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**REPORT ON THE STATUS OF MALARIA
PROGRAMS IN THE AMERICAS
(Based on 2000 data)**

CONTENTS

	<i>Page</i>
Introduction	1
Overview of the Epidemiological Situation	2
SubRegions	2
Malaria Classification	3
Malaria Parasites	3
Case detection, Management and Prevention	4
Financial Resources	5
Highlights from the Programs	6
Perspectives.....	9

Tables:

1. Population Living in Malaria Endemic Areas in the Americas, 1991-2000
2. Risk of Malaria Transmission in the Americas by Population, 2000
3. Malaria Morbidity in the Americas, 1991-2000
4. Total Blood Slides Examined and Number of Positive Slides by Level of Malaria Transmission, 2000
5. Epidemiological Status in High and Moderate Risk Areas for 21 Countries with Active Malaria Programs, 2000
6. Comparison between Passive and Active Case Detection, 2000
7. Antimalarial Drugs used in 21 Countries in 2000
8. National Budget and Nonbudgetary Contributions to Malaria Control Programs in the Americas, 1996-2000

Figures:

1. Population Living in Malaria Endemic Areas According to Transmission Level 1991-2000
2. Malaria Parasitic Indices by Geographic Subregion, 2000
3. Distribution of Malaria Cases in the American Region, 2000
4. Funds/Person in Malarious Areas vs. Malarious API, 1970-1999

Introduction

In spite of annual variations in the estimated number over the past decade, on average 36% of the population in the Americas has been considered living in areas at risk of malaria. Transmission of the disease occurs in 21 countries of the Americas, all of which have malaria control programs. Together with those persons considered living in areas of some risk in the remaining countries, 293 million (35.2%) of the approximately 832 million people in the Region were reported at risk in 2000 (Table 1).

With prompt diagnosis and opportune treatment being one of the basic tenets of the Global Malaria Control Strategy implemented in 1992, the efforts to achieve greater coverage is reflected in the increase in the number of blood examinations undertaken annually. This exceeded 10 million in 1999, being the highest single annual total during the decade of the nineties. In comparison with 1999, there was a 0.4% increase in the number of smears examined, but there was a 5.6% reduction in the number of positives, with 1.14 million cases of malaria reported in the Region in 2000 (Table 3).

In 1998, with the primary objective of significantly reducing the global malaria burden, the World Health Organization launched the Roll Back Malaria Initiative (RBM), a global partnership with other organizations, including those of the United Nations system, civil society, and the national governments of countries where the disease is endemic. The key elements of the initiative reinforce those of the Global Malaria Control Strategy and emphasize the need for effective management, prompt diagnosis, and opportune treatment of cases. RBM also stresses the need for prevention, operational research, and other coordination between distinct groups and organizations combating the disease and a dynamic global alliance between all involved.

At an October 1999 meeting held in Lima, Peru, RBM was launched in the nine countries that share the tropical Amazon rainforest in South America: Bolivia, Brazil, Colombia, Ecuador, French Guyana, Guyana, Peru, Suriname, and Venezuela. At that meeting, the countries agreed to strengthen activities to control the disease and develop plans of action. In 2000, the countries had a second meeting during which they monitored progress on their plans of action, defined areas for investigation, and programmed joint activities in areas of common epidemiological interest which they began executing.

In the other subregion where the disease is endemic, comprised of the Central American countries of Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama, together with Mexico, Haiti, and the Dominican Republic, the initiative was launched in November 2000. The launching of the RBM in these "Mesoamerica" countries took place at a meeting held in San Pedro Macoris in the Dominican Republic. At the meeting, the countries undertook a review of their epidemiological situation and prepared national and joint plans of action. As a result, activities at the national and subregional level in areas of common epidemiological interest were proposed.

At the regional level, member countries provide the Pan American Health Organization with annual information on malaria resulting from local transmission and on imported cases in those territories where transmission does not occur. The information thus received is the basis on which the present document is developed. Very limited information was received from Belize, French Guiana, and Haiti.

Overview of the Epidemiological Situation

In 1995, the 37 countries that comprise the Region of the Americas reported just over 1.3 million cases of malaria. Since then, the situation appears to have stabilized with a slight descending tendency in the annual incidence, which continued until the year 2000 when 1.14 million cases were reported. In spite of receiving provisional information from Belize, French Guiana, and Haiti, it is safe to say that the reported annual cases in the Region for 2000 was the lowest number since 1997.

It is estimated that approximately 57% of the Region's population live in 21 countries where transmission occurs and which have malaria control programs. Eleven of them are in South America: Argentina, Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Paraguay, Peru, Suriname, and Venezuela; the others are the seven from Central America: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama together with the Dominican Republic, Haiti, and Mexico. These 21 countries estimate that approximately 293 million persons live in areas with distinct social, economic, and ecological characteristics, which favor distinct degrees of transmission, reflected in an indicator known as the Annual Parasite Index (API), the number of cases per thousand population living in a specific geographic area.

In 2000, of the 1.14 million cases reported in the Americas, 53.6% were from Brazil, followed by Colombia 9.45%, Ecuador 8.65%, Peru 6.12%, Guatemala 4.68%, Honduras 3.08%, Bolivia 2.76%, Venezuela 2.61%, Guyana 2.11%, Haiti 1.48%, and Suriname 1.15%. With the exception of Haiti, for which data was not available, these were the same countries responsible for the majority of the 1.2 million cases in the Region in 1999.

Subregions

Of the 478 million persons who live in the 21 countries where malaria transmission occurs, 79 million (16.5%) reportedly reside in areas at risk of transmission in the nine countries which share common ecological conditions associated with the Amazon rainforest in South America. Of those residing in these areas, 16.4% live in areas of high risk, another 16.4% in areas of moderate risk, and 67.2% in areas of low risk (for definition of risk level, see next section). It was in these nine countries, Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname, and Venezuela, where 86.8% of the 1,140,329 malaria cases in the entire Region were reported in the year 2000 (Tables 2 and 4).

In the other subregion, comprising the Central American territories, Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama, in combination with Mexico, approximately 89 million persons live in areas which favor transmission of the disease. It is estimated that 35.3% live in areas of high risk, 28.9% in areas of moderate risk and 35.7% in areas of low risk of being infected. In 2000, approximately 3.5 million blood smears were examined in these countries from among which almost 125,000 cases were detected. The number and percentage cases by country were the following: Mexico 7,390 (5.9%); Belize 1,486 (1.2%); Costa Rica 1,879 (1.5%); El Salvador 745 (0.6%); Guatemala 53,311 (42.7%); Honduras 35,122 (28.1%); Nicaragua 24,014 (19.2%), and Panama 1,036 (0.8%). As such, of the eight countries, three (Guatemala, Honduras, and Nicaragua) were responsible for 90% of the cases in the subregion.

