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**STATUS OF MALARIA PROGRAMS IN THE AMERICAS**

**XLV REPORT**

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## Introduction

In 1996 the population of the Region of the Americas was estimated at 786 million, of which 298 million (37.9%) lived in areas where ecological conditions were propitious for the transmission of malaria (Table 1).

Out of 37 countries and territories that are members of PAHO/WHO, 21 still have active malaria transmission. Of these, only Ecuador and Mexico are implementing control programs outside the principles of the Global Malaria Control Strategy (GMCS). The other 18 countries (Argentina, Belize, Bolivia, Brazil, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Guyana, Haiti, Honduras, Nicaragua, Panama, Paraguay, Peru, Suriname and Venezuela) have reoriented their control programs in line with GMCS and 12 have been implementing it. Among those, Costa Rica, Dominican Republic, Haiti, and Paraguay have deviated significantly from the basic GMCS principles.

In order to obtain a more accurate picture of the distribution of the disease, the countries of the Americas have redefined their malarious areas on the basis of different levels of exposure-risk to transmission (Figure 1 and Table 2). Risk of exposure is the result of factors related to population movement, social stability, and adoption of individual and collective attitudes and behaviors which prevent malaria and protect against contact with vectors. These factors are further influenced by immediate access to appropriate diagnosis and treatment. Figures 2-4 show malaria annual parasitic indices (API) and the distribution of malaria cases in the American Region.

Table 3 shows a decrease in the malaria case detection rates (Figure 5) on the basis of the total population of the Americas (from 168.2 per 100,000 in 1995 to 144.9 per 100,000 in 1996). Case detection rates for the population inhabiting areas ecologically propitious for transmission decreased from 523.2 to 382.4 per 100,000 in the same period.

Of the total population of 452 million in the 21 countries with active malaria transmission, 218 million (48.2%) live in areas with any risk of transmission (Table 2). However, 130 million of those 48.2% are exposed to low or no-risk of malaria transmission, where only 52,269 malaria cases were detected, resulting in a case detection rate of 40.2/100,000 or an API of 0.4 cases/1,000 exposed persons per year.

The remaining 87 million people (19% of the total population of these 21 countries) are living in areas exposed to moderate and high risk of transmission. These groups of the population (Table 5) are still suffering quite severe malaria morbidity, with APIs ranging from a low 0.96/1,000 in El Salvador to a very high 343/1,000 in Suriname. The overall API is 12.5 per 1,000 inhabitants in those areas.

The analysis by subregion indicates that Brazil reported the greatest absolute number of malaria cases (39.1%), together with all the Andean Subregion with 39.5% (Figure 4). However, the greatest risk of transmission was seen in the subregion which includes Guyana, French Guiana, and Suriname (API = 322/1,000), followed by parts of Brazil (API = 61.6/1,000), Peru (API = 43.5/1,000), and Belize (API = 42.1/1,000).

In recent years the epidemiological stratification of malaria in the Americas has been accompanied by the integration of case finding, diagnosis, and immediate treatment within the local health services. This is demonstrated in Table 4, which shows the results of the parasitoscopic examinations of 8.6 million suspected cases. The local health services had a high diagnostic efficiency, confirming 16.4% of suspected cases, whereas active surveillance continues to show a low diagnostic efficiency and high operational cost, confirming only 2.1% of "recent fever" cases, as shown in Table 6.

Tables 7 and 8 display the availability of treatment per diagnosed case, ranging from 0.5 to 321 first-line treatments per case reported. The improvements in the availability of second/third-line therapy in Bolivia, Colombia, Peru, and Venezuela compared with previous years may be the result of further implementation of the Global Malaria Control Strategy, which calls for an emphasis on optimal clinical management of the disease. On the other hand, Guyana, Suriname, and Brazil are still reporting less than one treatment for each diagnosed case of *P. falciparum*.

Table 9 presents the geopolitical location and demographics of high risk areas, the causes of exposure, and the control measures implemented. From the characterization of the factors that lead to persistence of transmission, potential control measures can be identified. There is still a need for intersectoral coordination in order to ensure the sustainability of these measures.

Vector control activities continue to be applied by the countries as a means to prevent transmission. A clear shift away from the use of organochlorine and organophosphorus products towards the synthetic pyrethroids continues to be observed (Table 10).

Table 11 and Figure 7 show that the funds utilized by the control programs have greatly varied over the last five years. The expenditures have decreased to US\$0.65 per person in the malarious areas of the 14 countries that reported.

**TABLE 1**  
**POPULATION LIVING IN MALARIA ENDEMIC AREAS IN THE AMERICAS, 1970-1996**  
(in thousands)

Year	POPULATION IN AREAS WITH ECOLOGICAL RISK FOR MALARIA TRANSMISSION			Total Population at Ecological Risk	Total Population of Countries
	MALARIA TRANSMISSION RISK				
	Low	Moderate	High		
1970	80,770	40,518	59,807	181,257	505,819
1971	81,306	43,644	60,396	185,492	513,544
1972	86,634	42,016	61,645	190,448	524,774
1973	87,969	45,535	61,915	195,528	535,109
1974	91,527	46,042	63,130	200,755	544,865
1975	99,405	44,633	61,834	205,872	555,676
1976	101,068	48,813	61,205	211,086	565,249
1977	104,567	50,610	60,373	215,550	576,942
1978	105,611	59,734	54,808	220,153	587,704
1979	113,092	57,280	55,989	226,361	600,263
1980	114,620	58,087	58,659	231,366	610,021
1981	117,042	59,962	62,256	239,260	627,375
1982	118,338	62,028	64,941	245,307	635,954
1983	119,175	66,970	63,182	249,327	639,212
1984	124,408	68,372	64,496	257,276	659,535
1985	124,086	67,092	68,659	259,837	665,777
1986	116,143	43,717	103,500	263,371	662,983
1987	117,310	42,334	108,633	268,277	672,384
1988	124,250	46,048	109,927	280,225	703,358
1989	126,666	45,309	113,419	285,394	715,994
1990	120,980	47,481	110,139	278,600	698,199
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
<b>1996</b>	<b>210,519</b>	<b>41,332</b>	<b>46,277</b>	<b>298,128</b>	<b>786,055</b>

