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STATUS REPORT ON MALARIA PROGRAMS IN THE AMERICAS
(Based on 2001 data)
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1. Introduction

During the last century, malaria was transmitted in the Americas from Canada in the north to Argentina in the south as well as in the islands of the Caribbean. Due to efforts to combat the disease, which intensified after the global eradication strategy began in the 1950s, transmission of the disease was halted in large areas of the region. These include the countries of North America, most of the Caribbean islands and areas with greater socioeconomic development and access to health services in the remaining countries.

Malaria is still transmitted in 21 countries of the Americas, where it is estimated that approximately 203 million people live in areas with some transmission risk. In the countries where transmission of the disease is no longer reported, it is estimated that approximately 90 million people live in areas where transmission was reported in the past and transmission risk is extremely low. This total of 293 million people means that approximately 35% of the 835 million inhabitants in the Region lives in areas where there is some possibility that the disease will be transmitted. This is consistent with data from the last decade, when it was reported that an average of 36% of the population in the Americas lived in areas with some risk of malaria.

Of the approximately 203 million people living in 21 countries where there is a risk of transmission, 56% lives in low risk areas, 24% in moderate risk areas and 20% in high risk areas (Table 1). In countries where there is no transmission, 17 of 23 territories reported the detection of 1069 imported cases of malaria in 2001, most of them in Canada and the United States (Table 2a).

After the world discontinued the program to eradicate malaria, the countries of the Region adopted the global malaria control strategy in 1992. The technical principles of the global control strategy include early diagnosis and prompt treatment of the disease; implementation of protective and preventive measures; development of the capability to predict and contain epidemics; and strengthening of local capacity in basic and applied research to permit and promote regular assessment of the malaria situation.

In 1998, with the primary goal of significantly reducing the burden of malaria in the world, the World Health Organization (WHO) launched the Roll Back Malaria Initiative (RBM). It is a global partnership that includes organizations of the United Nations system, other institutions, civil society, and the national governments of countries where malaria is endemic. The key elements of the Initiative reinforce those of the Global Malaria Control Strategy and emphasize effective management, early diagnosis and timely treatment, multiple prevention and operations research. In addition, the Initiative promotes good coordination between different groups and organizations combating the disease and a dynamic world partnership among all those involved.

In the Americas, the RBM movement began in October 1999, in the nine countries that share areas of the Tropical Rain Forest in South America, namely Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname, and Venezuela. At that meeting, the countries agreed to strengthen activities to control the disease and developed joint and coordinated work plans. Since that year, they have held meetings to monitor the work plans, have defined areas of research and planned joint activities in areas of mutual epidemiological interest in the countries.

At an RBM meeting held in February 2001 in Bahía, Brazil, the countries proposed the establishment of an Amazon Network for Monitoring Resistance to Antimalarial Drugs (RAVREDA), based on the experiences of the East African Network for Monitoring Antimalarial Treatment (EANMAT), with support from the Pan American Health Organization (PAHO) and WHO. The United States Agency for International Development (USAID) and the Centers for Disease Control (CDC) are investing resources in RAVREDA.

During 2001, the Amazon Cooperation Treaty's Special Commission on Health in the Amazon has focused on malaria and promoted the RBM Initiative in the countries. As a result, ad hoc groups were established that developed proposals for joint malaria control activities and strengthening of the countries' epidemiological surveillance systems.

The other subregion, Central America (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama, Mexico, Haiti and the Dominican Republic), launched the RBM Initiative in November 2000 in San Pedro Macoris in the Dominican Republic. The countries conducted a study of the current situation and prepared national and joint work plans. As a result, in 2001, Haiti and the Dominican Republic developed a proposal to eliminate malaria from the Island of Hispaniola, although the budgeted funds could not be mobilized. Since early 2001, the Central American countries have the services of a PAHO focal point financed by the RBM Initiative, who provides technical support to the 10 countries. An RBM monitoring meeting was held in Honduras in August 2001. The countries have benefited from RBM funds to carry out individual and joint activities. In addition, some Central American countries have received funds from the United Kingdom Department for International Development (DFID) to combat malaria.

In September 2001, there was a meeting of the countries of the Caribbean Basin that are free of transmission but where imported cases are detected and there are anopheline mosquitoes, potential vectors of the disease. To prevent the re-establishment of malaria transmission and to strengthen imported case detection capacity and clinical management, these countries agreed to launch the RBM Initiative in 2002.

The countries of the Region submit annual data to PAHO on cases of malaria due to domestic transmission or imported. For the first time in many years, information was received for 2001 from all countries where the disease is endemic and from countries where only imported cases are detected. The information provided is the source used to prepare this report.

2. Analysis of the epidemiological situation

In the 21 countries where transmission of malaria occurs, 18% of the population lives in areas of high and moderate risk and 24% lives in low risk areas. The percentage of the national population at any risk ranges from 7% in Argentina to 100% in Guatemala, Haiti, Honduras, and the Dominican Republic. At the same time, Ecuador, Honduras, Mexico, and Nicaragua indicate that more than 20% of their populations live in high-risk areas (Table 2b).

In 2001, the countries reported less than 1 million cases, the lowest number in the last decade. At the same time, there was a decline in the number of slides examined compared to the last two years, while the index of positive slides was the lowest since 1993 (Table 3).

Eleven of the 21 countries where the disease is endemic are in South America: Argentina, Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Paraguay, Peru, Suriname, and Venezuela. The others are eight countries in Mesoamerica: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, and Panama, along with the Dominican Republic and Haiti.

Information provided by these 21 countries indicates that 718 cases were detected in 2001 in areas where there is no malaria transmission. Fifty percent of the blood tests were conducted in high-risk areas and 16% were positive; of the 23% of slides taken in moderate risk areas, 9% were positive; 3.3% of the slides taken in low risk areas were positive.

Brazil had 388,658 cases of the total of 960,000 cases reported in the Americas during the year, a 36.4% decline from the previous year. In 2001, Colombia reported 206,195 cases, an increase of 91.6% over the previous year. In addition, cases increased by 10.5% in Ecuador, by 14% in Peru, by 12.9% in Guyana, and by 30% in Suriname. Between 2000 and 2001, the number of cases declined by 32.8% in Guatemala, by 31.6% in Honduras, by 49.9% in Bolivia, and by 32.7% in Venezuela.

As a percentage of the 960,000 cases reported in the Americas during the year, Brazil accounted for 40.5%, falling from 53.6% in 2000. It was followed by Colombia, with a percentage that increased to 21.5% from 9.45% in the previous year. In addition,

cases increased in Ecuador from 8.65% to 11.35%, in Peru from 6.12% to 8.3%, in Guyana from 2.11% to 2.83%, and in Suriname from 1.2% to 1.8%. Between 2000 and 2001, the percentage of cases declined from 4.68% to 3.7% in Guatemala, from 3.08% to 2.5% in Honduras, from 2.76% to 1.64% in Bolivia, and from 2.61% to 2.08% in Venezuela.

Thus, these 10 countries accounted for 91% of the cases in the Region in 2001 (Table 4). It is noteworthy that these were the same countries that were responsible for the majority of cases in recent years.

The risk of contracting malaria is related to the social, economic and ecological characteristics of the area where people live. In combination, these characteristics foster different levels of disease transmission. The Annual Parasite Index (API), or the number of recorded cases for every thousand people living in a geographical area, is used to estimate the level of risk.

Of the 203 million people living in areas with some risk of contracting malaria, it is estimated that an average of 4.72 per 1,000 contracted malaria during 2001. Of these, 1.37 per 1,000 contracted malaria caused by *Plasmodium falciparum* and 3.34 per 1,000 contracted malaria caused by *Plasmodium vivax*. With the exception of Haiti and the Dominican Republic, there is transmission caused by *P. vivax* in all the countries. It is noteworthy that 73% of the 2,179 cases of *Plasmodium malariae* in the Americas were detected in Suriname. The 1,585 cases of infection by *P. malariae* represent a rate of 33 per 1000 people in the country's areas of risk and an increase of 95% compared to the previous year. Suriname is the only country in the region where there is a higher risk of being infected by *P. malariae* than *P. vivax* (Table 5a).

2.1 Subregions

There are 67 million people living in malaria risk areas in the nine countries that share the ecological conditions associated with South America's Amazon forest. Of those who reside in these areas, 17.9% live in high-risk areas, 15.6% in moderate risk areas and 66.5% in low risk areas. It was in these nine countries: Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname, and Venezuela, where approximately 90.3% of the 960,792 cases of malaria in the region in 2001 were reported (Tables 2b and 4)

In the other subregion, the countries of Mesoamerica (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua and Panama), it is estimated that 114 million people live in areas where there is a risk of malaria transmission. Of these people, 24.5% reside in high-risk areas, 28% in medium risk areas and 47.5% in low risk areas. In 2001, with the exception of Guatemala, almost 2.81 million blood slides were

examined, in which nearly 79,000 cases of malaria were detected. Case numbers and percentages by country were as follows: Mexico, 4,831 (6.1%); Belize, 1,097 (1.4%); Costa Rica 1,363 (1.7%); El Salvador 362 (0.5%); Guatemala 35,824 (45.4%); Honduras 24,023 (30.4%); Nicaragua 10,482 (13.3%); and Panama 928 (1.2%). This means that three of these countries (Honduras, Guatemala and Nicaragua) accounted for 90% of the total number of cases in the subregion. Slides were examined and were positive for *P. falciparum* on the Island of Hispaniola.

Argentina and Paraguay also have malaria control programs, and estimate that 7.8% and 38.9% of their populations, respectively, live in malaria risk areas. In Argentina there are 2.9 million people in medium and low risk areas. In Paraguay, of the 2.2 million people at risk, 1.3 million are in low risk areas. In 2001, 215 cases were detected in Argentina, based on 6,688 samples examined, while 2,710 cases were detected in Paraguay, based on 76,607 slides examined. This represents positivity rates of 3.2% and 3.5%, respectively.

