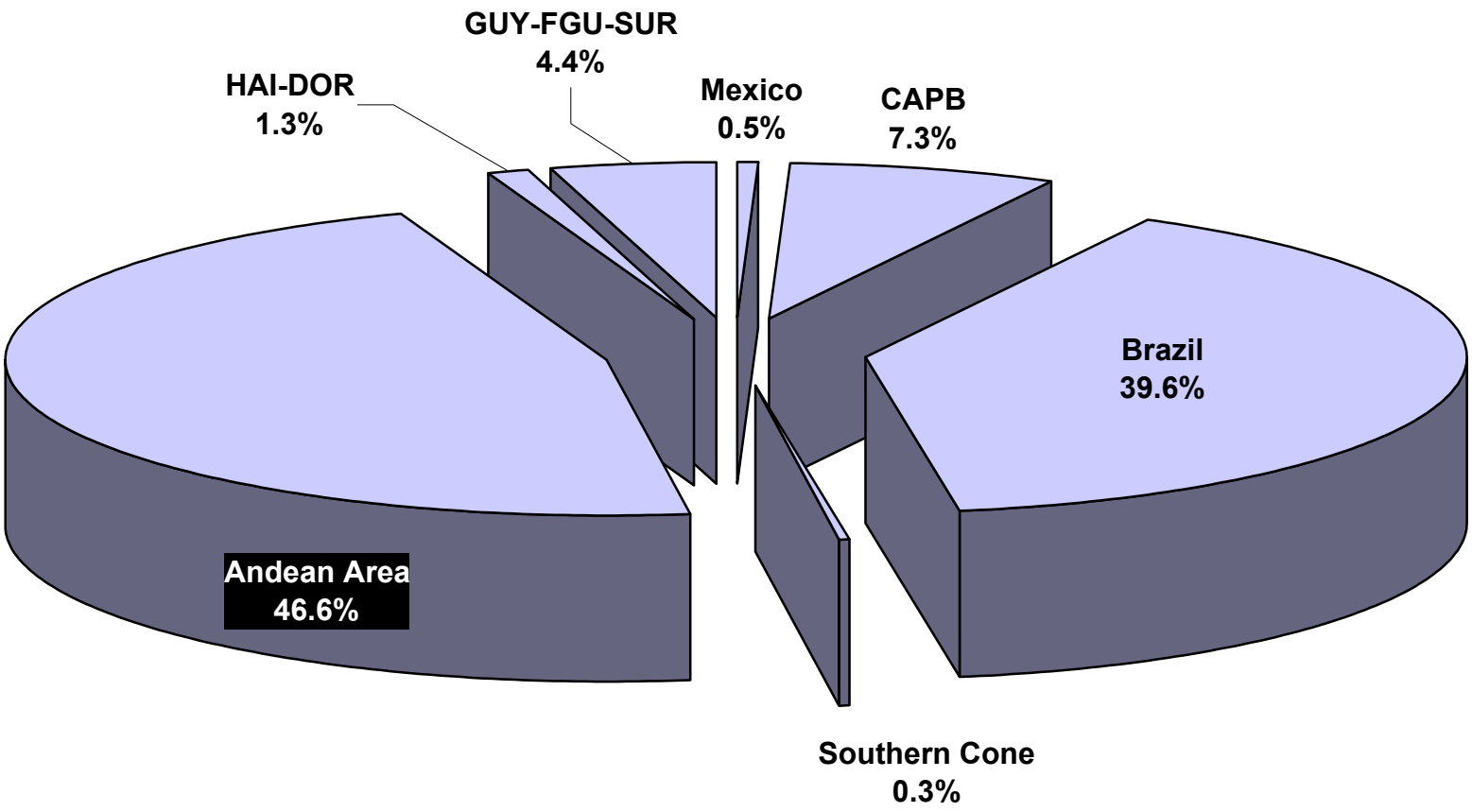
AVI=Annual *P. vivax* Index

AFI = Number of confirmed *P. falciparum* cases x 1000
Population at moderate and high risk