**TABLE 2**  
**STATUS OF RISK OF MALARIA TRANSMISSION IN THE AMERICAS**  
**BY POPULATION, 1996**  
**(in thousands)**

Countries and Territories	Total Population*	Low risk		Moderate risk		High risk	
		Total	%	Total	%	Total	%
Anguilla**	8	-	-	-	-	-	-
Antigua & Barbuda**	66	-	-	-	-	-	-
Neth. Antilles**	200	-	-	-	-	-	-
Aruba	71	-	-	-	-	-	-
Bahamas**	280	-	-	-	-	-	-
Barbados	263	-	-	-	-	-	-
Bermuda**	64	-	-	-	-	-	-
Canada**	29,784	-	-	-	-	-	-
Cuba	11,118	-	-	-	-	-	-
Chile	14,478	340	2.35	-	-	-	-
Dominica	71	21	29.58	-	-	-	-
Grenada	92	94	102.17	-	-	-	-
Guadeloupe	435	400	91.95	-	-	-	-
Cayman Islands	32	-	-	-	-	-	-
Turks and C. Islands**	15	-	-	-	-	-	-
Virgin Islands (USA)**	106	88	83.02	-	-	-	-
Virgin Islands (U.K.)**	19	-	-	-	-	-	-
Jamaica	2,465	-	-	-	-	-	-
Martinique	382	370	96.86	-	-	-	-
Montserrat**	11	-	-	-	-	-	-
Puerto Rico**	3,703	3,580	96.68	-	-	-	-
St. Kitts-Nevis**	41	-	-	-	-	-	-
St. Vincent & Grenadines**	113	-	-	-	-	-	-
St. Lucia**	144	122	84.72	-	-	-	-
Trinidad & Tobago	1,320	1,234	93.48	-	-	-	-
United States	265,765	73,777	27.76	-	-	-	-
Uruguay**	3,204	-	-	-	-	-	-
<b>Mexico</b>	<b>95,470</b>	<b>14,702</b>	<b>15.40</b>	<b>16,189</b>	<b>16.96</b>	<b>18,410</b>	<b>19.28</b>
Belize	221	66	29.86	67	30.32	83	37.56
Costa Rica	3,500	332	9.49	636	18.17	166	4.74
El Salvador	5,897	41	0.70	318	5.39	5,428	92.05
Guatemala	10,928	3,062	28.02	4,808	44.00	2,494	22.82
Honduras	5,816	557	9.58	442	7.60	3,518	60.49
Nicaragua	4,584	1,022	22.29	555	12.11	3,560	77.66
Panama	2,677	575	21.48	211	7.88	...	...
Haiti	7,329	-	0.00	7,329	100.00	-	...
Dominican Republic	7,961	...	...	...	...	20	0.25
French Guiana	153	139	90.85	-	0.00	14	9.15
Guyana**	844	...	...	14	1.66	53	6.28
Suriname	428	6	1.40	4	0.93	40	9.35
<b>Brazil</b>	<b>164,424</b>	<b>72,675</b>	<b>44.20</b>	<b>3,782</b>	<b>2.30</b>	<b>3,206</b>	<b>1.95</b>
Bolivia	7,593	205	2.70	1,124	14.80	2,202	29.00
Colombia	35,652	19,692	55.23	1,985	5.57	3,479	9.76
Ecuador	11,699	5,428	46.40	708	6.05	752	6.43
Peru	24,233	4,629	19.10	2,399	9.90	2,399	9.90
Venezuela	22,311	435	1.95	496	2.22	191	0.86
Argentina	34,995	5,770	16.49	...	...	262	0.75
Paraguay	5,090	1,157	22.73	...	...	-	0.00
<b>TOTAL</b>	<b>786,055</b>	<b>210,519</b>	<b>26.78</b>	<b>41,067</b>	<b>5.22</b>	<b>46,277</b>	<b>5.89</b>

(Total for 21 Countries) 451,805 130,493

\* Source: U.N. Population Division, New York, 1995

\*\* No data available for 1996; 1995 data used

... No information available

- No applicable

Risk criteria:

Nicaragua: Low Risk IPA > 1 < 10.0, Mod Risk > 10 < 17, High Risk > 17.