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

2.2 Classification of Malaria

The API and the number of cases detected for every thousand people living in an area of transmission are used to estimate the level of risk in malarious areas. Most countries classify areas with more than 10 cases per every 1,000 people as high-risk areas, areas with less than one for every 1,000 people as low risk areas, and areas with intermediate rates as medium risk areas. Brazil classifies areas with an API of less than 10 as low risk areas and areas with an API of more than 50 as high-risk areas. In 2001, of the 203 million people living in areas ecologically propitious for the transmission of malaria, the countries reported that approximately 89 million people live in areas of high and medium transmission risk, which represents an increase over the estimate for the previous year (Figure 1). Nearly 94% of the 960,792 cases in the Americas were detected in these high- and medium risk areas. The API for the population living in areas with some risk was 4.72 for every 1,000 people. However, in high and moderate risk areas, the API was approximately 10.13 cases for every 1,000 people, a decline from the 12.36 cases for every 1,000 people reported in 2000. While Brazil, Colombia, and Ecuador report the highest number of cases in the Region, French Guiana, Guyana and Suriname had the highest rates in the region in 2001 (Table 5 and Figure 2).

2.3 Detection, Management, and Prevention of Malaria

The predominant malarious parasite is *P. vivax*. It was the cause of 71% of the almost 960,000 cases in the countries with transmission (Table 5a). The vast majority of

the other cases were caused by *P. falciparum*, with almost all of these cases occurring in the nine countries that share the Amazon Jungle, plus the Island of Hispaniola. Mortality due to malaria is associated with *P. falciparum* and the countries indicated that there were 219 deaths in 2001, a decline from the 301 reported in 2000.

In Brazil, the percentage of cases due to *P. vivax* was 78.9%. In Mexico and the Central American countries of Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama, the percentage of cases due to *P. vivax* has continued to be nearly 97% in recent years.

In Argentina and Paraguay, all cases are due to *P. vivax*, while in the Andean countries (Bolivia, Colombia, Ecuador, Peru and Venezuela) it was the cause of 64.6% of cases in 2001. In French Guiana, Guyana, and Suriname, *P. vivax* was the cause of 34.3% of cases.

In Haiti and the Dominican Republic, the only Caribbean countries where the disease is transmitted, all cases are caused by *P. falciparum*. By parasite, it is noted that the rate for both parasites is highest in the populations of French Guiana, Guyana, and Suriname. These are the only geographical areas where the rate of *P. falciparum* was higher than that of *P. vivax* (Figure 3).

Except for Brazil, Guatemala, and Honduras, data was obtained on blood samples and tests. Sixty-eight percent of blood sampling and testing was done by the general health services, 12.2% by volunteers, and the rest through active search (Table 6).

The rate of slides examined based on population in transmission risk areas has shown a slightly increasing trend since 1992, but reports in 2001 were the lowest since 1998, while the annual parasitic was the lowest since 1996 and the rate of cases due to *P. falciparum* has been constant since 1999 (Figure 5).

Most countries have national treatment guides but many countries indicate that various antimalarial drugs are easily accessible through private pharmacies and/or informal suppliers, including some drugs that do not appear in the national guides. Studies conducted primarily in the countries that share the Amazon jungle have shown that there are varying degrees of resistance by *P. falciparum* to most frequently used first-line drugs, and even a reduction in its sensitivity to some of the second-line antimalarial drugs used. The antimalarial drugs used most often in the region are chloroquine, primaquine, sulfadoxine-pyrimethamine, quinine and mefloquine. Some countries also use derivatives of artemisinin in their treatment regimens (Table 7). In 2001, the countries that share the Amazon agreed to establish an Amazon Network for Monitoring Resistance to Antimalarial Drugs (RAVREDA), the goal being to obtain

information on the effectiveness of antimalarial drugs and to use that information in making decisions on their drug utilization policies.

Assuming that all cases received treatment with a 4-aminoquinoline in the countries that provided information, it is clear that there were large variations in the availability of treatment from country to country, with El Salvador reporting almost 650 treatments available per diagnosed case (Table 8).

Most of the countries have identified their areas with high risk of transmission of the disease and the causes for the persistence of transmission. The principal vectors in Central America are *Anopheles albimanus* and *Anopheles pseudopunctipennis*. In the countries that share the Amazon forest, the principal vectors are *Anopheles darlingi* and *Anopheles albitarsis* (Table 9). In 2001, with support from PAHO, Mexico and the Central American countries submitted a proposal to the Global Environment Facility (GEF) on a malaria control project that does not use DDT or other insecticides. In general, a reduction has been reported in the region in the use of DDT, which has been replaced by pyrethroids. The use of mosquito nets and personal protective measures is encouraged for people living in risk areas.

3. Financial Resources

With deconcentration and decentralization of the malaria control program and its integration and/or increased collaboration with local health services in most countries, there have been reports of efforts to increase the intersectoral approach and to promote community participation in controlling vector-borne diseases, including malaria.

The information provided by the countries indicates that funding for control programs in 2001 was the lowest it has been since 1997. However, per capita spending for those living in areas with some risk of contracting the disease was similar to spending in 1998 (Table 10).

4. Salient aspects of Country Programs

The 21 countries with malaria programs provided the following observations:

Argentina indicated that the number of cases had declined in comparison with 2000. It indicated that there were budget constraints that limited field activities. At the national level, transmission occurs in two provinces in the north of the country, Salta, and Jujuy on the border with Bolivia.

Belize indicated a reduction in the number of cases compared to 2000 and that the factors that contribute to the persistence of transmission include unsupervised treatment of cases, population movements, and limitations on vector control efforts.

Bolivia indicated that an initiative of the Canadian International Development Agency and the United Nations Children's Fund (UNICEF) provide significant support for promotion, control and epidemiological surveillance activities in the Departments of Beni and Pando. In some districts of the Amazon region, when the Annual Parasite Index for 1998 was compared with 2001, there was a decline of 89.5% in Riberalta, 79.3% in Guayaramerin and 70.5% in Magdalena. However, despite this decline, case incidence corresponds to a high risk.

As for inter-country activities, there is cooperation between Bolivia and Brazil. Meetings have been held to evaluate status and to coordinate and execute joint activities in Cobija and Pando, the regions bordering Brazil. Brazil cooperated with equipment and space spraying for both border areas. A joint strategic plan for malaria control was developed in 2001.

Brazil indicated that a new action plan called the Plan for Intensification of Control Measures in the Amazon (PICAM) was started in June 2000 under the auspices of the RBM Initiative. The objective of the plan is to reduce the incidence of malaria by 50% by the year 2003.

There were 610,878 cases recorded in 2000. In 2001, there were 36.4% fewer positives. Slides examined amounted to 2.2 million, 388,658 (17.6%) of which were positive. Of this total, 387,330 (99.6%) came from the Amazon area. Of the nine states that make up this region, Pará, Amazonas and Maranhão accounted for 273,307 cases, or 70.5% of the total for the area.

In July 2001, an intensive control strategy was implemented in the Amazon Region. This strategy produced a 36.8% reduction in cases in the final months of that year.

Colombia indicated that it had diagnosed 206,195 cases in 2001, representing an increase of 91.6% compared to the 107,616 reported in 2000. It is noteworthy that the number of cases reported in 2000 was also almost twice that reported in 1999. In 2001, there were 93,633 cases of *P. falciparum*, 60% higher than the 37,563 diagnosed in 2000. Six Departments (Antioquia, Córdoba, Choco, Nariño, Valle and Cauca) recorded 90.0% of the cases. There were 58 certified deaths from malaria, representing case-fatality of 0.9%. These deaths occurred in high-risk areas for *P. falciparum*. Illegal crops and armed conflicts are important factors in the persistence and spread of the disease.

As a strategy, the program has recommended early diagnosis and timely, effective and safe treatment, along with activities designed to promote individual protection, epidemiological surveillance, and timely control of outbreaks.

Costa Rica indicated that the 1,363 cases of malaria reported in 2001 represented a reduction of 516 (27.5%) cases compared to the 1,879 reported in 2000. In the classification by parasite species, 99.9% represented *P. vivax* and 0.1% represented *P. falciparum*. The Huetar Atlántica Region accounted for 66.2% of total cases in the country and the canton of Matina accounted for 499 cases, or 55.3% of the region's cases and 36.6% of the country's total. In the Huetar Norte Region, an integrated project for malaria control has been developing since 1996, allowing for a reduction from 1,503 cases reported in 1998 to 163 cases reported in 2001. The program's achievements include the fact that the Costa Rican Social Security Fund contributes the antimalarial drugs and that parasitological diagnosis is decentralized. A project was started in the canton of Talamanca to control malaria within the framework of the RBM Initiative.

The *Dominican Republic* reported that in 2001 hotel construction activities and activities relating to the growing of sugar cane declined in the eastern region of this country, which meant a reduction in the number of workers coming from malarious areas in both the Dominican Republic and Haiti. Activities coordinated by the National Center for Communicable Disease Control (CENCET) and the Central Romana designed to eliminate breeding grounds in the sugarcane plantations helped to eliminate cases in this region.

In the final quarter of the year, with technical and financial support from PAHO under the RBM Initiative, a new malaria control system was started in the Province of Monte Cristi. The control measures targeted 10 localities where 70% of the province's cases are concentrated. Local personnel have been trained to develop comprehensive surveillance and control actions, in addition to the strategy of early diagnosis, timely treatment, and reduction of the vector population through popular participation and mobilization of local resources.

Ecuador indicated that the 106,647 cases detected in 2001 represented an increase of 1.9% over the 104,598 cases diagnosed in 2000. By parasite species, cases of *P. vivax* increased by 28.3% over the cases diagnosed in 2000. However, cases of *P. falciparum* fell by 28.3%.

Economic and operational limitations helped to limit implementation of anticipated actions to just 30%. Epidemics have been reported in areas where malaria was not a priority. In the provinces bordering Colombia and Peru, there has been suspected resistance to the first-line therapeutic regimens managed by the Ministry of Health and effectiveness studies are being conducted.

El Salvador reported 753 cases in 2000, a 38.7% increase over the number recorded in the previous year. In 2001, 362 cases were detected, representing a decline in the number of cases, a favorable situation that is supported by the Ministry of Public Health in its approach to the problem.