Argentina and Paraguay also have malaria programs, with a reported 9.7% and 57.9% of their respective populations living in areas at risk of malaria transmission. The 3.5 million persons so classified in Argentina are at low and medium risk. In Paraguay, of the 3.2 million persons at risk, 1.3 million are considered at high risk. During the year 2000, of the 7,949 blood slides examined in Argentina, there were 440 cases detected. In Paraguay, 97,026 slides were examined and 6,853 cases were detected, representing a 0.04% and 0.6% smear positive rate.

Malaria Classification

It should be pointed out that with the use of the API, the countries have made attempts to classify the malaria regions by risk level. The majority of the countries classify areas with more than 10 cases per thousand people as being at high risk, areas with less than 1 case per thousand at low risk, and areas with intermediate rates are at moderate risk. In 2000, the countries reported that approximately 86 million persons live in areas of high and moderate risk of transmission, representing an increase over the previous year's estimate (Figure 1). In 2000, close to 94% of the 1,140,329 cases of malaria in the Americas were detected in the high and moderate risk areas. The API for the population in these areas was approximately 12.36 cases per thousand, a reduction from the 13.61 cases per thousand population reported in 1999.

The countries with the highest absolute number of cases do not necessarily have the highest rates. While Brazil, Colombia, and Ecuador account for the highest number of cases in the Region, French Guyana, Guyana, and Suriname had the highest overall rates per thousand population in the year 2000 (Table 5 and Figure 2).

Malaria Parasites

Plasmodium vivax is the predominant malaria parasite in the Americas. In the areas classified as being at high and moderate risk, it was responsible for 82.2% of the cases in year 2000, an increase from 73.7% in 1999. The great majority of the remaining cases are due to *Plasmodium falciparum*. Changes in the incidence reported in the Americas during past years and almost all the cases of *P. falciparum* are a result of

transmission in the nine countries that share the Amazon rainforest. Mortality associated with the disease in the Region is related to *P. falciparum*. Preliminary data for 2000 suggests that there were 301 malaria-associated deaths in the Region. There are a small number of cases caused by *P. malariae*, the third most prevalent parasite in the Region (Table 5).

In Brazil, the percentage of cases due to *P. vivax* increased from 75.5% in 1997 to 81.4% in 2000. In Mexico and the Central American countries, Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama, the percentage of cases due to this parasite has been approximately 97% during the same period.

P. vivax caused all cases in Argentina and Paraguay, while in Bolivia, Colombia, Ecuador, Peru, and Venezuela, it was responsible for 70.5% of the cases in 1997 and 71.5% in year 2000. In French Guiana, Guyana, and Suriname 36.5% of the cases were due to this parasite in 1997, and it accounted for 35% in 2000. Changes in the percentages of *P. vivax* are accompanied by changes in that of *P. falciparum*.

In the Dominican Republic and Haiti, the only countries in the Caribbean subregion where transmission occurs, all the cases are due to *P. falciparum*. Although data from Haiti has not been complete during the years, data from the Dominican Republic indicates a reduction in transmission as well as in the number of imported cases. There has been no apparent marked reduction in the movement of persons between the two countries, suggesting a reduction in transmission in both countries.

By parasite, an index of the number of cases per thousand persons living in the areas of high and medium risk shows that the highest rates for both *P. vivax* and *P. falciparum* were in the area comprising French Guiana, Guyana, and Suriname. In these countries, the *P. falciparum* index was higher than that of *P. vivax*, a situation that also occurs in the Dominican Republic and Haiti because *P. falciparum* is the only parasite (Figure 3).

Case Detection, Management, and Prevention

With the decision to de-concentrate and decentralize the malaria control programs in the majority of the countries, increased participation of the general health services and voluntary collaborators has been reported in diagnostic and treatment activities, thus reducing the dependency of the affected population on vertical malaria control programs. This is supported by the fact that between 1997 and 1999 there was a reduction in active case detection, an activity that was normally undertaken by the malaria programs. In 1997 the programs examined 2,706,084 blood smears, of which 0.94% were positive. In 1999 there was a reduction of almost 350 thousand examinations by the malaria programs and of the 2,363,373 examined, 2.15% were positive. This could be interpreted as having resulted from more focussed case detection. During the same period, the inverse was observed among the health services, which examined 3,513,171 blood smears with a 13.73% positive rate in 1997 and after increasing the number of blood smears by 400,000

to 3,926,350 reported a positive rate of 10.45% in 1999. That could signify that the health services are increasing the number of blood examinations among persons presenting with fever. Information available for 2000 reveals that the general health services examined 60.7% of the blood smears and there was a further reduction in the number of smears examined by the malaria programs. The highest percentage positives were among slides taken by voluntary collaborators (Table 6).

There has been a reported increase in the availability of first-line antimalarial drugs between 1996 and 2000. The majority of countries have national treatment guidelines but there are reports of relatively easy access to a wide range of antimalarials, including some which do not form part of the national guidelines, through private pharmacies and/or informal providers. Efficacy trials, the majority undertaken in countries which share the Amazon rainforest, have revealed different levels of resistance by *Plasmodium falciparum* to some first line as well as second line antimalarials. Although reported resistance has existed for a number of decades, this has varied by country in the Region. It should be borne in mind that a combination of increased accessibility and inappropriate use of antimalarials could be associated with development of resistance by the parasite (Table 7).

Another element of the global malaria control strategy is the focalized use of insecticides in vector control. The principal Anopheline vectors in Mesoamerica are *A. albimanus* and *A. pseudopunctipennis*. In the Amazon region group of countries they are *A. darlingi* and *A. albimanus*. There has been a reduction in the use of DDT, which has been replaced by a wide range of other insecticides, particularly pyrethroids. It should be pointed out that a number of the malaria endemic countries have had to combat outbreaks of another vector borne disease, dengue. In spite of the fact that the use of insecticides may have been to combat both or either of these two diseases, there has been little use and/or development of alternative methods for controlling the Anopheline mosquito vectors of malaria.

Financial Resources

With de-concentration and decentralization of the malaria control programs, and its integration and/or increased collaboration with the local health services in the countries, efforts to increase intersectoral collaboration have been reported and attempts have also been made to promote community participation in the control of vector-borne diseases including malaria.

Nevertheless, since 1993 when the countries reported that the national budgets and funds from other sources for malaria control surpassed US\$ 185.4 million, there was a constant reduction in funding available until 1996 when available funds totaled \$ 85.7 million. Since that year, funding has remained relatively constant, being \$ 91.2 million in 1999. In 2000, with the launching of Roll Back Malaria and a reported increase of contributions and loans in some countries, there was a 15% overall increase in available

funding in the Region with an average expenditure of \$ 0.57 per person living in the malarious areas. (Table 8 and Figure 4).