Venezuela: Low Risk IPA > 1 < 5, Mod Risk IPA > 5 < 10, High Risk IPA > 10

Brazil: Low Risk IPA > 1 < 10.0, Mod. Risk IPA > 10.0 < 50.0, High Risk IPA > 50.0 < 1000

Mexico: Low Risk = traditional "consolidation phase"

Mod. Risk = traditional "maintenance phase"

High Risk = traditional "attack phase"

All other countries: Low Risk IPA ≤ 1/1000, Mod. Risk IPA > 1/1000 ≤ 10/1000, High Risk IPA > 10/1000

**TABLE 3**  
**MALARIA MORBIDITY IN THE AMERICAS, 1970-1996**

Year	POPULATION (in thousands)		BLOOD SLIDES			CASE DETECTION (per 100,000 inhabitants)	
	Total Countries	Malarious Areas *	Examined	Positive	Slide Positivity Rate (SPR)	Total Americas	Malarious Areas
1970	505,819	181,257	9,925,162	344,170	3.47	68.04	189.88
1971	513,544	185,492	10,134,212	338,416	3.34	65.90	182.44
1972	524,774	190,448	9,695,953	284,813	2.94	54.27	149.55
1973	535,109	195,528	9,400,682	280,276	2.98	52.38	143.34
1974	544,865	200,755	8,997,318	269,003	2.99	49.37	134.00
1975	555,676	205,872	9,276,878	356,692	3.84	64.19	173.26
1976	565,249	211,086	9,352,775	379,364	4.06	67.11	179.72
1977	576,942	215,550	9,274,480	398,925	4.30	69.14	185.07
1978	587,704	220,153	9,493,751	468,923	4.94	79.79	213.00
1979	600,263	226,361	8,630,653	515,271	5.97	84.47	227.63
1980	610,021	231,366	8,943,369	602,836	6.74	98.82	260.56
1981	627,375	239,260	9,100,529	629,629	6.92	100.36	263.16
1982	635,954	245,307	8,826,418	715,177	8.10	112.46	291.54
1983	639,212	249,327	9,113,611	830,700	9.11	129.96	333.18
1984	659,535	257,276	9,422,827	931,356	9.88	141.21	362.01
1985	665,777	259,838	9,485,203	910,917	9.60	136.82	350.57
1986	662,983	263,371	10,070,388	950,570	9.44	143.38	360.92
1987	672,941	268,217	9,764,285	1,018,864	10.43	151.40	379.87
1988	703,370	280,758	10,092,472	1,120,040	11.10	159.24	398.93
1989	715,994	285,394	9,638,847	1,113,764	11.55	155.55	390.25
1990	698,741	278,600	9,459,912	1,045,808	11.06	149.67	375.38
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
<b>1996</b>	<b>786,055</b>	<b>298,128</b>	<b>8,601,279</b>	<b>1,138,966</b>	<b>13.24</b>	<b>144.90</b>	<b>382.04</b>

\* Areas ecologically propitious for transmission  
in 21 countries with active transmission.

Information for some countries is incomplete.

Not including information for Haiti or Guyana.

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TABLE 4

**TOTAL BLOOD SLIDES EXAMINED AND NUMBER OF POSITIVE SLIDES  
BY LEVEL OF MALARIA TRANSMISSION, 1996**

Countries and Territories*	TOTAL		LOW RISK OF TRANSMISSION		MODERATE RISK OF TRANSMISSION		HIGH RISK OF TRANSMISSION		NO MALARIOUS AREAS	
	Blood slides examined	Positive	Blood slides examined	Positive	Blood slides examined	Positive	Blood slides examined	Positive	Blood slides examined	Positive
Canada**	...	305	-	-	-	-	-	-	...	305
Cuba	149,106	11	-	-	-	-	-	-	149,106	11
Chile**	...	...	-	-	-	-	-	-	...	...
Barbados	...	2	-	-	-	-	-	-	...	2
Dominica	10	0	-	-	-	-	-	-	10	0
Grenada	...	...	-	-	-	-	-	-	...	...
Guadeloupe	...	5	-	-	-	-	-	-	...	5
Jamaica	206	31	-	-	-	-	-	-	206	31
Martinique	100	3	-	-	-	-	-	-	100	3
Puerto Rico**	5	5	-	-	-	-	-	-	...	5
St. Lucia**	...	...	-	-	-	-	-	-	...	...
Trinidad & Tobago	17,984	12	-	-	-	-	-	-	17,984	12
United States**	...	949	-	-	-	-	-	-	...	949
Uruguay	...	...	-	-	-	-	-	-	...	...
Virgin Islands(USA)**	...	...	-	-	-	-	-	-	...	...
<b>Subtotal</b>	<b>167,411</b>	<b>1,323</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>167,406</b>	<b>1,323</b>
Mexico	2,053,773	6,293	322,377	103	518,311	1,239	1,213,085	4,950	...	1
Belize	35,113	6,605	2,627	282	5,292	556	26,993	5,767	-	-
Costa Rica	148,153	5,480	3,468	60	76,979	2,010	66,380	3,102	1,326	308
El Salvador	164,491	5,888	19,090	323	23,392	402	112,896	5,122	9,113	41
Guatemala	97,586	20,268	1,331	36	56,631	6,882	39,622	13,347	2	2
Honduras	257,024	74,487	24,588	1,467	33,276	6,453	199,160	66,567	...	...
Nicaragua	461,989	75,606	54,470	3,528	59,713	6,727	347,806	65,351	...	...
Panama	188,914	476	34,745	90	154,169	386	-	-	...	...
Haiti	69,853	18,877	...	...	...	...	...	...	...	...
Dominican Republic	436,473	1,414	323,319	589	91,009	576	22,145	249	...	...
French Guiana	46,780	4,724	-	-	-	-	34,007	4,326	12,773	398
Guyana**	...	...	...	...	...	...	...	...	...	...
Suriname	68,674	16,649	...	1,342	...	2,463	...	12,141	...	703
<b>Brazil</b>	<b>2,159,551</b>	<b>455,194</b>	<b>449,705</b>	<b>28,523</b>	<b>345,116</b>	<b>71,741</b>	<b>1,364,098</b>	<b>354,769</b>	<b>632</b>	<b>161</b>
Bolivia	161,077	64,012	2,757	919	8,361	3,040	149,959	60,053	...	...
Colombia	461,137	135,923	25,475	1,362	4,862	1,435	800,800	133,126	...	...
Ecuador	161,307	11,882	115,132	4,706	21,168	2,162	25,007	5,014	...	...
Peru	1,162,230	213,132	40,806	2,963	141,469	19,226	979,955	190,943	...	...
Venezuela	218,752	18,858	27,399	1,012	70,710	6,337	119,091	11,168	1,552	341
Argentina	12,833	2,048	5,090	479	-	-	7,707	1,533	36	36
Paraguay	68,151	637	67,807	627	-	-	-	-	344	10
<b>21 Country Subtotal</b>	<b>8,433,861</b>	<b>1,138,453</b>	<b>1,520,186</b>	<b>48,411</b>	<b>1,610,458</b>	<b>131,635</b>	<b>5,508,711</b>	<b>937,528</b>	<b>25,778</b>	<b>2,001</b>
<b>TOTAL</b>	<b>8,601,272</b>	<b>1,139,776</b>	<b>1,520,186</b>	<b>48,411</b>	<b>1,610,458</b>	<b>131,635</b>	<b>5,508,711</b>	<b>937,528</b>	<b>193,184</b>	<b>3,324</b>