Guatemala recorded fewer cases in 2001 compared to the previous year. High-risk areas accounted for 83.4% of malaria cases nationally. In the Petén Norte area, a study is being conducted to determine the vector species involved in transmission. The program strategies include chemical control using pyrethroids that are applied in the event of outbreaks or epidemics. Problems include the lack of personnel to sustain interventions. The areas that represented the highest percentages were Alta Verapaz (23.7%), Peten Sur Occidental (19.0%), and Ixcán (12.7%).

Guyana indicated that most activities targeted problematic areas in Regions 1,2,4,6,7,8,9 and 10 based on the RBM Initiative. Selective activities are carried out to combat the vector in areas with high potential for transmission and high prevalence at present. It is important to point out that Regions 7 and 8 account for 68% of the country's cases.

French Guiana indicated that most cases occur in the area bordering Suriname and formed by Maroni River. Most cases are caused by *P. falciparum* and there was an increase in the number of cases in 2001 as compared to the previous year. Environmental changes associated with mining activities have contributed to increased transmission of the disease. Along the coast of Isla Cayena, transmission is minimal. The principal vector is *A. darlingi*. The principal activities to combat the disease are the use of household spraying with pyrethroids and the active search for cases among residents in a transmission area.

Haiti indicated that since the National Malaria Eradication Service was closed in 1988, the malaria control program has not been integrated in general health services due to a lack of human and financial resources. Nonetheless, diagnosis and treatment are carried out in health centers.

Honduras reported that 24,023 cases were diagnosed in 2001, representing a decline of 31.6% from the 35,125 cases reported in 2000. Of the cases in 2001, 96.1% were due to *P. vivax* and 3.9% to *P. falciparum*. Of the cases of *P. falciparum*, 92.4% come from Health Region IV. There is a need to improve the documentation on miscarriage in women affected by malaria and serious cases in children and young adults who require hospitalization as well as on malaria-related deaths.

Mexico indicated a declining trend in the incidence of malaria. It continued the "Focal Treatment" model that has been characterized by high yield and low cost. In the

current year, the Northwest Region was incorporated in order to eliminate residual foci. This treatment model is based on four strategies: stratification based on risk factors, treatment with single and massive doses of antimalarial drugs, clean-up of breeding sites with community involvement and household spraying with insecticides. In areas with transmission and migratory movements, spraying is applied using permethrin.

The new program strategy is to use increasingly less insecticide through the active and committed involvement of municipalities and the community in basic sanitation actions. As for the use of insecticides, organochlorine and organophosphorus have been replaced by pyrethroids with low ecological impact.

Difficulties include the fact that states need to adopt the focal treatment strategy; the hiring of temporary personnel leads to constant turnover and thus the need to constantly reschedule training, migratory movements from Central America, and union and labor factors.

Nicaragua indicated that given the increase in malaria and dengue in 1996, Vector Control Units were formed within the SILAIS (Comprehensive Health Service Systems), grouping vector staff together under a single command and delegating responsibility for the problem of vectors to the SILAIS and their municipalities. The program's fundamental measure was to capture and medicate every suspected case; this is carried out by the Health Services, supplemented by the use of *Bacillus sphaericus* and *Bacillus thuringiensis* as larvicides. The volunteer network was also reorganized and the use of mosquito nets impregnated with insecticides was implemented to protect children and pregnant women.

Achievements include the fact that 10,375 cases were diagnosed in 2001, which represented a 57.0% decline in comparison with the 24,014 cases diagnosed in 2000. The Program provided 6 pick-up trucks, 12 motorcycles, and 6 microscopists to the SILAIS to strengthen the laboratory network. Technical and operational training was carried out and 2000 boxes were prepared and distributed to volunteers. Two computers, one photocopier, a slide projector and an overhead projector were purchased for the DFID project.

Major problems included a lack of funding to pay per diems to field staff, lack of human resources (other functions are assigned to those available), transportation insufficient to obtain a good coverage percentage, lack of basic supplies for control activities, lack of technical resources in entomology, and cases of *P. falciparum* found in remote areas and areas where armed bands operate.

Panama indicated that the 928 cases detected in 2001 represented a slight decline compared to the 1,036 cases detected in 2000. Malaria is concentrated in the indigenous areas and cultural features of the various groups limit the suitability of interventions.

Paraguay indicated that the number of cases detected in 2001 represented a decline in comparison with the previous year. Despite the fact that Paraguay has medications and personnel, the lack of both a steady supply of fuel and a fleet of vehicles hinders the proper performance of control activities in malarious areas. Moreover, economic difficulties limit malaria surveillance and control activities.

Peru indicated that 79,473 cases were diagnosed in 2001, a slight increase of 14% compared to the 69,726 diagnosed in 2000. Of the total diagnosed, 17,685 (22.2%) cases were due to *P. falciparum*. Infection by this species is considered an emergency due to the circulation and dissemination of strains resistant to established therapeutic regimens. Problems include a reduction in the coverage of treatment and protected dwellings, external and internal migrations, drug resistance, lack of case monitoring and control, lack of a comprehensive malaria approach, lack of critical supplies, lack of administrative support, vector resistance to insecticides, difficult access to health services, limited transfer of technical responsibilities to local health levels. In response to these problems, the sector proposes to prioritize promotion and community involvement, provide combined therapy for treating *P. falciparum*, strengthen institutional capacity, call for other sources of financing, and conduct operations research for decision-making. The following strategies promulgated by the RBM Initiative are included: coordinating and targeting the resources of the Ministry of Health and other institutions involved, extending responsibility for the problem of malaria to local governments, implementing the Education–Health agreement, making technical transfers to the Health Bureaus, promoting and supporting the mobilization of resources, and gradually incorporating the actions identified by PAHO/RAVREDA.

Suriname indicates that malaria increased significantly in 2001 compared to 2000, particularly in areas where there are migratory movements. This increase was also due to a malaria epidemic in Brokopondo and upper Suriname. In 1998, the Government established the National Malaria Control Committee, to which PAHO belongs. This Committee is responsible for implementing the RBM Initiative. In addition, 25 new microscopists were trained, and support was provided along with the medical mission to a group of women who prepared 20,000 impregnated mosquito nets. In coordination with and with support from PAHO/RAVREDA, an analysis was started to study the resistance of antimalarial drugs in Marowijne.

Venezuela indicated a 23.7% decline in the incidence of malaria in 2001 compared to the previous year. Its control strategy includes training, evaluation, and technical support of programs in 14 states where transmission occurs. Centers for malaria

diagnosis and treatment have been increased and the country controls vectors through the use of chemical insecticides. Specific interventions are carried out with support from the central level to control outbreaks and epidemics when they exceed the response capacity of regional entities and/or when requested by regional authorities.

5. Perspectives

Since it was launched in the region in 1998, the RBM Initiative has been a catalyst for malaria control activities. These activities have been carried out at both the national and regional levels. Funds have been obtained from the Initiative to support the implementation of activities in the region and a focal point was hired for the countries of Central America. A meeting was held in 2001 to monitor the RBM Initiative in the countries of Central America.

In late 2001, the process to select another focal point for the Initiative for the countries that share the Amazon jungle was concluded. Most Caribbean countries are susceptible and vulnerable to malaria and agreed on the need to strengthen surveillance of the disease in their territories. In an external evaluation of the global RBM Initiative, efforts in the Western Pacific Region and the Americas Region stood out.

In 2001, the countries that share the Amazon forest proposed establishing a network to monitor resistance to antimalarial drugs and financing to do so was obtained late in the same year. It is hoped that similar funds will be available each year for five years, as part of a USAID initiative against malaria in the Amazon Region. These investments are expected to support the development and use of selective vector control methods, surveillance and efforts to improve the adequate and appropriate use of drugs.

However, there is a regional need to strengthen the health services and expand access to diagnosis and treatment of the disease, particularly in areas with high transmission due to *P. falciparum*, the goal being to reduce the number of malaria-related deaths.

The countries most affected by malaria are not only those with lower GDP but also those with major inequities in terms of income, access to education and health services, environmental quality, and adequate housing for the population. During 2001, despite the lower number of cases in the region as a whole, Colombia recorded a striking increase in the number of malaria cases. The indigenous peoples living in the Amazon jungle and people passing through such areas seeking economic opportunities or survival have insufficient and inadequate health services. Resolving this situation should be an effort shared by the health services, other sectors, major national and international consortia, as well as financing and cooperation agencies. At the same time, malaria control activities should be strengthened through integration with other programs such as

Integrated Care of Childhood Illness. This should be in conjunction with efforts to strengthen education and health promotion so as to achieve early diagnosis and treatment of the disease.

In late 2001, the global fund was established to combat three illnesses that have great impact: HIV/AIDS, tuberculosis, and malaria. This global fund is a potential source of financing to support efforts to combat malaria in the countries of the region, and to improve the situation of the affected populations through the coordinated participation of the public sector and civil society.

TABLE 1
POPULATION LIVING IN MALARIA ENDEMIC AREAS IN THE AMERICAS, 1992-2001
(in thousands)

Year	POPULATION IN AREAS WITH ECOLOGICAL RISK OF MALARIA TRANSMISSION			Total Population at Ecological Risk	Total Population of Countries
	MALARIA TRANSMISSION RISK				
	Low*	Moderate	High		
1992	134,089	103,885	51,974	289,948	725,564
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

* 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, 2001
(population in thousands)

Countries	Total Population	Population at Low Risk*	Blood slides (number)	
			Examined	Positive
Anguilla	8	...	...	1
Antigua & Barbuda	77	...	5	2
Aruba	98	...	...	...
Bahamas	301	...	0	4
Barbados	269	...	...	5
Bermuda	64	...	...	...
Canada	30,857	...	...	420
Cayman Islands	37	...	...	0
Cuba	11,229	3,797	372,080	23
Chile	15,401	200	8	4
Curaçao	215	...	...	...
Dominica	72	18	...	1
Grenada	103	36	78	0
Guadeloupe	420	410	...	12
Jamaica	2,560	2,176	596	6
Martinique	392	237	...	9
Montserrat	11	...	0	0
Puerto Rico	3,839	3,839	...	7
St. Kitts & Nevis	45	...	6	0
St. Vincent & Grenadines	112	...	0	0
St. Lucia	158	...	1	1
Trinidad & Tobago	1,234	1,230	14,874	13
Turks and C. Islands	16	14	0	0
United States	284,796	78,171	...	545
Uruguay	3,313	...	...	14
Virgin Islands (U.K.)	20	...	...	0
Virgin Islands (USA)	122	...	...	2
Subtotal	355,769	90,128	387,648	1,069

* Population living in areas where historically malaria is known to have occurred or with possibility of occurring.