Highlights from Country Programs

With no contribution from Belize, French Guiana, Guyana, and Haiti, 17 of the 21 countries with malaria programs submitted the following for 2000:

Argentina reported that although there was a more than 100% increase in the number of cases compared with 1999, and almost 80% of the 484 cases registered in 2000 were imported. Nationally, transmission was reported in two northern provinces, Salta and Jujuy on the border with Bolivia, where a total of 114 cases occurred. Migration, areas of difficult access, and the lack of joint activities in previous years were identified as factors favoring transmission. Joint evaluation activities with Bolivia were undertaken in 2000, and strategies aimed at focussing control activities were developed and being implemented.

Bolivia indicated that during the past three years a decreasing trend in the number of cases and the API was recorded. This was attributed to the Global Malaria Control Strategy and the launching of the RBM Initiative. Support from the national and local governments and international partnerships have allowed coverage of basic operational requirements. The “ARBOL” agreement with Argentina aimed at “Rolling Back Malaria” in the areas of common epidemiological interest facilitates joint activities in training, vector control, diagnosis, and treatment of cases. There were meetings with Brazil, and plans were developed for joint activities to combat malaria, dengue, and other vector-borne diseases under the RBM initiative.

Brazil pointed out that 99.7% of the cases in the country occur in the Amazon region and that 74% occur in three of nine states that constitute the region. Since 1992, the national program has implemented the Global Malaria Control Strategy in an integrated manner. Collaboration between states and municipalities has permitted an expansion of the number of available facilities for diagnosis and treatment. In the last 11 years, 1,300 new laboratories have been incorporated into the network for diagnosis and treatment, and there are 1,800 laboratories in the Amazon region. In June 2000, under the aegis of the RBM Initiative, a new plan of action called the Plan for Intensification of Control Activities in the Amazon (PICAM) was launched, and there was a 3.5% reduction in the number of cases recorded compared with 1999. The objective of the plan is to reduce the incidence of malaria by 50% by 2003. RBM sponsored and promoted inter-country collaboration with Bolivia, Colombia, French Guiana, Guyana, Peru, Suriname, and Venezuela.

Colombia recorded an almost 100% increase in the number of cases in comparison with the previous year but indicated that this could be due to underreporting in 1999 and an improvement in the information system in 2000. There were outbreaks

that resulted in an increased incidence of *P. falciparum* in areas of moderate risk. Factors associated with these outbreaks were population movement motivated by social conflict, search for work in areas of illicit farming, and climatic changes in malaria receptive areas. Other factors identified included operational difficulties in areas of social conflict and the transfer of responsibility for malaria patients to the general health service. There were cooperation activities with Brazil, Peru, and Venezuela in areas of common epidemiological interest within the framework of the RBM Initiative.

Costa Rica indicated that the 1,879 cases in 2000 was a 53% reduction from the previous year's total. Diagnosis and treatment of malaria cases is the responsibility of the country's health insurance network of laboratories and health facilities permitting decentralization of these activities. Malaria personnel now undertake activities as health promoters, and local companies have provided economic resources in community efforts.

The **Dominican Republic** reported controlling epidemic foci in 2000, and this resulted in a 66% reduction in the incidence compared with 1999. Success was attributed to improved surveillance, stratification, and focussed interventions in affected areas as well as coordination of joint activities with the agricultural, industrial, and tourist industries. Imported cases among workers was identified as a risk factor for transmission, and a joint plan of action to control malaria within the context of the RBM Initiative was developed with Haiti.

Ecuador stated that the 98,598 cases reported in 2000 represented a 12.5% increase over those in 1999. The deterioration in the malaria situation was associated with political instability, climatic, economic, social, and institutional factors. Outbreaks were observed in areas previously free from the disease with a gradual increase in the number of cases and geographical distribution of *P. falciparum* infections. In comparison with the previous year, there were increases in both the numbers of *P. falciparum* and *P. vivax* cases. Areas of cooperation in information exchange, control measures, logistical support, and supplies in emergency situations were established with Peru.

El Salvador reported 753 cases in 2000, a 38.7% reduction in the number recorded the previous year. Malaria control activities are focussed in endemic areas and have included strengthening epidemiological and entomological surveillance, diagnosis, and opportune treatment of cases.

Guatemala registered 48,213 cases in 2000, a 7% increase in the number reported in 1999. Poor environmental conditions, migration, insufficient human resources, reduced budgets, limited community participation, limited health promotion and education, decentralized but insufficient health budget, as well as large ecological areas with appropriate conditions were identified as factors favoring transmission. The malaria control efforts received support through inter-country cooperation with Belize, El Salvador, and Mexico.

Honduras reported a 32% reduction in the number of cases in 2000 but this could be associated with the 30% reduction in the number of blood examinations compared with the previous year. The areas of most transmission are Regions VI and VII. Migration is identified as a risk factor, and focus will be placed on strengthening the information system and the network of voluntary collaborators.

Mexico reported a continued decreasing trend in malaria incidence. The reduction was attributed to strengthening epidemiological stratification, parasite elimination among potential and actual carriers, ecological larval control through community participation, including elimination of algae from *A. pseudopunctipennis* breeding sites, chemical control of adult *A. albimanus* mosquitoes through use of techniques of both low cost and low ecological impact. Efforts will continue to be focussed on incorporating activities within the context of the RBM Initiative in Mesoamerica, at the national level and in joint efforts with neighboring countries.

Nicaragua indicated that in comparison with 1999, an 11% reduction in smear examination was accompanied by an overall 37.5% reduction in incidence in 2000. There was a 38.2% and 24.3% reduction in the number of *P. vivax* and *P. falciparum* cases respectively. Surveillance in the highly *P. falciparum* endemic areas is hampered by logistical difficulties and social conflict. Problems identified include internal migration, inaccessibility to health services, and lack of human and financial resources.

Panama focussed its efforts on the indigenous populations where inaccessibility to health services and cultural factors affect the efficiency of the program, which otherwise has had great success in significantly reducing the malaria burden in the rest of the country. The 1,036 cases detected in 2000 represented a 10% increase over those in 1999.

Paraguay stated that in comparison with the previous year, there was a reduction in the number of cases detected in 2000. The most affected persons belong to indigenous groups in the country, among whom migration and a lack of treatment compliance result in large numbers of carriers. These groups also suffer from inaccessibility to health services.