\* Countries without malaria transmission are included in one group, not by geographic region

\*\* No data available for 1996, 1995 data used

... No information available

- No applicable

Tab95.4 12-VIII-97



**TABLE 5**  
**EPIDEMIOLOGICAL STATUS OF 21 COUNTRIES**  
**WITH ACTIVE MALARIA PROGRAMS, 1996**

Countries by Geographic Subregion	Population Malarious Areas*	BLOOD SLIDES			PARASITE SPECIES					
		Examined	Positive	Proportion of all cases	API	P.falciparum & mixed	AFI	P.vivax	AVI	P.malariae
Mexico	34,599	1,731,396	6,189	0.57	0.18	85	0.00	6,104	0.18	0
Belize	150	32,285	6,324	0.58	42.16	424	2.83	5,900	39.33	0
Costa Rica	805	143,359	5,112	0.47	6.35	59	0.07	5,305	6.59	0
El Salvador	5,746	133,288	5,529	0.51	0.96	0	0.00	5,524	0.96	0
Guatemala	7,302	96,253	20,217	1.85	2.77	111	0.02	20,106	2.75	0
Honduras	3,960	232,436	73,020	6.69	18.44	870	0.22	72,150	18.22	0
Nicaragua	4,115	407,519	72,081	6.61	17.52	2,647	0.64	69,434	16.87	0
Panama	211	154,169	409	0.04	1.94	23	0.11	386	1.83	0
Haiti	7,329	69,853	18,877	1.73	2.58	18,887	2.58	0	0.00	0
Dominican Rep.	20	113,154	825	0.08	41.25	825	41.25	0	0.00	0
French Guiana	14	34,007	4,334	0.40	309.57	3,694	263.86	585	41.79	55
Guyana**	...	...	...	...	...	...	...	...	...	...
Suriname	55	68,674	18,880	1.73	343.27	13,604	247.35	5,262	95.67	14
Brazil	6,988	1,706,214	426,510	39.10	61.03	127,539	18.25	297,372	42.55	1,599
Bolivia	3,326	158,320	63,093	5.78	18.97	4,252	1.28	58,841	17.69	0
Colombia	5,464	405,662	134,561	12.34	24.63	36,558	6.69	97,968	17.93	35
Ecuador	1,460	46,175	7,176	0.66	4.92	1,062	0.73	6,114	4.19	0
Peru	4,798	1,121,424	208,543	19.12	43.46	49,962	10.41	158,458	33.03	123
Venezuela	687	198,801	17,505	1.60	25.48	3,343	4.87	14,116	20.55	46
Argentina	262	7,707	1,533	0.14	5.85	0	0.00	1,533	5.85	0
Paraguay	-	-	-	-	-	-	-	-	-	-
<b>TOTAL</b>	<b>87,291</b>	<b>6,860,696</b>	<b>1,090,718</b>	<b>100</b>	<b>12.50</b>	<b>263,945</b>	<b>3.02</b>	<b>825,158</b>	<b>9.45</b>	<b>1,872</b>

... No information available

- No applicable

\* Population by thousands (Moderate and High Risk areas only)

\*\* No 1996 data available

Haiti entire population recorded as malarious areas

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**TABLE 6**  
**COMPARISON BETWEEN PASSIVE AND ACTIVE CASE DETECTION, 1996**