...Information not available

TABLE 2b
RISK OF MALARIA TRANSMISSION IN THE AMERICAS
BY POPULATION, 2001
(in thousands)

Countries and Territories by Geographic Subregion	POPULATION IN AREAS WITH ECOLOGICAL RISK OF MALARIA TRANSMISSION									
	Total Population*	Low risk		Moderate risk		High risk		Total at risk		
		Total	%	Total	%	Total	%	Total	%	
Mexico	101,098	43,376	42.90	24,026	23.77	21,313	21.08	88,715	87.75	
Belize	250	0	0.00	153	61.20	0	0.00	153	61.20	
Costa Rica	3,810	948	24.88	307	8.06	33	0.87	1,288	33.81	
El Salvador	6,351	3,179	50.06	2,283	35.95	0	0.00	5,462	86.00	
Guatemala	9,366	1,763	18.82	1,478	15.78	705	7.53	3,946	42.13	
Honduras	6,780	1,693	24.97	680	10.03	4,407	65.00	6,780	100.00	
Nicaragua	5,342	3,418	63.98	759	14.21	1,165	21.81	5,342	100.00	
Panama	2,919	0	0.00	2,430	83.25	391	13.39	2,821	96.64	
Haiti	8,000	3,242	40.53	4,758	59.48	0	0.00	8,000	100.00	
Dominican Republic	8,942	8,791	98.31	142	1.59	9	0.10	8,942	100.00	
French Guiana	157	139	88.61	0	0.00	15	9.57	154	98.18	
Guyana	764	511	66.88	45	5.89	59	7.72	615	80.50	
Suriname	450	2	0.44	22	4.93	24	5.29	48	10.67	
Brazil	168,260	12,464	7.41	4,020	2.39	2,001	1.19	18,485	10.99	
Bolivia	8,329	100	1.20	1,434	17.22	337	4.05	1,871	22.46	
Colombia	43,834	16,750	38.21	831	1.90	4,900	11.18	22,481	51.29	
Ecuador	12,423	3,931	31.64	1,383	11.13	2,542	20.46	7,856	63.24	
Peru	25,662	4,068	15.85	2,442	9.52	1,627	6.34	8,137	31.71	
Venezuela	24,642	6,563	26.63	232	0.94	451	1.83	7,246	29.41	
Argentina	37,032	1,949	5.26	947	2.56	0	0.00	2,896	7.82	
Paraguay	5,634	1,291	22.91	752	13.35	150	2.66	2,193	38.92	
21 countries with active malaria programs	480,045	114,178	23.78	49,124	10.23	40,129	8.36	203,431	42.38	
TOTAL (incl. countries with no active malaria transmission)	835,814	204,307	24.44	49,124	5.88	40,129	4.80	293,560	35.12	

* 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, 1992-2001

Year	POPULATION (in thousands)		BLOOD SLIDES			CASE DETECTION (per 100,000 inhabitants)	
	Total Countries	Risk Areas *	Examined	Positive	Slide Positivity Rate (SPR)	Total Americas	Malarious Areas
1992	725,564	289,948	9,373,323	1,187,316	12.67	163.64	409.49
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	9,456,689	960,798	10.16	114.95	327.29

* 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, 2001

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	354,059	...	331,672	...	1,122,797	...	7,743	...	1,816,271	4,831	0.50%
Belize	6,996	338	11,177	759	0	0	0	0	18,173	1,097	0.11%
Costa Rica	11,606	210	27,501	624	3,946	499	70	30	43,123	1,363	0.14%
El Salvador	0	0	48,245	68	63,585	294	...	...	111,830	362	0.04%
Guatemala	...	560	...	5,385	...	29,879	...	...	...	35,824	3.73%
Honduras	12,782	140	26,626	2,736	133,271	21,147	...	...	172,679	24,023	2.50%
Nicaragua	320,003	3,580	42,233	1,367	126,464	5,535	...	...	488,700	10,482	1.09%
Panama	0	0	30,225	102	126,363	826	...	...	156,588	928	0.10%
Haiti	0	0	51,067	9,837	0	0	...	...	51,067	9,837	1.02%
Dominican Republic	329,451	507	69,543	441	12,437	90	...	...	411,431	1,038	0.11%
French Guiana	14,815	367	-	-	29,903	3,314	1,830	142	46,548	3,823	0.40%
Guyana	...	331	...	487	...	26,304	...	...	211,221	27,122	2.83%
Suriname	72	18	0	0	69,815	17,056	...	...	69,887	17,074	1.78%
Brazil	391,149	35,284	678,167	117,300	1,205,294	235,996	424	78	2,275,034	388,658	40.50%
Bolivia	...	...	55,552	8,392	67,381	7,373	...	...	122,933	15,765	1.64%
Colombia	3,598	1,980	13,722	2,788	807,460	201,427	...	...	824,780	206,195	21.48%
Ecuador	...	5,069	...	10,354	...	93,480	...	...	538,757	108,903	11.35%
Peru	116,692	3,004	674,943	18,450	625,788	57,924	898	95	1,426,410	79,473	8.28%
Venezuela	61,963	2,188	14,567	1,253	121,470	16,223	2,314	342	200,314	20,006	2.08%
Argentina	3,296	19	3,389	193	0	0	3	3	6,688	215	0.02%
Paraguay	28,961	798	29,843	1,107	12,904	777	4,899	28	76,607	2,710	0.28%
21 Country Subtotal	1,655,443	54,393	2,108,472	181,643	4,528,878	718,144	18,181	718	9,069,041	959,729	100.00%
TOTAL (incl. countries with no active malaria transmission)	2,043,091	54,393	2,108,472	181,643	4,528,878	718,144	405,829	1,787	9,456,689	960,798	

... No information available
- Not applicable

TABLE 5 a
EPIDEMIOLOGICAL STATUS FOR
21 COUNTRIES WITH ACTIVE MALARIA PROGRAMS, 2001

Countries and Territories by Geographic Subregion	Population in risk areas*	PERSONS AT RISK			PARASITE SPECIES					MORTALITY
		Examined	Positive	API	<i>P.falciparum</i> & mixed	AFI	<i>P.vivax</i>	AVI	<i>P.malariae</i>	Preliminary Data
Mexico	88,715	1,808,528	4,831	0.05	70	0.00	4,761	0.05	0	0
Belize	153	18,173	1,097	0.00	6	0.00	1,091	0.00	0	0
Costa Rica	1,288	43,053	1,363	1.06	1	0.00	1,362	1.06	0	0
El Salvador	5,462	111,830	362	0.07	2	0.00	360	0.07	0	0
Guatemala	3,946	0	35,824	9.08	1,052	0.27	34,772	8.81	0	...
Honduras	6,780	172,679	24,023	3.54	938	0.14	23,085	3.40	0	0
Nicaragua	5,342	488,700	10,482	1.96	1,041	0.19	9,441	1.77	0	2
Panama	2,821	156,588	928	0.33	39	0.01	889	0.32	0	0
Haiti	8,000	51,067	9,837	1.23	9,837	1.23	0	0.00	0	16
Dominican Rep.	8,942	411,431	1,038	0.12	1,034	0.12	4	0.00	0	16
French Guiana	154	44,718	3,823	24.77	3,166	20.51	657	4.26	0	0
Guyana	615	211,221	27,122	44.10	12,831	20.86	14,291	23.24	0	...
Suriname	48	69,887	17,074	355.71	13,957	290.77	1,532	31.92	1,585	4
Brazil	18,485	2,274,610	388,658	21.03	81,402	4.40	306,681	16.59	575	98
Bolivia	1,871	122,933	15,765	8.43	808	0.43	14,957	7.99	0	...
Colombia	22,481	824,780	206,195	9.17	93,633	4.16	112,562	5.01	0	58
Ecuador	7,856	538,757	108,903	13.86	37,491	4.77	71,412	9.09	0	...
Peru	8,137	1,417,423	79,473	9.77	17,687	2.17	61,680	7.58	11	25
Venezuela	7,246	198,000	20,006	2.76	2,774	0.38	17,224	2.38	8	...
Argentina	2,896	6,685	215	0.07	0	0.00	215	0.07	0	0
Paraguay	2,193	71,708	2,710	1.24	4	0.00	2,706	1.23	0	0
TOTAL	203,431	9,042,771	959,729	4.72	277,773	1.37	679,682	3.34	2,179	219

* Population in thousands (All risk areas)