Peru highlighted the fact that in 2000 there was a 69.3% reduction in the number of cases of *P. falciparum* as well as a 49.3% reduction in the number of cases of *P. vivax* reported in 1999. Additionally, there was a 57.9% reduction in the mortality rate between the years. Ninety-five percent of the public health laboratories in the country perform malaria diagnosis and in areas of difficult access, the use of rapid dip-stick tests for malaria diagnosis was implemented and undertaken by voluntary collaborators. The effectivity of the health services in administering antimalarial treatment was 94.53% for *P. vivax* infections with chloroquine and primaquine and was 92.81% for *P. falciparum* with sulfadoxine/pyrimethamine and primaquine. In 2000, a National Antimalarial Drug Policy was implemented, and the design and validation of a Surveillance System for Antimalarial Drug Efficacy and Resistance was undertaken. Additionally, the National

Policy for Malaria Prevention and Control for the period 2000-2005 was updated. Goals have been established for the five-year period, which are to reduce the incidence rates to 2 cases per 1,000 population with emphasis in the high-risk areas, and almost no mortality associated with malaria. Cooperation activities were undertaken with Colombia and Ecuador.

Suriname indicated that in comparison with the previous year, there were no significant changes in the epidemiological situation in 2000. The Ministry of Health appointed a new Malaria Board as an advisory group to the Minister of Health. Under the RBM Initiative, there were bilateral talks with Brazil and French Guiana on joint projects that are expected to begin in 2001.

Venezuela highlighted the fact that in 2000 there was a 38% increase in the incidence of malaria in comparison with the previous year. The associated factors identified were intense migration in mining areas, the apparent presence of strains of *P. falciparum* with reduced susceptibility to the first line drugs, the lack of appropriate surfaces for use of insecticides in mining areas, and administrative problems associated with the decentralization of the malaria program. Joint activities with neighboring territories were initiated as part of the RBM Initiative.

Perspectives

The RBM Initiative is not a new financial institution but a movement that aims to acquire greater political support and provide orientation for more appropriate use of available funds. The principles of the initiative include partnerships at the local levels, efficient use of resources, evidenced-based decision-making, application of coordinated activities for the control of human reservoirs of the disease and vectors, and the utilization of entomological and epidemiological data while strengthening the health services. Nevertheless, efforts to control the disease cannot be solely those of the health sector, as there are a wide range of factors that affect transmission of the disease. It has been observed that there have been reductions in available funding to combat the disease compared to previous years. The reported reduction in mortality related to *P. falciparum* from a little more than 800 deaths to just a little more than 200 deaths between 1994 and 1999 could have resulted in reduced priority among countries in combating the disease. The malaria situation continues being an important health problem in the Region. Provisional data for 2000 from the countries reveals that there were 301 malaria-related deaths in the Region, an increase over the number reported in 1998 and 1999. An increase in transmission of *P. vivax* has been reported, and given this parasite's life cycle in the human, its transmission is more difficult to control. This means that the endemic countries have to recognize the need for further investment in health to combat the disease through the development and use of selective vector control methods and efforts aimed at improving compliance with the recommended treatment regimen.

Although there may be an increase in coverage and access to diagnosis, this is not always accompanied by increased access to treatment. This is especially true where cost

recovery programs do not discriminate in favor of the poorest, and most likely affected, population groups which are also required to purchase antimalarial treatment. Dissemination of resistant strains of parasites could be associated with population displacement and inaccessibility to diagnostic and treatment facilities, but paradoxically, drug resistance can also be associated with greater access to medication if such access is accompanied by indiscriminate or inappropriate use (non-compliance), with subsequent selection of resistant strains.

The countries in the Region are part of the RBM Initiative and identified needs for operational research. In this context, a collaborative effort in 2000 resulted in a number of small research grants being offered by the WHO Special Program for Research and Training in Tropical Diseases (TDR) for drug efficacy trials to be undertaken in the Region in 2001. The countries have also identified the need for the development of a network for monitoring malaria drug resistance, with emphasis on *P. falciparum* in the countries that share the Amazon rainforest. At the same time, although resistance is not suspected and has not been identified, there is also need for such monitoring in the other subregions. The countries have also identified the need for efforts to control the disease in areas of common epidemiological interest, improve entomological surveillance, and strengthen efforts to reduce vector densities through the use of alternates to insecticides.

The most affected malaria countries belong to the group with the lowest gross domestic product as well as that with the greatest inequity of income and accessibility to health, education, adequate environmental sanitation, and housing. The indigenous groups, particularly those which live in the Amazon rainforest, as well as persons who visit these areas seeking economic opportunities or means of survival are the least protected from the disease, and it is in these areas where there are both insufficient and inadequate health services. Responsibility to resolve this situation cannot be solely that of the health sector. It must be shared by other sectors including mining, logging, environmental, educational, and those responsible for the welfare of indigenous groups at the national level as well as large national and international consortia, and financial and cooperation agencies which have indicated their support to the RBM Initiative. As part of the RBM Initiative, the Dominican Republic and Haiti, the only countries in the Caribbean basin where malaria is endemic, have developed a plan of action with the long term goal of eliminating the disease from the island. This goal cannot be achieved without support for strengthening basic health services and infrastructure. Additionally, most of the territories in the Caribbean Basin are both susceptible and vulnerable to malaria, and there is need for strengthening malaria surveillance in these territories.

The four technical elements of the global strategy are: prompt diagnosis and opportune treatment of the disease; planning and implementation of selective prevention methods; the detection, containment, or prevention of epidemics, as well as the evaluation of the epidemiological situation through strengthening the local capacity to undertake basic operational investigations. These still need to be implemented in the context of the RBM movement.

**REPORT ON THE STATUS OF MALARIA
PROGRAMS IN THE AMERICAS**
(Based on 2000 data)

TABLES AND FIGURES

TABLE 1

POPULATION LIVING IN MALARIA ENDEMIC AREAS IN THE AMERICAS, 1991-2000
(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		
1991	143,239	66,504	71,381	281,124	721,256
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

Information on risk population for some countries is incomplete.