AVI = Number of confirmed *P. vivax* cases x 1000
Population at moderate and high risk

Figure 4

DISTRIBUTION OF MALARIA CASES IN THE AMERICAN REGION, 2002

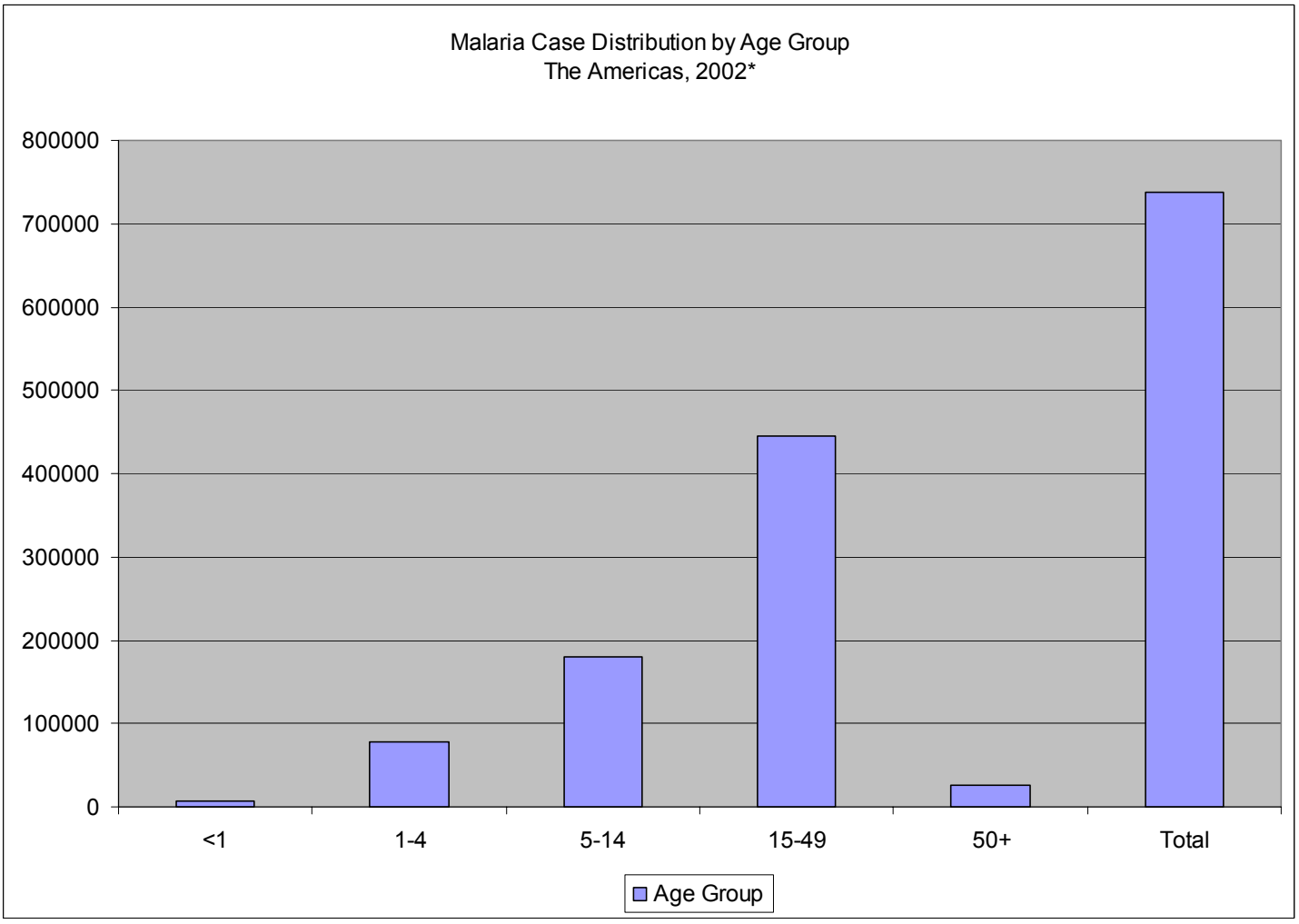


HAI-DOR = Haiti, Dominican Republic
CAPB = Central America, Panama, Belize
GUY-FGU-SUR = Guyana, French Guiana, Suriname