... No information available

TABLE 5b

**EPIDEMIOLOGICAL STATUS IN HIGH AND MODERATE RISK AREAS FOR
21 COUNTRIES WITH ACTIVE MALARIA PROGRAMS, 2001**

Countries and Territories by Geographic Subregion	Population* in Mod./High risk Areas	PERSONS AT RISK			PARASITE SPECIES					MORTALITY
		Examined	Positive	API	<i>P.falciparum</i> & mixed	AFI	<i>P.vivax</i>	AVI	<i>P.malariae</i>	Preliminary Data
Mexico	45,339	1,454,469	4,792	0.11	70	0.00	4,722	0.10	0	0
Belize	153	11,177	759	4.96	2	0.00	757	4.95	0	0
Costa Rica	340	31,447	1,123	3.30	1	0.00	1,122	3.30	0	0
El Salvador	2,283	111,830	362	0.16	2	0.00	360	0.16	0	0
Guatemala	2,183	-	35,264	16.15	1,044	0.48	34,220	15.68	0	...
Honduras	5,087	159,897	23,883	4.69	935	0.18	22,948	4.51	0	0
Nicaragua	1,924	168,697	6,902	3.59	1,025	0.53	5,877	3.05	0	2
Panama	2,821	156,588	928	0.33	39	0.01	889	0.32	0	0
Haiti	4,758	51,067	9,837	2.07	9,837	3.49	0	0.00	-	16
Dominican Rep.	151	81,980	531	3.52	531	3.52	0	0.00	-	16
French Guiana	15	29,903	3,314	220.36	2,779	184.79	535	35.57	-	0
Guyana	104	211,221	26,791	257.61	12,700	122.12	14,091	135.49	-	-
Suriname	46	69,815	17,056	370.78	13,942	303.09	1,530	33.26	1,584	4
Brazil	6,021	1,883,461	353,296	58.68	75,701	12.57	277,030	46.01	565	98
Bolivia	1,771	122,933	15,765	8.90	808	0.46	14,957	8.45	0	...
Colombia	5,731	821,182	204,215	35.63	93,055	16.24	111,160	19.40	-	58
Ecuador	3,925	-	103,834	26.45	35,437	9.03	68,397	17.43	-	...
Peru	4,069	1,300,731	76,374	18.77	17,385	4.27	58,989	14.50	-	25
Venezuela	683	136,037	17,476	25.59	2,700	3.95	14,768	21.62	8	...
Argentina	947	3,389	193	0.20	0	0.00	193	0.20	-	-
Paraguay	902	42,747	1,884	2.09	0	0.00	1,884	2.09	0	0
T O T A L	89,253	6,848,571	904,579	10.13	267,993	3.00	634,429	7.11	2,157	219

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

... No information available

TABLE 6
COMPARISON BETWEEN PASSIVE AND ACTIVE CASE DETECTION, 2001

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	812,905	...	0.00	469,797	...	0.00	533,369	...	0.00
Belize	...	...	...	11,971	...	...	6,202	...	...
Costa Rica	1,303	472	36.22	1,385	123	8.88	40,435	768	1.90
El Salvador	51,698	140	0.27	52,157	211	0.40	7,975	11	0.14
Guatemala	...	...	...	...	...	...	...	...	...
Honduras	...	...	...	...	...	...	...	...	...
Nicaragua	286,754	5,299	1.85	175,594	4,899	2.79	26,352	284	1.08
Panama	21,281	272	1.28	259	36	13.90	135,048	620	0.46
Haiti	51,067	9,837	19.26	...	...	...	...	...	...
Dominican Rep.	71,071	341	0.48	14,427	90	0.62	171,641	272	0.16
French Guiana	32,466	3,497	10.77	...	...	...	14,082	326	2.32
Guyana	94,397	3,870	4.10	...	...	...	116,824	23,252	19.90
Suriname	69,887	17,074	24.43	-	-	-	...	...	...
Brazil	...	...	...	...	...	...	...	...	...
Bolivia	57,012	10,329	18.12	14,188	2,656	18.72	51,733	2,780	5.37
Colombia	824,780	206,195	25.00	...	...	...	...	...	...
Ecuador	519,386	98,524	18.97	19,371	8,123	41.93	-	-	-
Peru	1,418,321	79,473	5.60	-	-	-	-	-	-
Venezuela	89,881	14,755	16.42	-	-	-	110,433	5,251	4.75
Argentina	1,432	136	9.50	91	27	29.67	5,165	52	1.01
Paraguay	4,177	486	11.64	34,927	1,587	4.54	37,503	637	1.70
TOTAL	4,407,818	450,700	10.23	794,167	17,752	2.24	1,256,762	34,253	2.73

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

TABLE 7
ANTIMALARIAL DRUGS USED IN 21 COUNTRIES IN 2001
(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	Artemisinin derivatives number of treatments*	Quinine @ 300 mg
Mexico	...	...	-	-	-	-
Belize	65,420	15,273	-	-	-	-
Costa Rica	99,100	54,525	-	-	-	-
El Salvador	2,348,700	2,348,700	-	-	-	-
Guatemala	...	...	-	-	-	-
Honduras	1,076,068	792,172	-	-	-	-
Nicaragua	17,625,510	12,190,521	-	-	-	-
Panama	195,000	182,500	80	-	-	-
Haiti	250,000	...	...	...	...	...
Dominican Republic	892,681	856,105	-	-	-	350
French Guiana	...	...	...	...	...	...
Guyana	...	...	...	...	...	...
Suriname	30,000	60,000	...	...	-	600,000
Brazil	5,197,318	8,077,447	-	182,308	115,000	1,222,390
Bolivia	804,330	1,250,195	-	2,100	6,875	4,650
Colombia	20,043,000	2,476,600	406,200	10,014	-	22,250
Ecuador	2,425,250	818,716	8,000	-	-	2,650
Peru	669,289	785,805	28,194	19,500	4,965	183,078
Venezuela	616,386	914,057	1,395	-	-	33,921
Argentina	3,422	1,748	-	-	-	-
Paraguay	282,900	40,535	-	-	-	-

* Artesunate and Artemeter @ 724 mg/treatment; Artemisinin @ 4,800 mg./treatment
... No Information available
- Not applicable

TABLE 8
ANTIMALARIAL TREATMENT COMPLETED IN 2001

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 <i>P. falciparum</i> and mixed cases reported	Number of second-line treatments available per case <i>P. falciparum</i>
Mexico	...	4,831	...	70	...
Belize	6,542	1,097	5.96	6	0.00
Costa Rica	9,910	1,363	7.27	1	0.00
El Salvador	234,870	362	648.81	2	0.00
Guatemala	...	35,824	...	1,052	...
Honduras	107,607	24,023	4.48	938	0.00
Nicaragua	1,762,551	10,482	168.15	1,041	0.00
Panama	19,500	928	21.01	39	0.68
Haiti	...	9,837	...	9,837	...
Dominican Rep.	89,268	1,038	86.00	1,034	0.00
French Guyana	...	3,823	...	3,166	...
Guyana	...	27,122	...	12,831	...
Suriname	3,000	17,074	0.18	13,957	1.02
Brazil	519,732	388,658	1.34	81,402	1.38
Bolivia	80,433	15,765	5.10	808	1.48
Colombia	2,004,300	206,195	9.72	93,633	1.51
Ecuador	242,525	108,903	2.23	37,491	0.07
Peru	66,929	79,473	0.84	17,687	1.14
Venezuela	61,639	20,006	3.08	2,774	0.46
Argentina	342	215	1.59	0	0
Paraguay	28,290	2,710	10.44	4	0.00

... No information available

TABLE 9
MALARIOUS AREAS AT HIGH RISK OF TRANSMISSION AND CONTROL PRIORITIES, 2001

COUNTRIES	POPULATION	km2	REPORTED CASES	API	P. Falc. + MIXED	AFI	CONTROL MEASURES APPLIED IN DIFFERENT AREAS	MAIN VECTORS	CAUSES OF PERSISTENCE OF TRANSMISSION
ARGENTINA	207,435	...	193	0.93	-	-	Epidemiological surveillance and spraying	<i>A. pseudopunct.</i>	Heavy internal and international migration, areas difficult to reach due to climatic factors; economic and financial constraints on program activities.
BELIZE	6,153	...	231	37.54	2	0.33			
BOLIVIA								<i>A. darlingi</i>	Dynamic migration related to economic activities.
2/9 departamentos:									
Beni									
Guayaramerin	46,414	...	2,057	44.32	160	3.45			
Maadjalena	17,492	...	429	24.53	67	3.83			
Riberalla	75,158	...	3,351	44.59	308	4.10			
Pando	58,142	...	1,536	26.42	242	4.16			
BRAZIL*									
A) Very High Risk (API ≥ 50/1000)									
State (# municipalities at very high risk/local # municipalities)									
Acre (1/22)	7,309	32,184.0	1,370	187.44	301	41.18	Case detection and treatment; house spraying; health education; elimination of breeding sites; diagnosis and treatment integrated into Primary Health Care System (PHC).	<i>A. darlingi</i> <i>A. albivittis</i>	All of the epidemiological risk factors that determine malaria transmission in ecological areas of rain forests with remote farms, mining areas, and intense internal migration.
Amazonas (16/62)	278,890	1,171,761.0	29,268	104.94	5,364	19.23			
Amapá (10/16)	62,593	128,118.0	14,124	225.65	3,344	53.42			
Maranhão (14/217)	206,160	38,922.0	15,526	75.31	1,182	5.73			
Mato Grosso (4/126)	55,533	46,980.0	4,577	82.42	906	16.31			
Pará (44/143)	1,143,786	655,732.0	141,337	123.57	34,330	30.01			
Rondonia (12/52)	148,719	53,400.0	36,830	247.65	10,832	72.84			
Roraima (13/15)	97,757	192,060.0	14,832	151.72	2,983	30.51			
Sub-Total	2,000,747	2,319,157	257,864	118.88	59,242	29.61			
BRAZIL* (Continued)									
B) High Risk (API ≥ 10/1000 up to 49.9/1000)									
State (# municipalities at high risk/local # municipalities)									
Acre (9/22)	150,531	48,154.0	3,220	21.39	604	4.01	Case detection and treatment; house spraying; health education; elimination of breeding sites; diagnosis and treatment integrated into Primary Health Care System (PHC).	<i>A. darlingi</i> <i>A. albivittis</i>	All of the epidemiological risk factors 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 to and from cities.
Amazonas (20/62)	529,992	308,408.0	14,448	27.26	1,874	3.54			
Amapá (6/16)	415,316	6,562.0	8,462	20.37	2,437	5.87			
Maranhão (39/217)	783,393	44,052.0	17,721	22.62	1,344	1.72			
Mato Grosso do Sul (1)	7,420		130	17.52	0	0.00			
Mato Grosso (9/126)	77,079	138,672.0	1,623	21.06	150	1.95			
Pará (37/143)	1,530,156	415,698.0	39,844	26.04	7,511	4.91			
Rondonia (8/52)	495,947	91,090.0	18,526	37.35	4,082	8.23			
Roraima (1/15)	6,114	20,957.0	104	17.01	27	4.42			
Tocantins (5/139)	23,963	7,701.0	448	18.70	28	1.17			
Sub-Total	4,019,911	1,061,294	104,526	26.00	18,057	4.49			