TABLE 2

RISK OF MALARIA TRANSMISSION IN THE AMERICAS
BY POPULATION, 2000
(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	98,872	43,007	43.50	22,225	22.48	20,553	20.79	85,785	86.76	
Belize	226	...	...	...	...	...	...	...	...
Costa Rica	4,024	841	20.90	493	12.25	25	0.62	1,359	33.77	
El Salvador	6,278	3,143	50.06	907	14.45	1,350	21.50	5,400	86.01	
Guatemala	11,385	751	6.60	1,277	11.22	884	7.76	2,912	25.58	
Honduras	6,417	1,578	24.59	1,788	27.86	2,714	42.29	6,080	94.75	
Nicaragua	5,071	2,670	52.65	1,478	29.15	832	16.41	4,980	98.21	
Panama	2,856	0	0.00	2,006	70.24	424	14.85	2,430	85.08	
Haiti	8,142	...	...	...	...	...	...	...	...
Dominican Republic	8,373	6,473	77.31	95	1.13	0	0.00	6,568	78.44	
French Guiana	165	149	90.30	0	0.00	18	10.91	167	101.21	
Guyana	761	511	67.15	45	5.91	59	7.75	615	80.81	
Suriname	417	34	8.15	9	2.16	19	4.56	62	14.87	
Brazil	170,406	22,741	13.35	5,404	3.17	3,452	2.03	31,597	18.54	
Bolivia	8,329	0	0.00	2,828	33.95	742	8.91	3,570	42.86	
Colombia	42,105	13,897	33.01	1,757	4.17	3,165	7.52	18,819	44.70	
Ecuador	12,646	3,836	30.33	400	3.16	3,271	25.87	7,507	59.36	
Peru	25,662	4,068	15.85	2,442	9.52	1,627	6.34	8,137	31.71	
Venezuela	24,170	8,017	33.17	80	0.33	650	2.69	8,747	36.19	
Argentina	37,032	2,642	7.13	947	2.56	0	0.00	3,589	9.69	
Paraguay	5,496	1,054	19.18	818	14.88	1,313	23.89	3,185	57.95	
21 countries with active malaria programs	478,833	115,412	24.10	44,999	9.40	41,098	8.58	201,509	42.08	
TOTAL	832,863	207,099	24.87	44,999	5.40	41,098	4.93	293,196	35.20	
<i>(incl. countries with no active malaria transmission)</i>										

*Sources: United Nations Population Division, World Population Prospects: 2000; **Country Information to PAHO

- Not applicable

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

... No information available

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, 1991-2000

Year	POPULATION (in thousands)		BLOOD SLIDES			CASE DETECTION (per 100,000 inhabitants)	
	Total Countries	Risk Areas *	Examined	Positive	Slide	Total Americas	Malarious Areas
					Positivity Rate (SPR)		
1991	721,256	281,124	9,732,930	1,230,671	12.64	170.63	437.77
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

* Population in areas of the Americas ecologically propitious for transmission
Information for some countries is incomplete.

TABLE 4

**TOTAL BLOOD SLIDES EXAMINED AND NUMBER OF POSITIVE SLIDES
BY LEVEL OF MALARIA TRANSMISSION, 2000**

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	655,603	58	420,081	1,260	927,885	6,072	-	-	2,003,569	7,390	0.65%
Belize	...	...	...	...	...	...	...	...	18,559	1,486	0.13%
Costa Rica	27,755	246	32,883	1,275	483	259	140	99	61,261	1,879	0.16%
El Salvador	22,764	60	24,187	60	86,788	610	145,333	15	279,072	745	0.07%
Guatemala	46,065	6,003	102,564	17,072	98,013	30,236	-	-	246,642	53,311	4.68%
Honduras	15,485	386	42,368	9,079	117,724	25,657	-	-	175,577	35,122	3.08%
Nicaragua	206,801	3,633	167,424	10,727	131,740	9,654	-	-	505,965	24,014	2.11%
Panama	-	-	27,445	75	122,257	961	-	-	149,702	1,036	0.09%
Haiti*	...	...	...	...	...	...	...	...	...	16,897	1.48%
Dominican Republic	353,401	679	73,896	536	-	-	-	-	427,297	1,215	0.11%
French Guiana	12,712	292	-	-	35,450	3,416	-	-	48,162	3,708	0.33%
Guyana	...	...	...	...	...	...	...	...	209,197	24,018	2.11%
Suriname	...	...	...	...	...	...	...	...	66,443	13,132	1.15%
Brazil	230,869	23,770	641,180	134,693	1,690,102	452,297	425	118	2,562,576	610,878	53.62%
Bolivia	-	-	34,077	10,457	109,913	21,011	-	-	143,990	31,468	2.76%
Colombia	10,248	2,100	235,728	49,386	266,476	56,130	...	...	512,452	107,616	9.45%
Ecuador	...	12,131	...	3,126	...	83,341	-	-	544,828	98,598	8.65%
Peru	81,059	2,058	794,069	27,142	607,325	40,397	1,363	129	1,483,816	69,726	6.12%
Venezuela	60,108	3,540	5,484	505	190,414	25,544	5,860	147	261,866	29,736	2.61%
Argentina	3,225	43	4,720	393	-	-	4	4	7,949	440	0.04%
Paraguay	3,314	17	17,013	1,333	75,694	5,493	1,005	10	97,026	6,853	0.60%
21 Country Subtotal	1,729,409	55,016	2,623,119	267,119	4,460,264	761,078	154,130	522	9,805,949	1,139,268	100.00%
Countries with no active malaria transmission)	2,134,190	55,016	2,623,119	267,119	4,460,264	761,078	558,911	1,583	10,210,730	1,140,329	

... No information available

- Not applicable

*Provisional data

TABLE 5

**EPIDEMIOLOGICAL STATUS IN HIGH AND MODERATE RISK AREAS FOR
21 COUNTRIES WITH ACTIVE MALARIA PROGRAMS, 2000**

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	42,778	1,347,966	7,332	0.17	131	0.00	7,259	0.17	-	0
Belize	153	18,559	1,486	9.71	20	0.13	1,466	9.58	-	-
Costa Rica	518	33,366	1,534	2.96	12	0.02	1,867	3.60	-	0
El Salvador	2,257	110,975	670	0.30	...	-	...	-	...	...
Guatemala	2,161	200,577	47,308	21.89	1,474	0.68	50,171	23.22	36	-
Honduras	4,502	160,092	34,736	7.72	1,467	0.33	36,676	8.15	-	-
Nicaragua	2,310	299,164	20,381	8.82	1,369	0.59	22,645	9.80	-	4
Panama	2,430	149,702	1,036	0.43	45	0.02	991	0.41	-	0
Haiti	...	...	...	...	...	...	...	...	...	...
Dominican Rep.	95	73,896	536	5.64	693	7.29	4	0.04	-	6
French Guiana	18	35,450	3,416	189.78	3,051	169.50	657	36.50	-	0
Guyana***	104		24,018	230.94	12,324	118.50	11,694	112.44	-	-
Suriname***	28		12,321	440.04	10,648	380.29	1,673	59.75	811	10
Brazil	8,856	2,331,282	586,990	66.28	131,616	14.86	478,212	54.00	932	192
Bolivia	3,570	143,990	31,468	8.81	2,446	0.69	28,932	8.10	-	4
Colombia	4,922	502,204	105,516	21.44	37,563	7.63	69,612	14.14	-	41
Ecuador	3,671	0	86,467	23.55	48,974	13.34	55,624	15.15	-	...
Peru	4,069	1,401,394	67,539	16.60	20,618	5.07	47,690	11.72	-	20
Venezuela	730	195,898	26,049	35.68	5,491	7.52	24,829	34.01	1	24
Argentina	947	4,720	393	0.41	1	0.00	439	0.46	-	-
Paraguay	2,131	92,707	6,826	3.20	0	0.00	6,853	3.22	-	-
TOTAL	86,250	7,101,942	1,066,022	12.36	277,943	3.22	847,294	9.82	1,780	301