ANDEAN AREA = Bolivia, Colombia, Ecuador, Peru, Venezuela
SOUTHERN CONE = Argentina, Paraguay

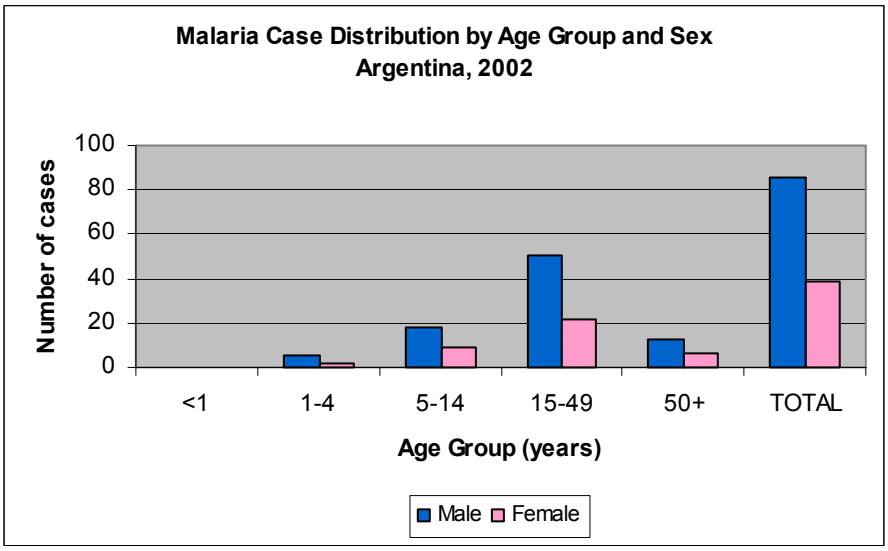
Figure 5

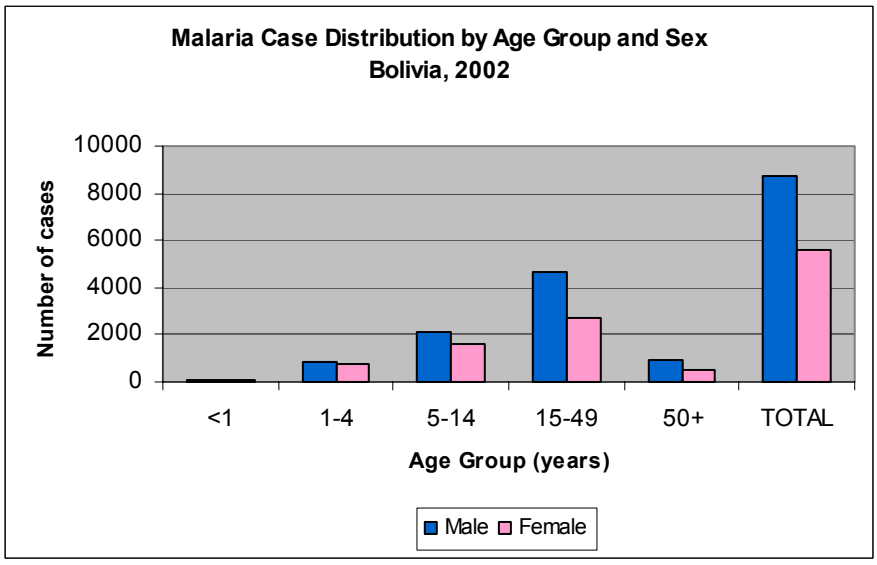
MALARIA CASE DISTRIBUTION BY AGE GROUP