TABLE 9
MALARIOUS AREAS AT HIGH RISK OF TRANSMISSION AND CONTROL PRIORITIES, 2001

COUNTRIES	POPULATION	km2	REPORTED CASES	API	P. Falc. + MIXED	AFI	CONTROL MEASURES APPLIED IN DIFFERENT AREAS	MAIN VECTORS	CAUSES OF PERSISTENCE OF TRANSMISSION
EL SALVADOR									
5/5 Provinces:									
Ahuachapan (12 municipalities)	326,437	...	21	0.06	1	0.00	Intra (residual action, insecticide) and peri-domiciliar spraying, larvicide use, curative and preventive treatment.	<i>A. albimanus</i>	Migration; commerce between neighboring countries, and border visits.
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			
Usulután (23 municipalities)	364,221	...	37	0.10	0	0.00			
Sub-Total	1,723,689		294	0.17	1	0.00			
FRENCH GUIANA									
5/5 Regions									
Moroni	11,827	...	2659	224.82	2,563	216.71			
Ouyapock	3,212	...	655	203.92	300	93.40			
Arrière pays	2,939	...	142	48.32	91	30.96			
Littoral	54,960	...	219	3.98	147	2.67			
Cayenne	84,336	...	148	1.75	30	0.36			
Sub-Total	157,274	83,544	3,823	24.31	3,131	19.91			
GUATEMALA *									
7/25 Departments									
Cobán Alta Verapaz	313,864	7,814	21,097	67.22	1,025	3.27	Diagnosis and radical treatment of suspected and confirmed cases, control of breeding sites; house spraying; larvicides	<i>A. albimanus</i> <i>A. vestitipennis</i>	Lack of political commitment to implement Global Malaria Control Strategy in local health services; lack of budgetary resources allotted to malaria; limited coverage of General Health Services in malaria endemic areas; priority given to dengue programs
Peten sur Occidente	67,407	7,014	4,315	64.01	140	2.08			
Peten sur Oriente	112,242	6,300	5,141	45.80	287	2.56			
Peten Norte	96,978	16,918	1,881	19.40	66	0.68			
San Marcos	179,280	1,590	1,887	10.53	0	0.00			
Ixcán	...	...	...	...	...	...
Izabal	...	...	...	...	...	...
Sub-Total	769,771	39,636	34,321	44.59	1,518	2.57			
GUYANA									
Region 1									
Region 1	20,000	...	5,450	272.50	2,281	114.05	Increased surveillance; decreased lag time between visits to unstable populations; introduction of 7 day treatment program of Quinine + Primaquine, selective spraying with DDT.	<i>A. darlingi</i>	Delay in the release of funds; lack of experienced staff; lack of appropriate transportation; itinerant population of miners and loggers; high rate of non-compliance with drug regimens; makeshift housing of itinerant groups offers little to no insecticide sprayable surfaces
Region 7	16,200	...	6,330	390.74	2,966	183.09			
Region 8	6,250	...	11,523	1,845.68	6,268	1,002.88			
Region 9	16,200	...	3,001	185.25	904	55.80			
Sub-Total	58,650	...	26,304	448.49	12,419	211.75			

TABLE 9
MALARIOUS AREAS AT HIGH RISK OF TRANSMISSION AND CONTROL PRIORITIES, 2001

COUNTRIES	POPULATION	REPORTED CASES	API	P. Falc. + MIXED	AFI	CONTROL MEASURES APPLIED IN DIFFERENT AREAS	MAJIN VECTORS	CAUSES OF PERSISTENCE OF TRANSMISSION
<i>No Information Available</i>								
HAITI								
HONDURAS								
<i>Population at risk</i>								
5/9 Regions:	6,907,681	761	0.11	3	0.00			
Region II/50 (municipalities)	1,838,571	1,771	0.96	8	0.00	Selected intradomestic spraying, treatment,	<i>A. albimanus</i>	Lack of stratification in control strategies; lack of supervision due to budgetary constraints; lack of funds and resources; unsustainable actions; lack of personnel in high risk areas
Region IV/37 (municipalities)	702,787	2,140	3.05	3	0.00	biological control of breeding sites, physical control measures;	<i>A. darlingi</i>	
Region VI/26 (municipalities)	738,609	13,240	17.93	867	1.17		Note:	
Region VII/23 (municipalities)	456,074	2,235	5.13	5	0.01	insecticide applied by ULV.	<i>A. darlingi</i>	
Sub-Total	10,623,722	20,147	1.90	886	0.08		found only in Region VI	
MEXICO								
<i>832 States:</i>								
Chiapas 118 (municipalities)	4,117,508	2,540	0.62	38	0.01	House, larvicide, and aerial spraying, individual and mass radical treatments; entomological studies; active case surveillance; monthly follow-up of cases	<i>A. pseudopunct.</i>	Migration from malarious areas of Central America; poor housing conditions; sociopolitical factors; late detection and treatment of cases.
Oaxaca 570 (municipalities)	17,584	292	0.08	0	0		<i>A. albimanus</i>	
Campeche 11 (municipalities)	723,059	57	0.08	0	0		<i>A. vestripennis</i>	
Sinaloa 18 (municipalities)	2,513,268	612	0.24	0	0			
Michoacán 113 (municipalities)	4,299,958	50	0.01	0	0			
Guerrero 76 (municipalities)	3,221,605	88	0.03	0	0			
Q. Roo 8 (municipalities)	841,294	189	0.22	0	0.00			
Tabasco 17 (municipalities)	1,970,839	218	0.11	30	0.02			
Sub-Total	21,212,862	4,046	0.19	68	0.00			
NICARAGUA								
<i>517 Departments:</i>								
Jinotega (1 municipality)	291,848	1,533	5.25	178	0.61			Technical deficiencies; inadequate drug supply.
Matagalpa (2 municipalities)	569,702	1,731	3.04	101	0.18			
Raan (1 municipality)	200,374	1,763	8.80	517	2.58			
Raas (1 municipality)	103,081	508	4.93	149	1.45			
Sub-Total	1,165,005	5,535	4.75	945	0.81			
PANAMA								
<i>9 Provinces:</i>								
Bocas Del Toro (3 municipalities)	90,099	194	2.15	0	0.00			
Chiriqui (4 municipalities)	98,081	22	0.22	1	0.01			
C. Embera (2 municipalities)	9,272	0	0.00	0	0.00			
Colón (1 municipality)	10,028	0	0.00	0	0.00			
Darien (2 municipalities)	44,377	122	2.75	26	0.59			
Ngöbe Bugle (3 municipalities)	53,530	287	5.36	0	0.00			
Panama (2 municipalities)	40,520	112	2.76	0	0.00			
San Blas (1 municipality)	32,571	89	2.73	7	0.21			
Veraguas (1 municipality)	12,090	0	0.00	0	0.00			
Sub-Total	390,568	826	2.11	34	0.09			

TABLE 9
MALARIOUS AREAS AT HIGH RISK OF TRANSMISSION AND CONTROL PRIORITIES, 2001

COUNTRIES	POPULATION	REPORTED CASES	API	P. Falc. + MIXED	AFI	CONTROL MEASURES APPLIED IN DIFFERENT AREAS	MAIN VECTORS	CAUSES OF PERSISTENCE OF TRANSMISSION
PARAGUAY								
1/17 Provinces								
Canindeyú (10 municipalities)	149,914	777	5.18	0	0.00			Personnel and resources inadequate to respond to outbreaks.
Sub-total	149,914	777	5.18	0	0.00			
PERU								
12/34 Health Departments								
Loreto	627,678	35,308	56.25	8,461	13.48	Medication, rotation of anti-malarials in areas of resistance; integrated entomological surveillance and vector control; treatment of breeding sites; distribution of impregnated bednets; active epidemiological surveillance;	<i>A. pseudopunct.</i>	Climatological factors, inadequate access to health services; increase in breeding sites; expansion in rice production; internal and external migration;
Junin	244,099	8,426	34.52	0	0.00		<i>A. benarrochi</i>	emergence of drug resistance to <i>P. falciparum</i> in endemic areas; decreased vector susceptibility to insecticides on the north coast
Piura II	393,822	19,800	50.28	18,881	47.94		<i>A. albimanus</i>	
Piura I	361,164	19,250	53.30	12,464	34.51		<i>A. darlingi</i>	
Jaen-bugaa	42,437	540	12.72	51	1.20			
Tumbes	188,718	21,249	112.60	14,081	74.61			
San Martin	19,997	524	26.20	41	2.05			
Cusco	133,047	4,484	33.70	1	0.01	community participation and integration into health service.		
Ayacucho	109,937	6,752	61.42	0	0.00			
Lambayeque	121,664	6,535	53.71	5,066	41.64			
Ucayali	47,122	706	14.98	94	1.99			
Madre de dios	66,352	1,172	17.66	1	0.02			
Sub-total	2,356,037	124,746	52.95	59,141	32.81			
SURINAME								
3/10 Districts								
Sipahwini District								
Upper Suriname	20,000	2,733	136.65	2,680	134.00	Residual house spraying; use of Permethrin impregnated bednets in all areas.	<i>A. darlingi</i>	
Upper Marowijne	8,100	4,842	597.78	4,182	516.30			
Tapanahony	5,300	1,466	276.60	1,201	226.60			
Upper Saramacca	1,300	1,245	957.69	751	577.69			
Brokopondo District	9,100	1,184	130.11	1,137	124.95			
Bovenlandse Indanen	2,200	429	195.00	122	55.45			
Sub-total	46,000	11,899	258.67	10,073	218.98			

TABLE 9
MALARIOUS AREAS AT HIGH RISK OF TRANSMISSION AND CONTROL PRIORITIES, 2001

COUNTRIES	POPULATION km2	REPORTED CASES	AFI	P. FAL. + MIXED	AFI	CONTROL MEASURES APPLIED IN DIFFERENT AREAS	MAIN VECTORS	CAUSES OF PERSISTENCE OF TRANSMISSION
VENEZUELA								
4/23 States								
Amazonas (5 Municipios)								
Manapiare	3,490	1767	506.30			Residual and space spraying	<i>A. darlingi</i>	Dispersal of the indigenous population, transient miners, <i>P. falciparum</i> resistance to chloroquine, intense migration in endemic zones, Endophagic and exophilic vectors
Autana	8,336	702	84.20					Lack of human and financial resources
Atures	62,659	3300	52.67					
Alto Orinoco	6,819	475	69.66					
Atabapo	7,925	543	68.52					
Subtotal:	89,229	17941	76.10	...	...	
Bolivar (5 Municipios)								
Sucre	2396	88	36.73			Residual and space spraying	<i>A. darlingi</i>	
Raul Leon	12302	578	46.98					
Sifontes	26773	315	11.77					
Cedeno	29961	88	2.94					
Guan Sabana	28990	163	5.62					
Subtotal:	100,422	1,232	12.30	...	...	
Sucre (10 Municipios)								
Cujigal	11036	2065	187.11	...	...	Residual and space spraying	<i>A. aquasalis*</i>	
Marino	14936	231	15.47					
Libertador	12710	914	71.8					
Benitez	31448	1349	42.9					
Ribero	32107	831	25.88					
Arimandi	47951	1445	30.13					
Andres E. Blanco	14935	122	8.17					
Andres Mata	21057	272	12.92					
Valdez	26655	216	8.1					
Bermudez	123024	673	5.47					
Subtotal:	335,879	8,118	24.17	...	...	
Delta Amacuro (1 Municipio)								
Pedernales	3,214	78	24.30					
Sub-total	528,744	429,241	30.65	...	...	