Countries by Geographic Subregion	PASSIVE CASE DETECTION General health services & hospitals			VOLUNTARY COLLABORATORS			ACTIVE CASE DETECTION Epidemiologic investigations and follow-ups		
	Blood slides examined	Positive	SPR	Blood slides examined	Positive	SPR	Blood slides examined	Positive	SPR
	Mexico	743,962	2,287	0.31	300,509	2,551	0.85	1,007,565	1,454
Belize	...	2,554	-	...	2,992	...	...	1,059	-
Costa Rica	1,326	1,698	128.05	11,353	594	5.23	135,474	3,197	2.36
El Salvador	45,649	903	1.98	94,431	4,582	4.85	24,411	403	1.65
Guatemala	14,640	4,030	27.53	82,942	16,238	19.58	...	...	...
Honduras	-	-	...	257,024	74,487	28.98	-	-	...
Nicaragua	265,610	40,446	15.23	163,760	30,271	18.48	10,680	497	4.65
Panama	28,770	117	0.41	297	36	12.12	152,943	308	0.20
Haiti	69,853	18,877	...	...	...	...	...	...	...
Dominican Rep.	34,722	254	0.73	17,752	184	1.04	236,105	331	0.14
French Guiana	...	...	-	...	...	...	...	...	-
Guyana**	...	...	-	...	...	...	...	8,416	-
Suriname	64,069	16,267	25.39	-	-	-	4,605	382	8.30
Brazil	...	...	...	...	...	...	...	...	...
Bolivia	73,222	37,408	51.09	35,544	17,120	48.17	52,311	9,484	18.13
Colombia	304,961	103,300	33.87	130,698	25,826	19.76	25,478	6,747	26.48
Ecuador	86,578	8,449	9.76	37,047	2,303	6.22	37,682	1,130	3.00
Peru	1,010,663	213,132	21.09	...	...	...	-	...	...
Venezuela	79,007	13,449	17.02	...	...	...	139,745	5,359	3.83
Argentina	2,633	1,009	38.32	-	-	-	10,200	1,039	10.19
Paraguay	1,634	148	9.06	35,449	339	0.96	28,882	96	0.33
<b>TOTAL</b>	<b>2,827,299</b>	<b>464,328</b>	<b>16.42</b>	<b>1,166,806</b>	<b>177,523</b>	<b>15.21</b>	<b>1,866,081</b>	<b>39,902</b>	<b>2.14</b>

\*\* No data available for 1996, 1995 data used

- No applicable

... No Information available

SPR = Slide Positivity Rate

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**TABLE 7**  
**ANTIMALARIAL DRUGS USED IN 21 COUNTRIES IN 1996**  
(number of tablets)

Countries by Geographic Subregion	Chloroquine and/or Amodiaquine 150 mg.	Primaquine 15 mg.	Primaquine 7.5 mg.	Sulpha/Pyrimethamine @ 500/25	Mefloquine @ 250 mgs.	Artemisine derivatives number of treatments*	Quinine @ 300 mgs.
Mexico	7,384,259	623,944	1,039,908	-	-	-	125
Belize	206,498	55,795	34,466	-	-	-	-
Costa Rica	854,241	258,600	517,000	-	-	-	-
El Salvador	1,241,340	1,241,340	-	-	-	-	-
Guatemala	358,670	-	-	...	...	...	...
Honduras	2,008,565	719,490	179,335	-	-	-	-
Nicaragua	21,886,927	10,899,452	2,356,210	-	-	-	-
Panama	211,000	119,000	75,000	-	-	-	-
Haiti	937,426	-	-	-	-	-	-
Dominican Rep.	4,542,986	1,639,747	-	-	-	-	-
French Guiana	...	...	...	...	...	...	...
Suriname	57,795	9,275	-	11,250	200	-	76,000
Brazil	10,549,166	4,662,000	1,525,500	-	94,600	5,718	2,499,915
Bolivia	1,950,000	994,000	304,000	-	-	-	1,863,000
Colombia	1,247,300	1,389,000	98,000	304,200	-	-	12,400
Ecuador	1,120,000	4,000	18,000	-	-	-	-
Peru	6,360,590	4,941,758	5,509,656	273,550	-	-	33,695
Venezuela	1,836,097	577,480	216,549	34,346	-	-	12,753
Argentina	19,588	15,011	11,270	-	-	-	-
Paraguay	212,689	-	-	-	-	-	-

\* Artesunate @ 600 mg/treatment; Artemeter @ 768 mg./treatment

... No Information available

- No applicable

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**TABLE 8**  
**ANTIMALARIAL TREATMENT COMPLETED IN 1996**

Countries by Geographic Subregion	Number P. falciparum treatments complete	Treatments complete @ 1,500 mg. of 4- Amino quinolines	Number of reported cases	Number of first-line treatments available per case reported	Number of second-line treatments available per case P.falciparum
Mexico	4	738,425	6,293	117.34	-
Belize	...	20,650	6,605	3.13	-
Costa Rica	...	85,424	5,480	15.59	-
El Salvador	...	124,134	5,888	21.08	-
Guatemala	...	35,867	20,268	...	-
Honduras	...	200,856	74,487	2.70	-
Nicaragua	...	2,188,692	75,606	28.95	-
Panama	...	2,110	476	4.43	-
Haiti	...	93,743	18,877	4.97	...
Dominican Rep.	...	454,258	1,414	321.26	...
French Guyana	...	...	46,780	...	...
Guyana**	46,604	32,558	59,311	0.55	(0.4)
Suriname	5,559	5,779	16,649	0.35	(0.4)
Brazil	81,005	1,054,916	455,194	2.32	(0.6)
Bolivia	44,357	195,000	64,012	3.05	(10.4)
Colombia	101,695	124,730	135,923	0.92	(2.7)
Ecuador	-	112,000	11,882	9.43	-
Peru	91,985	636,059	213,132	2.98	(1.8)
Venezuela	11,751	183,610	18,858	9.74	(3.4)
Argentina	...	1,959	2,048	0.96	-
Paraguay	...	21,268	637	33.39	...