THE AMERICAS, 2002



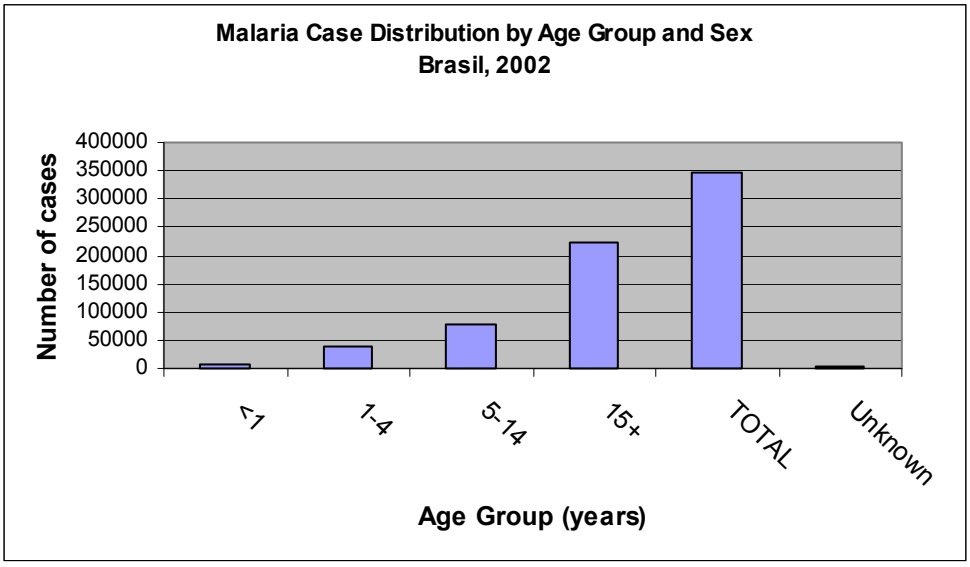
- Argentina, Bolivia, Brazil, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Honduras, Panama, Paraguay, Suriname, Venezuela