... No information available

TABLE 10

NATIONAL BUDGET AND NONBUDGETARY CONTRIBUTIONS TO MALARIA CONTROL PROGRAMS IN THE AMERICAS, 1997-2001

Countries	1997		1998		1999		2000		2001	
	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	57,471	-	660,189	46,898	133,431	122,925	845,764	944,187	935,101	601,656
Brazil	28,488,629	9,480,618	30,188,891	...	30,307,650	...	44,766,876	2,477,870	21,517,299	805,197
Colombia	8,307,692	-	11,661,290	...	9,930,000	-	9,950,000	-	11,363,636	-
Costa Rica	109,999	36373	3,597,000	389	4,750,000	-	3,380,000	-	2,500,000	-
Dominican Rep.	1,010,976	107809	1,430,963	208,548	1,495,527	90,722	1,410,013	157,238	1,443,223	29,722
Ecuador	2,516,464	274,859	573,136	...	1,453,583	52,013	...	...	3,155,525	180,000
El Salvador	4,031,982	-	4,357,798	...	3,000,000	307,167	...	...	4,555,000	...
Guatemala*	3,957,307	1139	1,359,775	52,857	730,232	-	702,703	-	...	-
Haiti	...	...	-	41,462	...	...	...	...	...	...
Honduras	1,936,481	-	1,859,022	-	149,558	239,398	2,597,868	3,605,010	2,352,572	1,450,000
Mexico	19,403,038	-	14,117,650	-	15,349,724	-	17,652,182	-	17,157,485	-
Nicaragua	...	...	...	...	4,101,657	1,871,250	333,333	-	333,333	175,500
Panama	5,505,232	-	5,171,984	-	5,161,509	-	5,066,318	-	4,680,289	-
Paraguay	8,270,231	-	7,501,159	-	4,338,457	21,281	1,932,103	-	1,061,490	-
Peru	3,308,104	-	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	...	...
SUB TOTAL	86,903,606	9,900,798	87,038,408	350,154	86,659,667	3,737,579	95,949,750	8,202,877	75,164,681	3,372,075
Guyana	551,724	20,000	640,093	...	772,000	...	1,000,000	-	800,000	10,000
Belize	461,600	58,000	440,174	-	...	...	...	...	...	...
French Guiana	...	...	...	...	...	...	...	...	...	...
Suriname	...	...	106,236	-	...	...	65,778	-	178,363	636,000
SUB TOTAL	1,013,324	78,000	1,186,503	...	772,000	...	1,065,778	...	978,363	646,000
TOTAL	87,916,930	9,978,798	88,224,911	350,154	87,431,667	3,737,579	97,015,528	8,202,877	76,143,044	4,018,075
Grand Total		97,895,728		88,575,065		91,169,246		105,218,405		80,161,119
\$US Funds/Person in Malarious Areas		\$0.47		\$0.42		\$0.45		\$0.57		\$0.43

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, 1992-2001

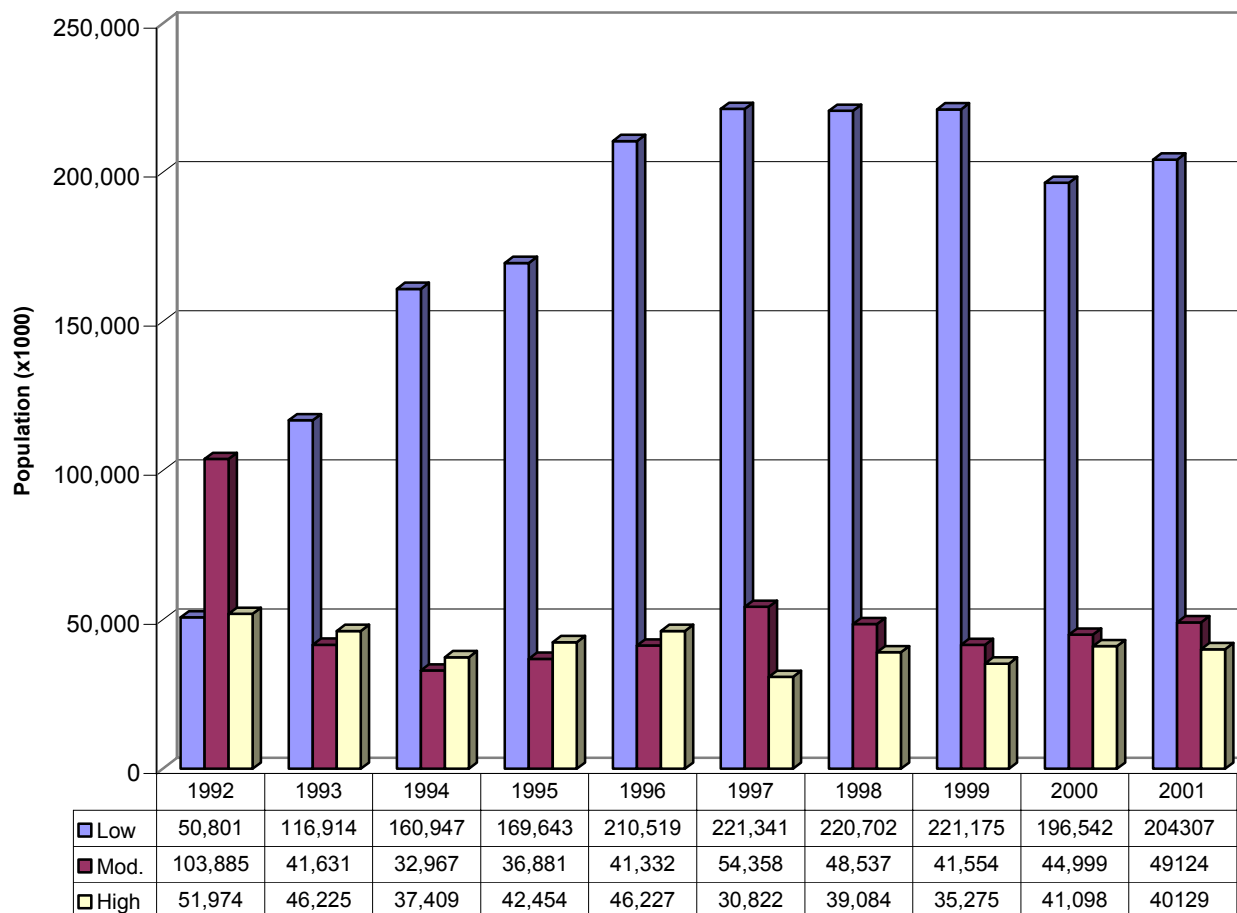
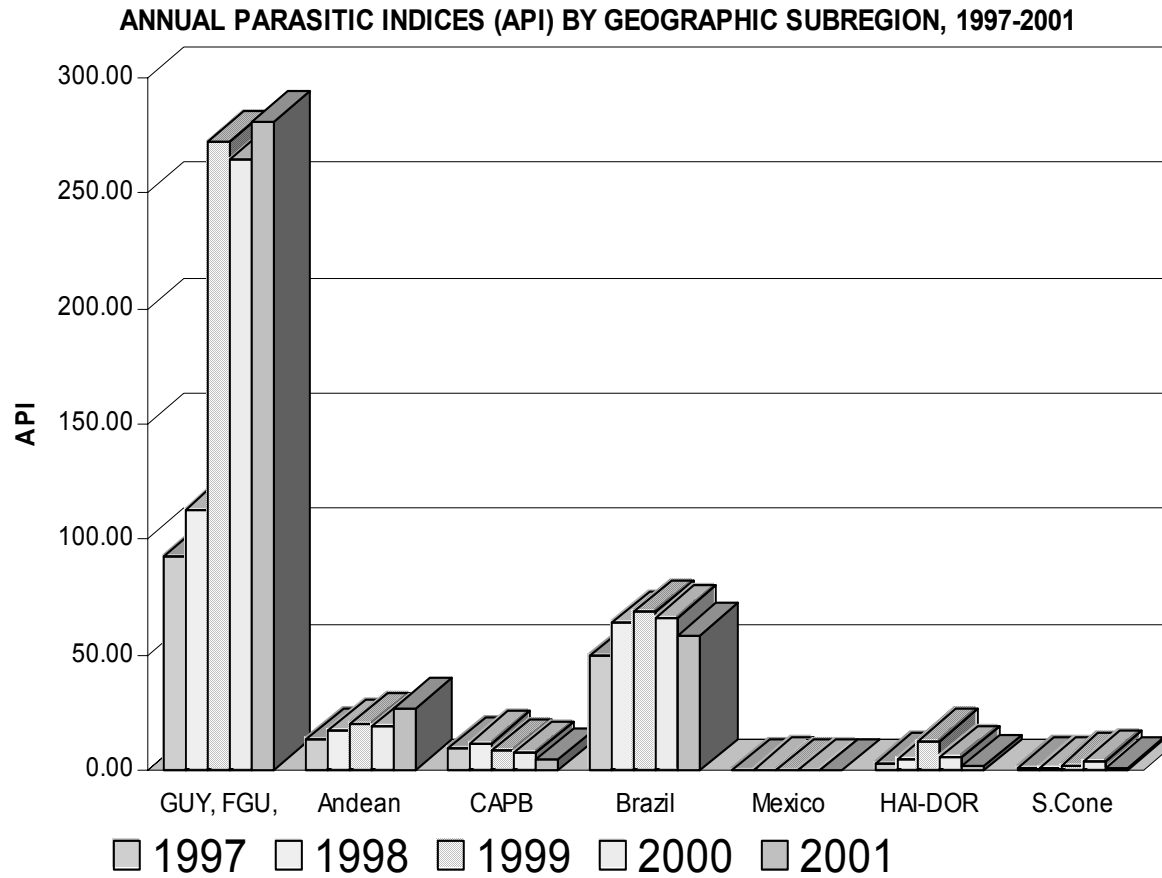