* Population in thousands (Moderate and High Risk areas only)

** Data subject to revision.

*** Cases not discriminated by risk area

TABLE 6

COMPARISON BETWEEN PASSIVE AND ACTIVE CASE DETECTION, 2000

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	927,885	2,368	0.26	420,081	1,172	0.28	655,603	1,460	0.22
Belize	...	...	...	...	...	...	...	...	...
Costa Rica	4,118	605	14.69	1,621	159	9.81	55,522	1,115	2.01
El Salvador	63,250	410	0.65	7,478	802	10.72	4,525	17	0.38
Guatemala	52,312	11,695	22.36	141,054	32,487	23.03	29,181	4,286	14.69
Honduras	-	-	-	175,577	35,122	20.00	-	-	-
Nicaragua	297,304	13,648	4.59	199,969	10,038	5.02	12,092	328	2.71
Panama	19,643	265	1.35	293	31	10.58	122,083	657	0.54
Haiti	...	...	...	...	...	...	...	...	...
Dominican Rep.	63,382	361	0.57	18,040	100	0.55	173,300	383	0.22
French Guiana	...	...	...	...	...	...	...	...	...
Guyana	...	...	...	...	...	...	...	...	...
Suriname	64,941	12,995	20.01	-	-	-	1,502	137	9.12
Brazil	...	...	...	...	...	...	...	...	...
Bolivia	81,958	20,512	25.03	23,100	5,482	23.73	38,932	5,474	14.06
Colombia	...	...	...	...	...	...	...	...	...
Ecuador	521,250	100,581	19.30	23,578	4,017	17.04	-	-	-
Peru	1,398,255	69,726	4.99	-	-	-	-	-	-
Venezuela	127,819	21,907	17.14	-	-	-	156,953	8,414	5.36
Argentina	1,728	199	11.52	154	58	37.66	6,110	183	3.00
Paraguay	10,850	1,369	12.62	47,214	3,941	8.35	38,962	1,543	3.96
TOTAL	3,634,695	256,641	7.06	1,058,159	93,409	8.83	1,294,765	23,997	1.85

- Not applicable

... No Information available

SPR = Slide Positivity Rate

TABLE 7

ANTIMALARIAL DRUGS USED IN 21 COUNTRIES IN 2000

(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	8,271,408	2,010,222	-	-	-	-
Belize	...	...	...	...	...	...
Costa Rica	177,000	97,440	-	-	-	-
El Salvador	...	...	...	...	...	...
Guatemala	2,253,905	1,567,416	-	-	-	-
Honduras	2,945,815	1,910,773	-	-	-	-
Nicaragua	22,921,425	10,696,665	-	-	-	-
Panama	198,000	194,500	-	-	-	-
Haiti	...	...	...	...	...	...
Dominican Republic	1,023,233	841,017	-	-	-	-
French Guiana	...	...	...	...	...	...
Guyana	158,897	229,921	30,970	-	-	695,087
Suriname	70,000	24,000	15,105	800	-	218,750
Brazil	12,782,155	15,974,366	-	483,000	130,238	2,266,277
Bolivia	295,400	452,360	-	7,101	-	5,100
Colombia	1,665,400	1,579,230	80,830	-	-	17,020
Ecuador	2,710,300	1,204,850	9,000	-	20,000	1,940
Peru	526,270	681,139	43,023	2,500	-	74,928
Venezuela	1,038,802	259,809	2,607	-	-	28,265
Argentina	6,514	4,514	-	-	-	-
Paraguay	330,244	173,466	-	-	-	-