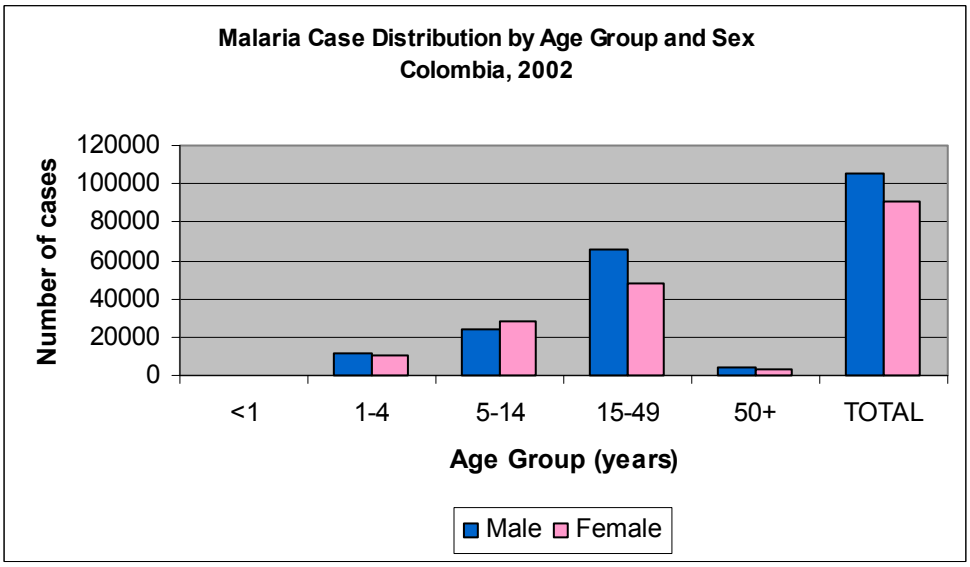
MALARIA CASE DISTRIBUTION BY AGE GROUP, SEX AND COUNTRY 2002



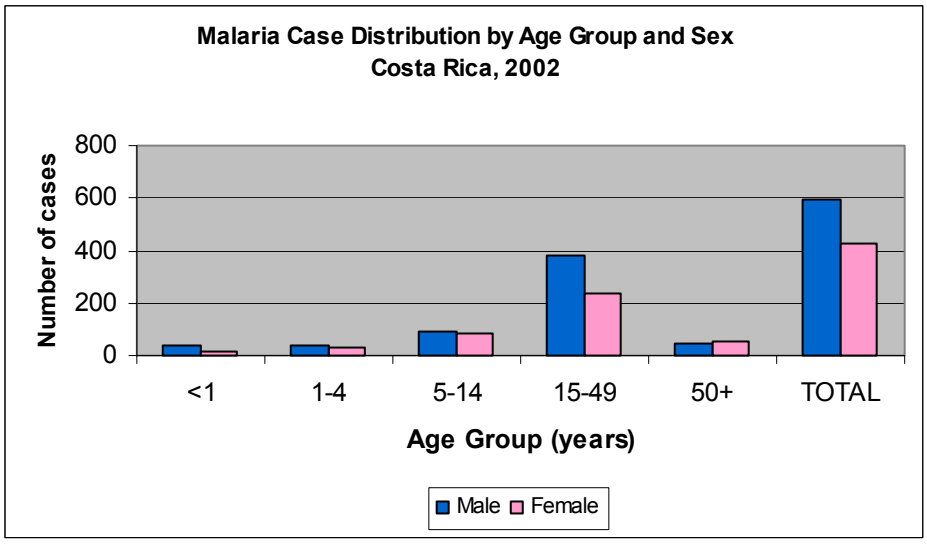


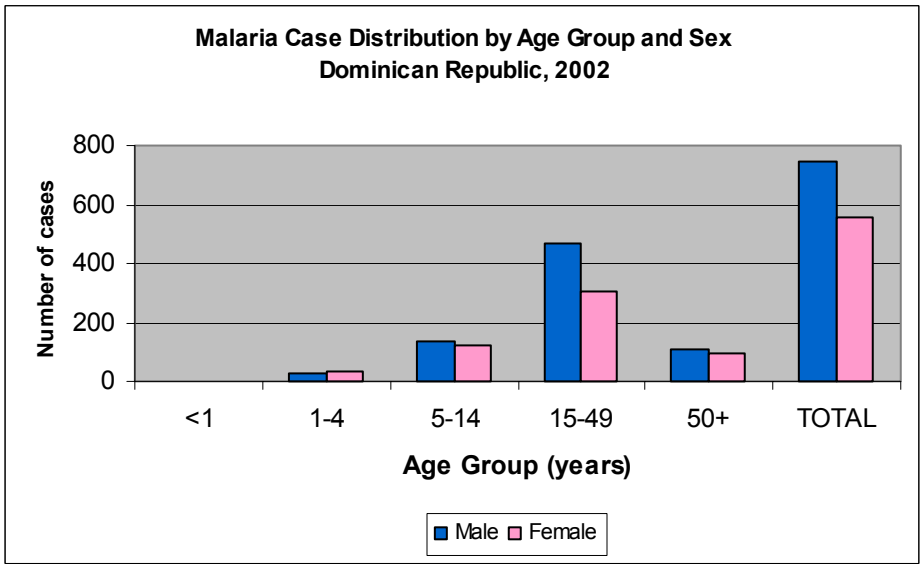