... No information available

\*\* 1995 data used

TABLE 9

## MALARIOUS AREAS AT HIGH RISK OF TRANSMISSION, AND CONTROL PRIORITIES, 1996

COUNTRIES	POPULATION	km <sup>2</sup>	REPORTED CASES	CONTROL MEASURES APPLIED IN DIFFERENT AREAS	MAIN VECTORS	CAUSES OF PERSISTENCE OF TRANSMISSION
<b>MEXICO</b>						
Campeche	129,121	15,550	89	House, larvicide and aerial spraying; individual and mass radical treatments; entomological studies; and promotion of environmental management.	A. albimanus A. vestitipennis A. pseudopunct	Significant migration of agricultural workers from the south. Poor housing conditions. Vector resistance in small dispersed areas. Population habits of outdoor activities in the evening hours.
Chiapas	1,092,683	24,000	1,539			
Guerrero	426,911	9,407	74			
Michoacan	558,801	8,596	341			
Oaxaca	933,348	17,584	1,051			
Quintana Roo	141,156	7,552	141			
Sinaloa	482,643	11,618	1,516			
Tabasco	259,546	4,932	199			
<b>Sub-total</b>	<b>4,024,209</b>	<b>99,239</b>	<b>4,950</b>			
<b>BELIZE</b>						
Corozal	30,809	1,390	345	Spraying and drug therapy. Case Treatment	A. albimanus	Limited residual spraying No compliance to treatment Unsupervised spraying
Orange Walk	33,207	1,256	211			
Belize	61,733	701	282			
Cayo	40,800	3,585	2,246			
Stann Creek	19,575	1,289	1,495			
Toledo	18,877	2,190	2,006			
<b>Sub-total</b>	<b>205,001</b>	<b>10,411</b>	<b>6,585</b>			
<b>COSTA RICA</b>						
Canton Los Chiles	21,293	1,358	567	Radical treatment, focal spraying and aerial spraying. Social Education and Programs. Epidemiologic Stratification of areas API = 19.32/1000	A. albimanus	Border areas with heavy illegal migratory movements. Poorly timed control measures with little interagency coordination. Poor community participation. Environmental degradation.
Canton Limon	78,032	1,766	1065			
Canton Talamanca	27,858	2,810	638			
Canton Matina	24,210	773	655			
<b>Sub-total</b>	<b>151,393</b>	<b>6,707</b>	<b>2,925</b>			
<b>EL SALVADOR</b>						
Costa Pacifico area hiperendem.	5,428,293	4,754	5,121	Spraying, drug therapy, larvicides, structural works, mosquito bednets. API = 0.9/1000	A. albimanus	Poor housing conditions. Unhealthy environment. Migratory movement. Lack of education. Poverty. Ideal vector habitat. Types of crops.
<b>GUATEMALA</b>						
El Peten		35,854		Non-coordinated house spraying; low diagnostic and treatment coverage	A. albimanus	Uncontrolled internal migration. Poor housing conditions. Difficult access to services. Insecticide resistance.
Poptun	20,704		1,411			
Dolores	26,741		921			
San Benito	15,639		722			
San Marcos		3,791				
Ocos	30,654		515			
Malacaton	39,960		457			
Tecún Unán	17,115		364			
Alta Verapaz		8,656				
Chisec	41,752		840			
Cobán	42,719		767			
Fray Bartolomé	35,814		649			
<b>Sub-total</b>	<b>271,098</b>	<b>48,301</b>	<b>6,646</b>			
<b>HONDURAS</b>						
Health Region II	565,209	10,049	10,416	Integrated measures implemented; drug treatment; different spraying methods for physical and larval control; and community participation.	A. albimanus	Presence of rice crops. Increase in the at-risk population due to creation of industrial parks and rice farming. Migrant populations. Lakes and large ponds used as watering holes for cattle. Note: A. darlingi is present only at Region VI
Health Region III	1,504,379	14,328	7,345			
Health Region IV	...	...	17,215			
Health Region VI	604,354	15,512	16,178			
Health Region VII	356,810	23,821	13,169			
<b>Sub-total</b>	<b>3,030,752</b>		<b>64,323</b>	API = 21.22/1000		

... No information available

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TABLE 9 (cont.)