Figure 2



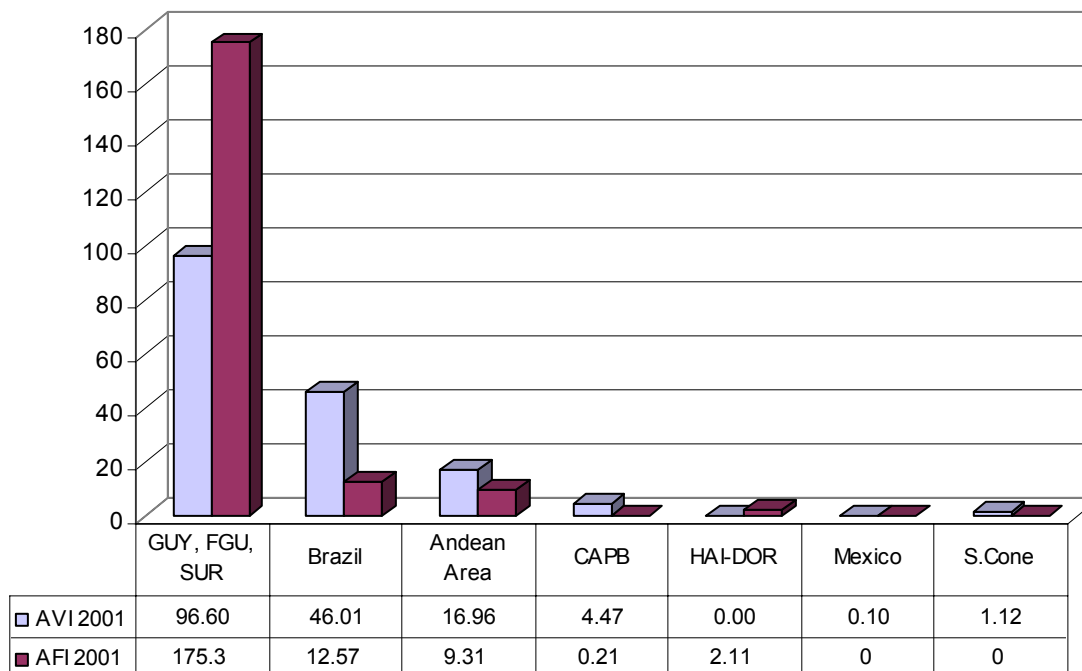
* Based on population in moderate and high risk malarious areas
 CAPB=Central America, Panama, Belize
 HAI-DOR=Haiti, Dominican Republic
 GUY-FGU-SUR = Guyana, French Guiana, Suriname
 Andean Area = Bolivia, Colombia, Ecuador, Peru, Venezuela

Southern Cone = Argentina Paraguay

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

Figure 3

MALARIA PARASITIC INDICES BY GEOGRAPHIC SUBREGION, 2001*



* 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

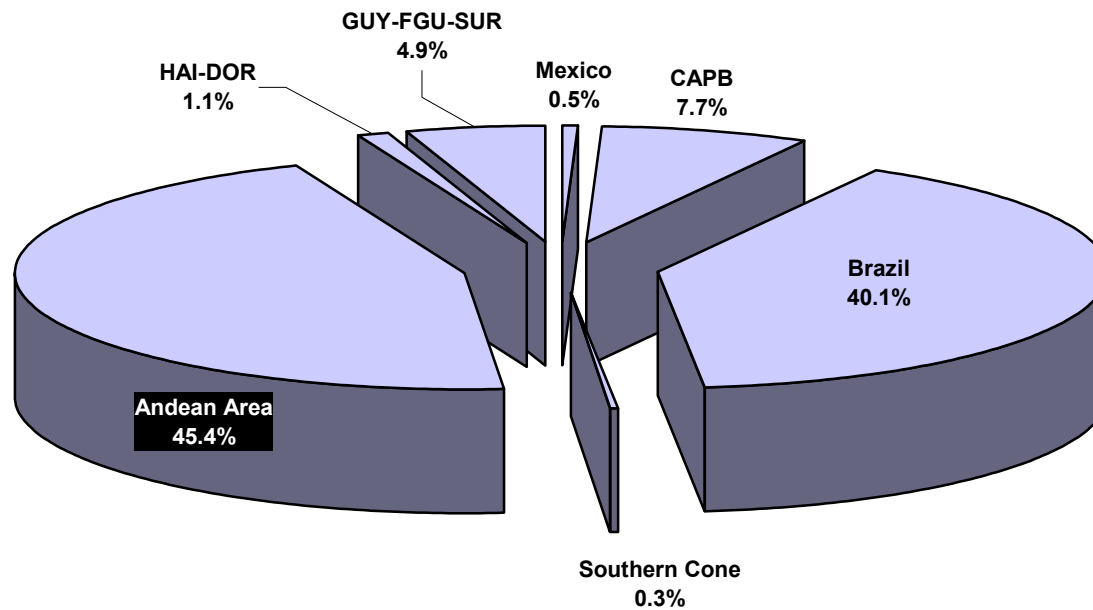
AVI=Annual *P. vivax* Index

$$AFI = \frac{\text{Number of confirmed } P. falciparum \text{ cases} \times 1000}{\text{Population at moderate and high risk}}$$

$$AVI = \frac{\text{Number of confirmed } P. vivax \text{ cases} \times 1000}{\text{Population at moderate and high risk}}$$

Figure 4

**DISTRIBUTION OF MALARIA CASES IN THE AMERICAN REGION,
2001**



HAI-DOR = Haiti, Dominican Republic

CAPB = Central America, Panama, Belize

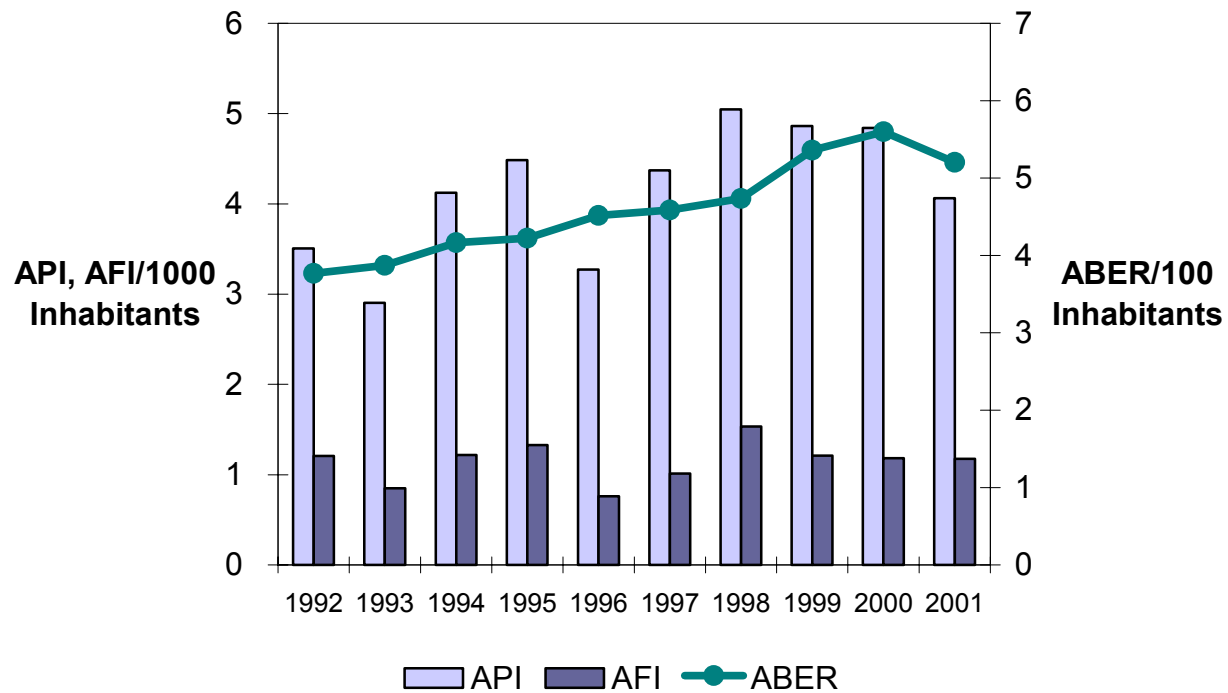
GUY-FGU-SUR = Guyana, French Guiana, Suriname

ANDEAN AREA = Bolivia, Colombia, Ecuador, Peru, Venezuela

SOUTHERN CONE = Argentina, Paraguay

Figure 5

MALARIOMETRIC INDICES OF 21 COUNTRIES OF THE AMERICAS, 1992-2001*



* Based on population exposed in malarious areas

API=Annual Parasite Index

AFI=Annual P.falciparum Index

ABER = Annual Blood Examination Rate

$$ABER = \frac{\text{Number of Slides Examined}}{\text{Total pop. in areas at risk for transmission}} \times 100$$