MALARIA CASE DISTRIBUTION BY AGE GROUP, SEX AND COUNTRY 2002



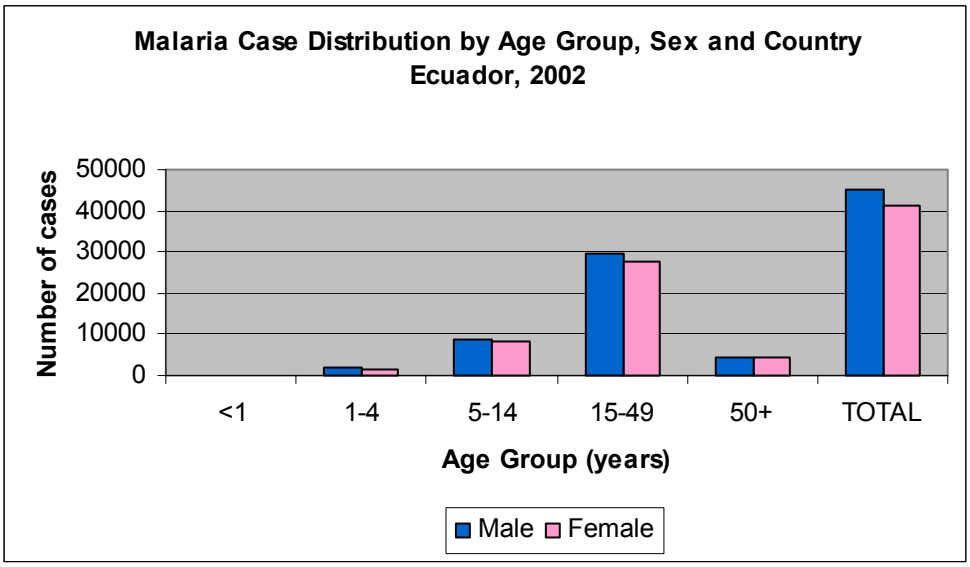


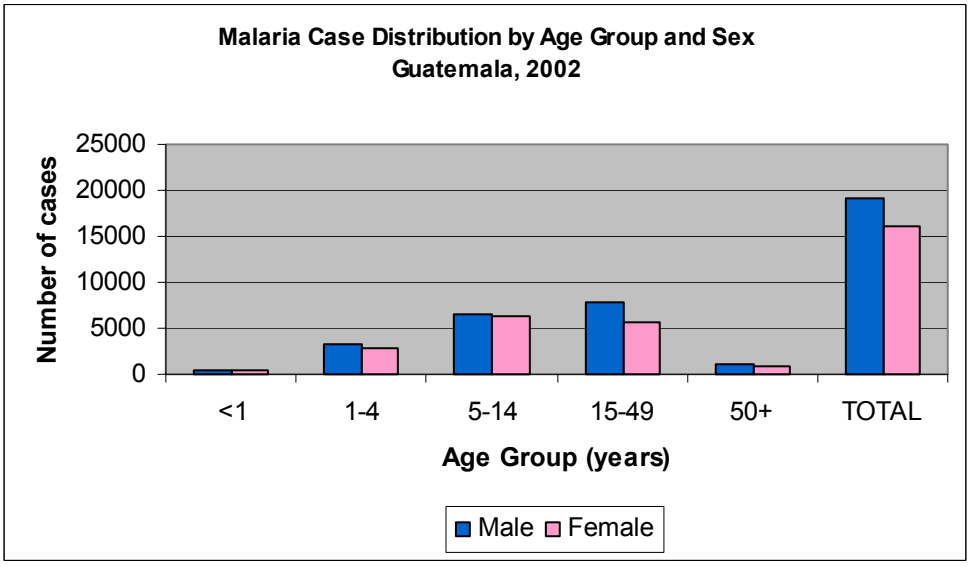
MALARIA CASE DISTRIBUTION BY