## MALARIOUS AREAS AT HIGH RISK OF TRANSMISSION, AND CONTROL PRIORITIES, 1996

COUNTRIES	POPULATION	km2	REPORTED CASES	CONTROL MEASURES APPLIED IN DIFFERENT AREAS	MAIN VECTORS	CAUSES OF PERSISTENCE OF TRANSMISSION
<b>NICARAGUA</b>						
Rio San Juan	70,875	7,473	1,978	...	A. albimanus	Decentralization process under way.
Chinandega	348,971	4,926	8,802			Low coverage of SILAIS.
Leon	330,168	5,107	14,382		A. pseudopunct.	High unemployment.
Jinotega	214,070	9,755	6,462			Highly mobile population.
Matagalpa	364,790	8,523	7,027			Urban epidemic.
Nueva Segovia	151,324	3,123	4,420			Internal migration.
R.A.A.N.	175,405	32,159	2,578			Inaccessibility.
Managua	1,056,702	3,672	19,702			
<b>Sub-total</b>	<b>2,712,305</b>	<b>74,738</b>	<b>65,351</b>	API = 24.1/1000		
<b>PANAMA</b>						
Pinogama	15,838	4,790	36			
Las Palmas	23,552	2,560	55			
Bocas del Toro	23,280	2,123	61	...	A. albimanus	Nomadic migration of indigenous groups to the south.
Changuinola	70,110	2,281	68			
Chepigana	31,172	7,700	21			
San Blas	38,268	2,823	96			
Tole	30,552	3,203	70			
<b>Sub-total</b>	<b>232,772</b>	<b>25,480</b>	<b>407</b>	API = 1.75/1000		
<b>HAITI</b>						
	...	...	...	...	...	...
<b>DOMINICAN REPUBLIC</b>						
Pepillo Salcedo	8,735	16,295	103	Prophylactic treatment of immigrants, medicinal barriers, spraying in house and surrounding areas, cleanup of canals, fish farming, Bti treatment of breeding sites.	A. albimanus	Cross-border migration. Trade.
Castanuela	12,159	7,858	146			Rice farming. Extensive use of immigrant labor in countryside and construction.
<b>Sub-total</b>	<b>20,894</b>	<b>24,153</b>	<b>249</b>	API = 11.9/1000		
<b>FRENCH GUIANA</b>						
Camopi/T-Sauts	746	1003	91		A. darlingi	Precarious housing
Bas Oyapock	1605	340	161	API = 464.6/1000		Border areas with intense migratory movement.
Moroni	6,793	2,512	3,996	API = 452.1/1000		
<b>Sub-total</b>	<b>9,144</b>	<b>3,855</b>	<b>4,248</b>			
<b>GUYANA</b>						
	145	...	4,724	API = 449.3/1000 AFI = 224.6/1000	A. darlingi	Natural resources exploitation in the rain forest.
<b>SURINAME</b>						
Districts:				House spraying with pyrethroids. PHC treatment of clinical cases.	A. darlingi	Low coverage of PHC services.
Para	6,250	1,150	1,342			Gold mining exploitation.
Brokopondo	4,176	3,000	2,463			High circulation of people to/from coastal districts.
Sipaliwini	44,336	132,525	15,075			
<b>Sub-total</b>	<b>54,762</b>	<b>136,675</b>	<b>18,880</b>	API = 344.8/1000 AFI = 247.3/1000		

TABLE 9 (cont.)

MALARIOUS AREAS AT HIGH RISK OF TRANSMISSION, AND CONTROL PRIORITIES, 1996

COUNTRIES	POPULATION	km2	REGISTERED CASES	CONTROL MEASURES APPLIED IN DIFFERENT AREAS	MAIN VECTORS	CAUSES OF PERSISTENCE OF TRANSMISSION
<b>BRAZIL</b>						
States (# municipalities at risk/total municipalities)						
AC (07/27)	59,768	...	7,383	Low coverage of integrated control due to difficult access and low stability in decentralization process. Lack of coordination between administrative and financial policies.	A. darlingi	All of the epidemiological risk factors that determine malaria transmission in ecological areas of rain forests with remote farms, mining areas and internal migration.
AM (02/62)	447,582	...	45,855			
AP (10/16)	127,951	...	13,418			
MA (02/136)	41,160	...	2,735			
MT (18/117)	358,314	...	34,017			
PA (37/128)	1,146,618	...	123,065			
RO (23/42)	640,365	...	93,302			
RR (07/08)	259,283	...	34,994			
<b>Sub-total</b>	<b>3,081,041</b>		<b>354,769</b>	API = 82.68/1000 AFI = 35.30/1000		
<b>BOLIVIA</b>						
<b>BENI</b>						
Rebiralta	53,700	34,000	10,767	Supervised case finding and treatment, chemical control, physical control of breeding sites through petroleum applications. Health education on prevention and control.	A. darlingi A. pseudopunct.	Lack of clear and straightforward policy decision. Permanent migration to areas bordering Brazil and, in the south, Argentina. Internal resistance to change to the new strategies. Insufficient financial support.
Guayaraminin	34,500	22,434	10,007			
<b>TARIJA</b>						
Yacuiba y Bermejo	51,947	12,073	22,331			
<b>STA. CRUZ</b>						
Plan 3000 y						
Prov. Andres Babiñez	450,000	83,322	8,255	API = 87.03/1000 AFI = 47.21/1000 only for the population of Riberalta, Guayaraminin		Note: Population at risk of P.falciparum 88.200 only in Beni.
<b>Sub-total</b>	<b>590,147</b>	<b>151,829</b>	<b>51,360</b>			
<b>COLOMBIA</b>						
1. Bajo Cauca-Uraba	1,027,202	55,000	63,864	House spraying, physical control. Impregnated bednets, topical repellents.	A. albimanus A. nuneztovari A. darlingi A. punctimacula	Sociopolitical factors. Mining. Animalarial drugs and supplies. Migration Settlement. Illegal crops. Vector behavior unknown Drug Resistance
2. Orinoquia	605,818	90,063	47,076			
3. Pacifico	1,114,582	80,000	6,881			
4. Amazonia	466,342	110,000	17,317			
<b>Sub-total</b>	<b>3,213,944</b>	<b>335,063</b>	<b>135,138</b>	API = 42.05/1000 AFI = 14.69/1000		
<b>ECUADOR</b>						
Esmeralda	394,485	14,597	5,555	House spraying.	A. albimanus	Low operational coverage of national program. Lack of political commitment to resolving labor problems in the old centralized structure.
El Oro	425,503	302	1,364			
Los Rios	564,372	1,992	1,748			
Manabi	1,093,830	4,015	3,534			
Canar	37,047	349	...			
Cotopaxi	37,924	233	...			
Loja	195,281	610	...			
Sucumbios	81,275	2,049	1,579			
Pastaza	14,208	24,160	822			
Guayas	2,702,074	...	3,599			
Napo	112,860	542	...			
<b>Sub-total</b>	<b>5,658,859</b>	<b>48,849</b>	<b>18,201</b>	API = 3.2/1000 AFI = 0.3/1000		