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

... No Information available

- Not applicable

TABLE 8

NATIONAL BUDGET AND NONBUDGETARY CONTRIBUTIONS TO MALARIA CONTROL PROGRAMS IN THE AMERICAS, 1996-2000

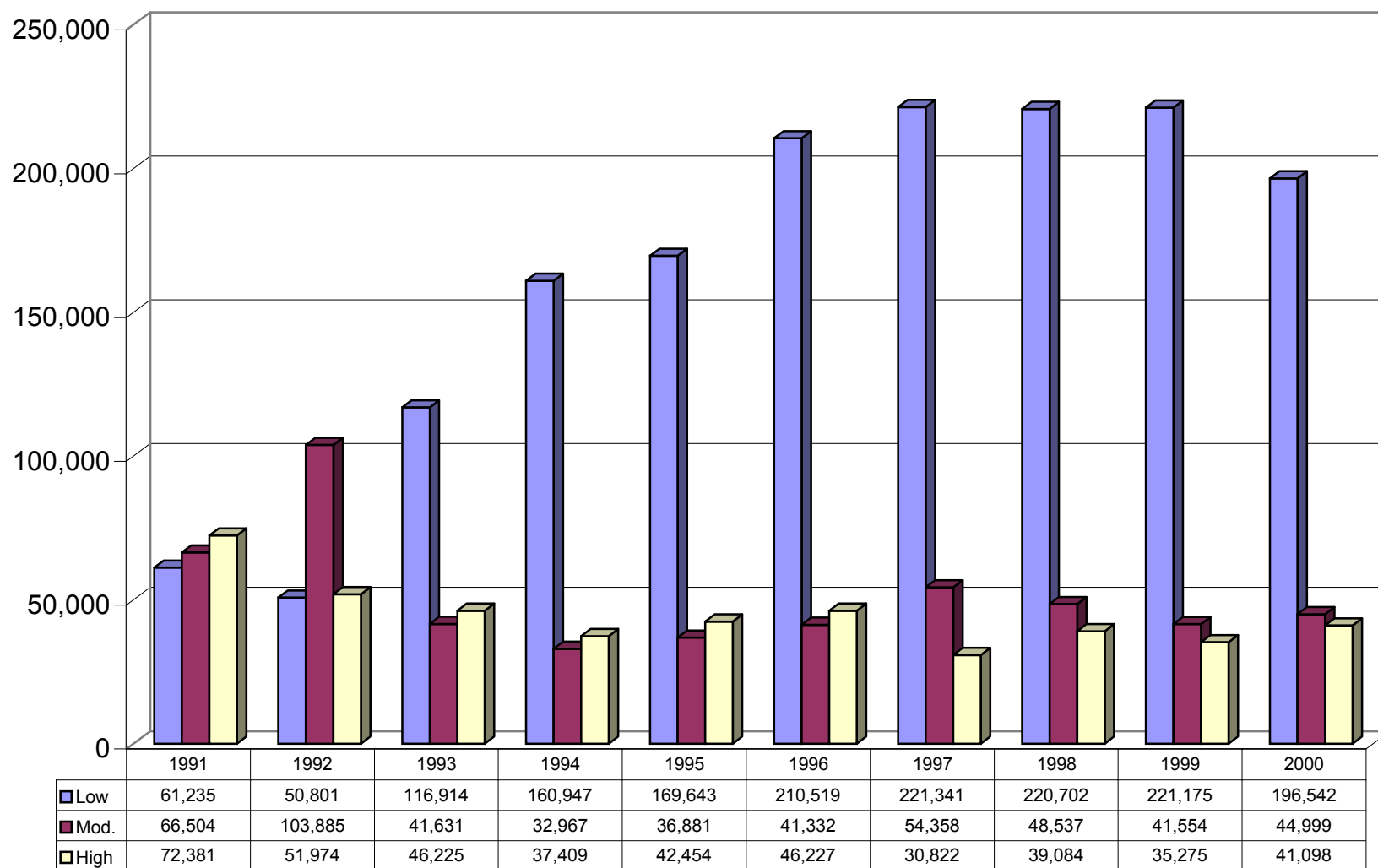
Countries	1996		1997		1998		1999		2000	
	National Malaria Budget	Contributed Funds, Loans Other	National Malaria Budget	Contributed Funds, Loans Other	National Malaria Budget	Contributed Funds, Loans Other	National Malaria Budget	Contributed Funds, Loans Other	National Malaria Budget	Contributed Funds, Loans Other
Argentina	1,800,000	-	...	...	...	...	...	...	...	...
Bolivia	257,936	...	57,471	-	660,189	46,898	133,431	122,925	845,764	944,187
Brazil	28,488,629	7,498,145	28,488,629	9,480,618	30,188,891	...	30,307,650	-	44,766,876	2,477,870
Colombia	8,500,000	-	8,307,692	-	11,661,290	-	9,930,000	-	9,950,000	-
Costa Rica	1,012,859	367,346	109,999	36373	3,597,000	389	4,750,000	-	3,380,000	-
Dominican Rep.	719,784	117,651	1,010,976	107809	1,430,963	208,548	1,495,527	90,722	1,410,013	157,238
Ecuador	...	-	2,516,464	274,859	573,136	...	1,453,583	52,013	...	...
El Salvador	4,597,701	-	4,031,982	-	4,357,798	...	3,000,000	307,167	...	...
Guatemala*	372,795	-	3,957,307	1139	1,359,775	52,857	730,232	-	702,703	-
Haiti	...	...	...	...	-	41,462	...	...	...	...
Honduras	1,295,788	-	1,936,481	-	1,859,022	-	149,558	239,398	2,597,868	3,605,010
Mexico	18,878,871	-	19,403,038	-	14,117,650	-	15,349,724	-	17,652,182	-
Nicaragua	...	-	...	...	...	...	4,101,657	1,871,250	333,333	-
Panama	3,686,553	74,973	5,505,232	-	5,171,984	-	5,161,509	-	5,066,318	-
Paraguay	6,949,609	-	8,270,231	-	7,501,159	-	4,338,457	21,281	1,932,103	-
Peru	...	-	3,308,104	-	2,927,417	...	4,996,471	-	1,900,915	58,572
Venezuela	...	...	...	...	1,632,134	...	761,868	1,032,823	5,411,675	960,000
SUB TOTAL	76,560,525	8,058,115	86,903,606	9,900,798	87,038,408	350,154	86,659,667	3,737,579	95,949,750	8,202,877
Guyana	...	...	551,724	20,000	640,093	...	772,000	...	1,000,000	-
Belize	331,513	760,819	461,600	58,000	440,174	-	...	...	...	...
French Guiana	-	-	...	...	...	...	...	...	...	...
Suriname	45,544	195	...	...	106,236	-	...	...	65,778	-
SUB TOTAL	377,057	761,014	1,013,324	78,000	1,186,503	...	772,000	...	1,065,778	...
TOTAL	76,937,582	8,819,129	87,916,930	9,978,798	88,224,911	350,154	87,431,667	3,737,579	97,015,528	8,202,877
Grand Total		85,756,711		97,895,728		88,575,065		91,169,246		105,218,405
SUS Funds/Person in Malarious Areas		\$0.65		\$0.47		\$0.42		\$0.45		\$0.57