AGE GROUP, SEX AND COUNTRY 2002



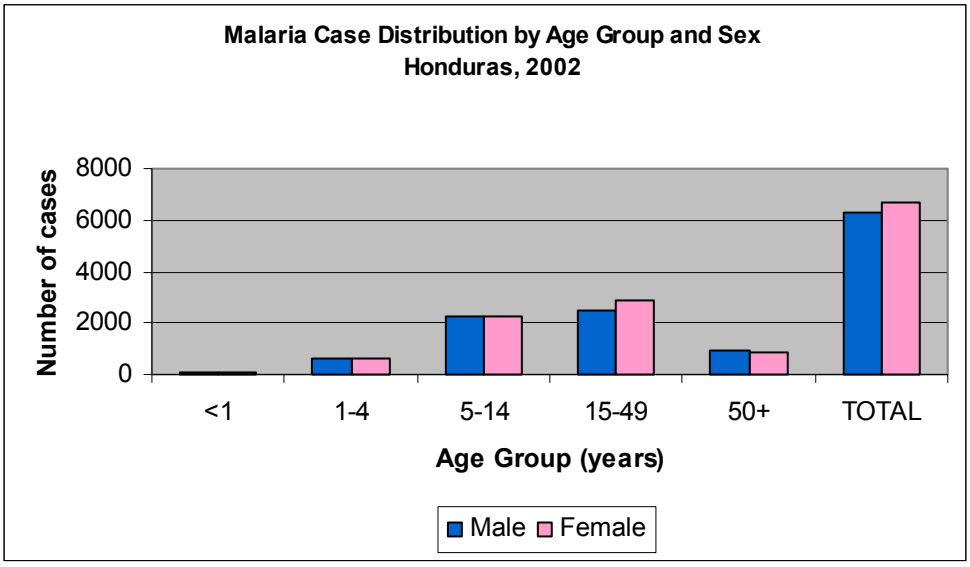


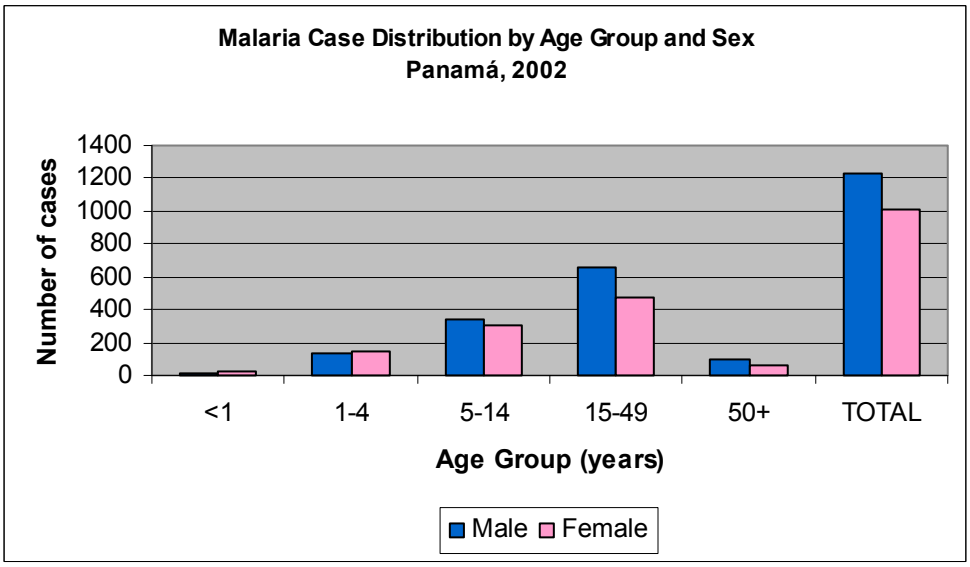
MALARIA CASE DISTRIBUTION BY AGE GROUP, SEX AND COUNTRY 2002



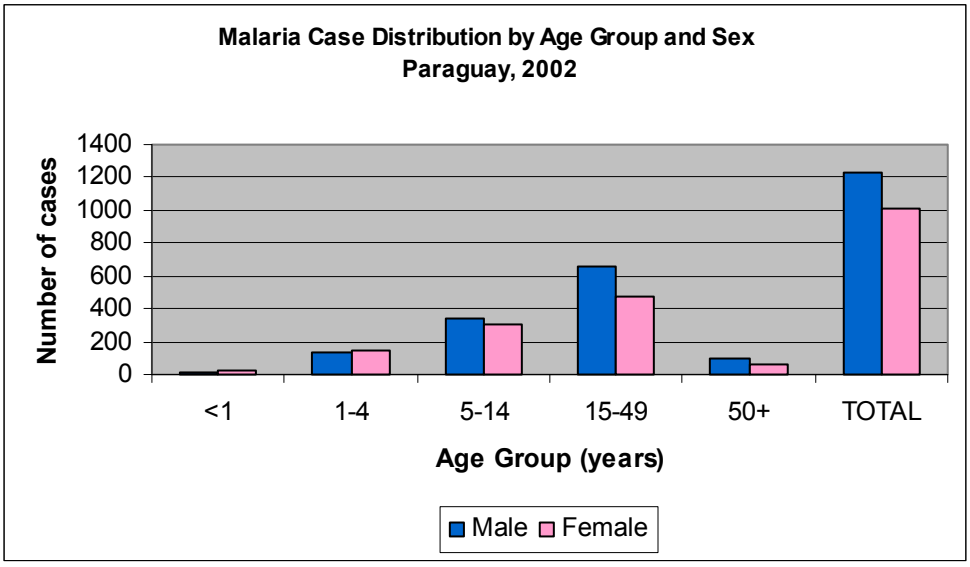


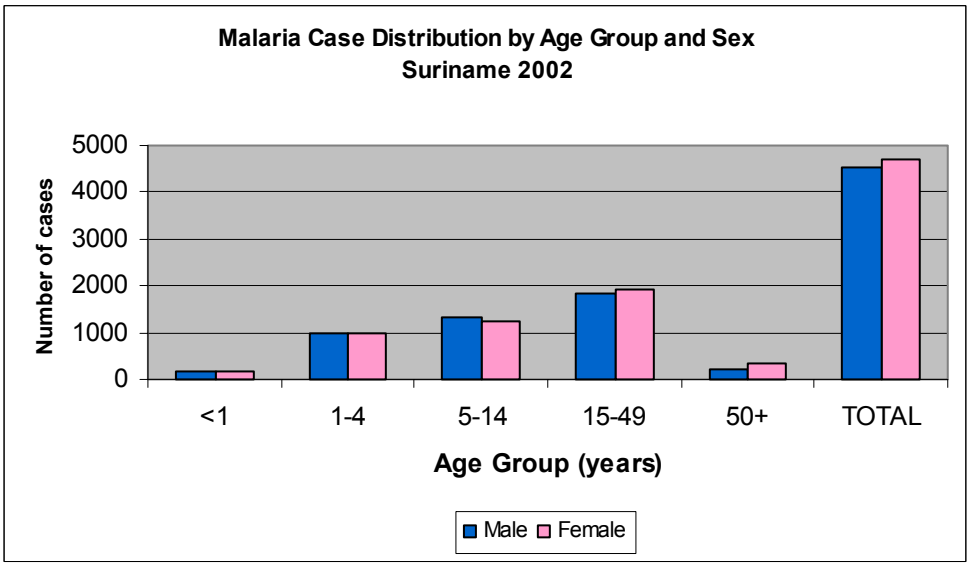
MALARIA CASE DISTRIBUTION BY AGE GROUP, SEX AND COUNTRY 2002





MALARIA CASE DISTRIBUTION BY AGE GROUP, SEX AND COUNTRY 2002





MALARIA CASE DISTRIBUTION BY AGE GROUP, SEX AND COUNTRY 2002