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

* GUT 1999 - budgetary information for only 5/25 health areas

Figure 1

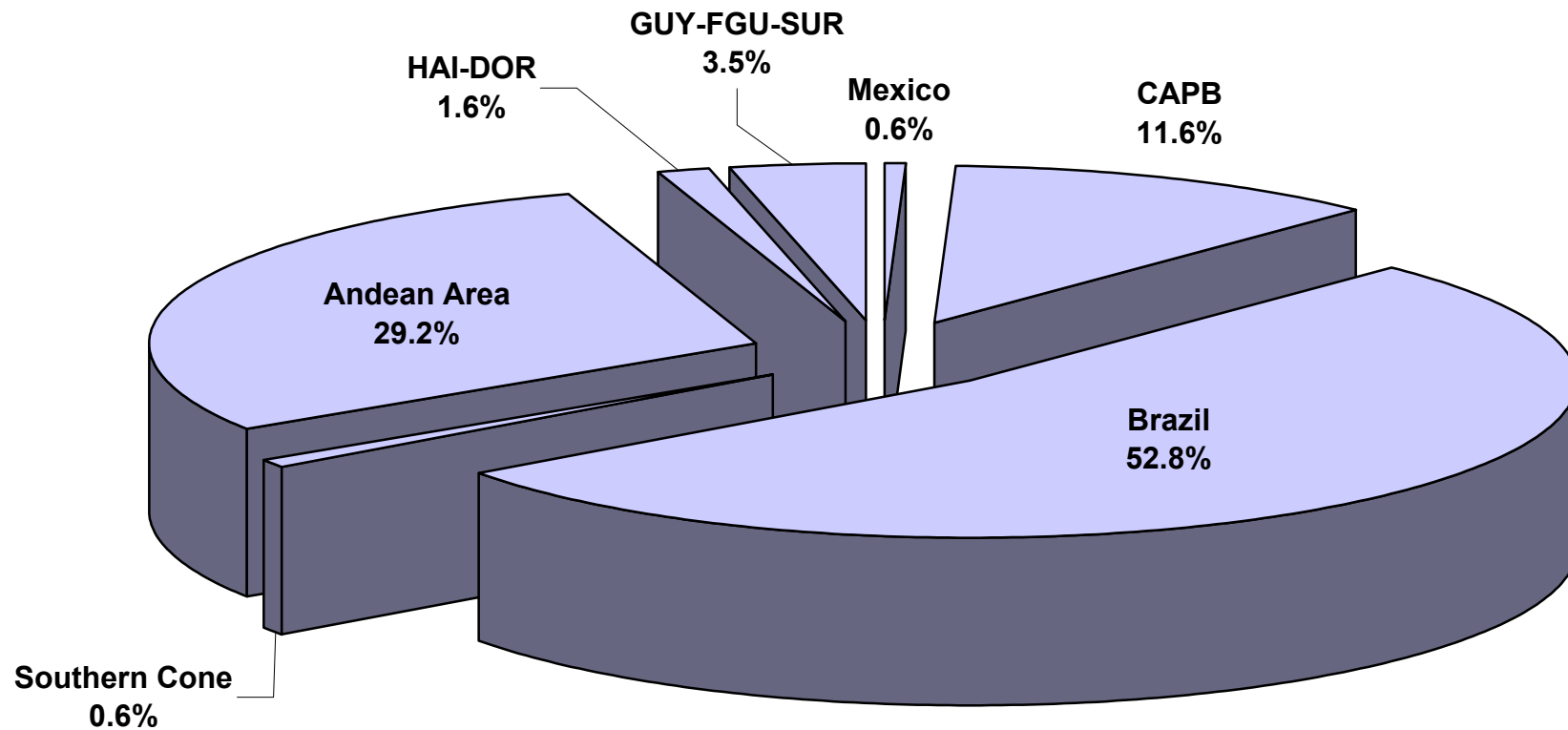
POPULATION LIVING IN MALARIA ENDEMIC-AREAS ACCORDING TO TRANSMISSION LEVEL, 1991-2000



* Population in thousands of inhabitants

Figure 2

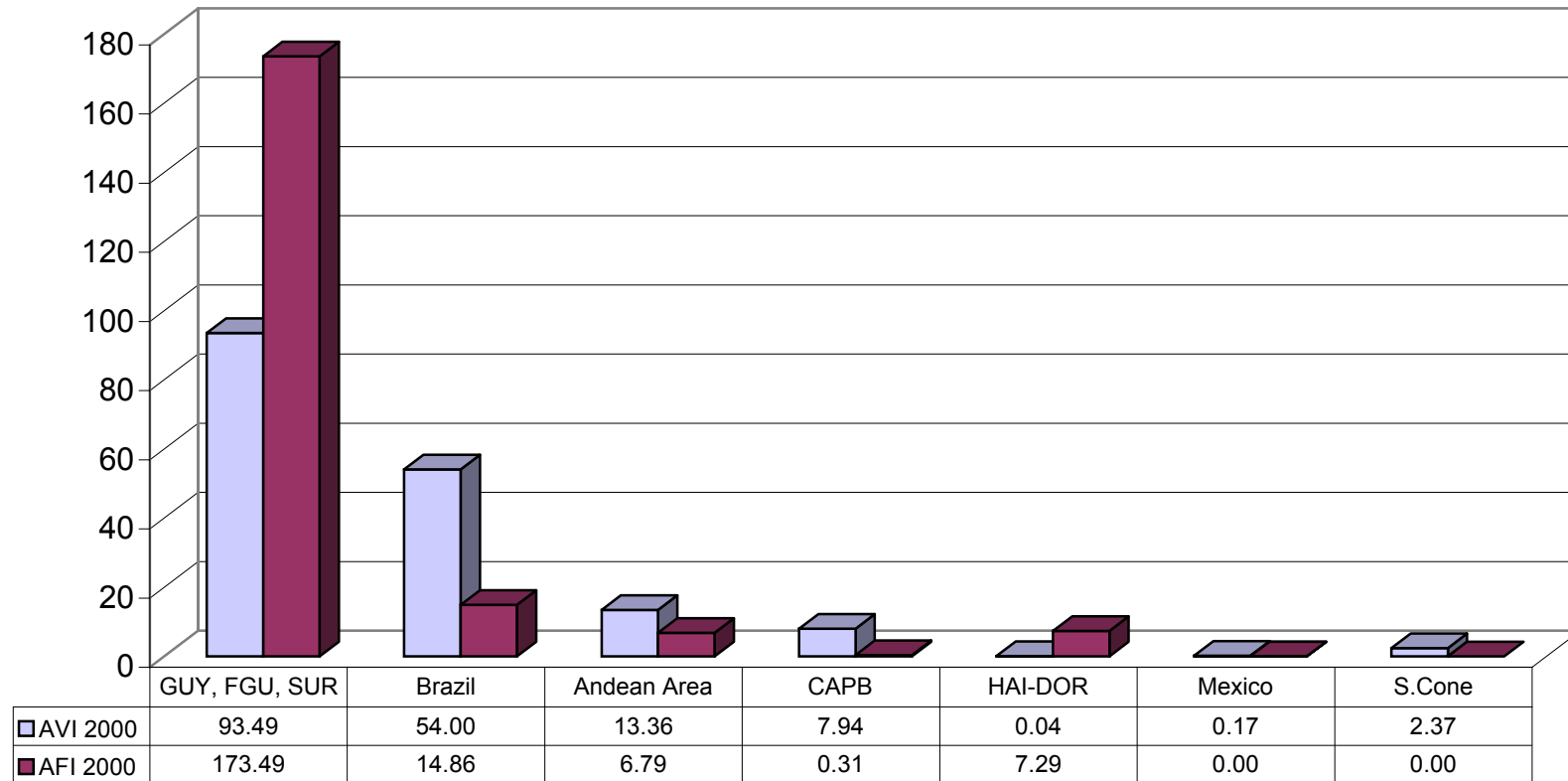
DISTRIBUTION OF MALARIA CASES IN THE AMERICAN REGION, 2000



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 3

MALARIA PARASITIC INDICES BY GEOGRAPHIC SUBREGION, 2000*



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

CAPB=Central America, Panama, Belize

AFI=Annual *P. falciparum* Index

AVI=Annual *P. vivax* Index

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

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

Figure 4

FUNDS/PERSON IN MALARIOUS AREAS Vs. MALARIOUS API - 1970-2000