**TABLE 9 (cont.)**

**MALARIOUS AREAS AT HIGH RISK OF TRANSMISSION, AND CONTROL PRIORITIES, 1996**

COUNTRIES	POPULATION	km2	REPORTED CASES	CONTROL MEASURES APPLIED IN DIFFERENT AREAS	MAIN VECTORS	CAUSES OF PERSISTENCE OF TRANSMISSION
<b>PERU</b>						
Ayacucho	570,000	43,814	9,017	Diagnosis and treatment through general health services. Very limited residual spraying, aerial spraying, environmental sanitation.  API = 37.19/1000 AFI = 18.42/1000 only for the population of Piura, L. Castillo, Jaen, San Martin and Loreto	A. pseudopunct. A. benarrochi A. rangeli A. darlingi	Delay in implementing the Global Malaria Control Strategy. Implementation began in 1994. Lack of coverage of population at risk. Migration. Rice cultivation.
L. Castillo	642,817	15,238	9,034			
Loreto	796,694	368,851	94,856			
Jaen-Bagua	553,713	44,409	22,048			
Junin	1,133,345	44,409	26,840			
San Martin	647,175	51,253	13,074			
Ucayali	366,877	102,410	5,885			
Madre de Dios	53,810	85,182	1,243			
Pasco	243,863	25,319	4,264			
<b>Sub-total</b>	<b>5,008,294</b>	<b>780,885</b>	<b>186,261</b>			
<b>VENEZUELA</b>						
Amazonas	55,717	179,441	1,365	Spraying and fogging, use of larvicides. API = 4.9/1000 AFI = 1.7/1000	A. darlingi A. aquasalis A. nuneztovari	Uncontrolled mining areas in the jungle. Border migration. Transient workers
Bolivar	900,310	238,000	2,977			
Sucre	679,595	11,800	3,797			
<b>Sub-total</b>	<b>1,635,622</b>		<b>8,139</b>			
<b>ARGENTINA</b>						
Attack phase	24,741	11,275	1,550	Epidemiological surveillance and spraying.	A. pseudopunc.	Heavy internal and international migration. Limited access due to climatic factors. Economic and financial constraints on activities.
<b>PARAGUAY</b>						
Caaguazu	435,461	11,474	214	Case detection and treatment, house spraying.	A. darlingi	Increase in the number of breeding sites. Migratory movements. Indigenous groups. Temporary workers.
Alto Parana	562,216	14,895	263			
Aambay	...	...	...			
Canindeyu	128,935	14,667	119			
<b>Sub-total</b>	<b>1,126,612</b>	<b>41,036</b>	<b>596</b>			



TABLE 10

## INSECTICIDES USED IN MALARIA CONTROL PROGRAMS IN 1996

Countries	D D T (Kg.)		Malathion (Lts.)	Propoxur (Kg.)	Fenitrothion (Kg.)
	100%	75%	95%	50%	40%
Mexico	10,769	513,890	176,425	-	-
Belize	...	...	...	...	...
Costa Rica	-	-	2,912	2,809	-
El Salvador	-	-	-	-	-
Guatemala	-	-	-	-	-
Honduras	-	-	-	-	-
Nicaragua	-	-	-	-	-
Panama	-	-	-	-	66,000
Haiti	-	-	-	-	-
Domin. Rep.	-	-	1,628	-	468
F. Guiana	...	-	...	-	...
Guyana	-	-	-	-	-
Suriname	-	-	-	-	-
Brazil	-	-	-	-	84,450
Bolivia	-	-	100	-	-
Colombia	-	-	-	-	48,000
Ecuador	163	100	8,798	-	-
Peru	-	-	2,397	-	3,718
Venezuela	-	32,017	83,858	-	121,290
Argentina	176,400	767	-	-	-
Paraguay	-	-	-	-	-
<b>TOTAL</b>	<b>187,332</b>	<b>546,774</b>	<b>276,118</b>	<b>2,809</b>	<b>323,926</b>

... No information available

O T H E R S (1996):

MEX: Temephos 50% 4973 Lts. 1% 113425 g.a.

COR: Temephos 1% 5275 Kg. Pyrethroids: Deltamethrin 5% 996 Kg. 2.7% 3000L ULV. Cyflutin 10% 365 Kg

ELS: Permethrin 5% 1800 gallons. Larvicides: Temephos 1% 12800Kg. 5% 5.000Kg. 50% 400 gal.

NIC: Deltamethrin 2.5% 18445 Kgs. Cipermetrine 25% 1850 L. Larvicides: B Spacicus 42058 L. Pyriproxifen .5% 2098 Kg.

PAN: Fenthion 50% 974 L. Deltamethrin 2.7% 20L. Larvicides: Vectobac .2% 25 Kg.

DOR: Temephos 1.2% 60L

BRA: K'Otrina SI 130.000 charges. Etonfeprox 200pm 125.000 Kg

BOL: Lambdac. 10% 80Kg (PM). 5% 20L (CE). Deltamethrin 2.5% 5280 L. Larvicides: ABATE 1% 1500 Kg

COL: Lambdac. 10% 7670 Kgs., Deltametrine 2.5% 740 L.. Deltametrina 5% 56 Kg.

PER: Lambdac. 2.5% 272 L. Alfapemetrian 5% 799 L. Cyfultrina 10% 933 Kg. Larvic: Temephos/powder 1% 3.824 Kg. B. Spacicus 223 L.

VEN: Deltamethrin 5% 5117 L. SC. 2.5% 72.141L C.E.. Lambdac. 25% 47956 L. Larvic: Temephos 1% 2307 Kg. 50% 2170 L. CE.

ARG: Kothrina 2.5% 906.400L.

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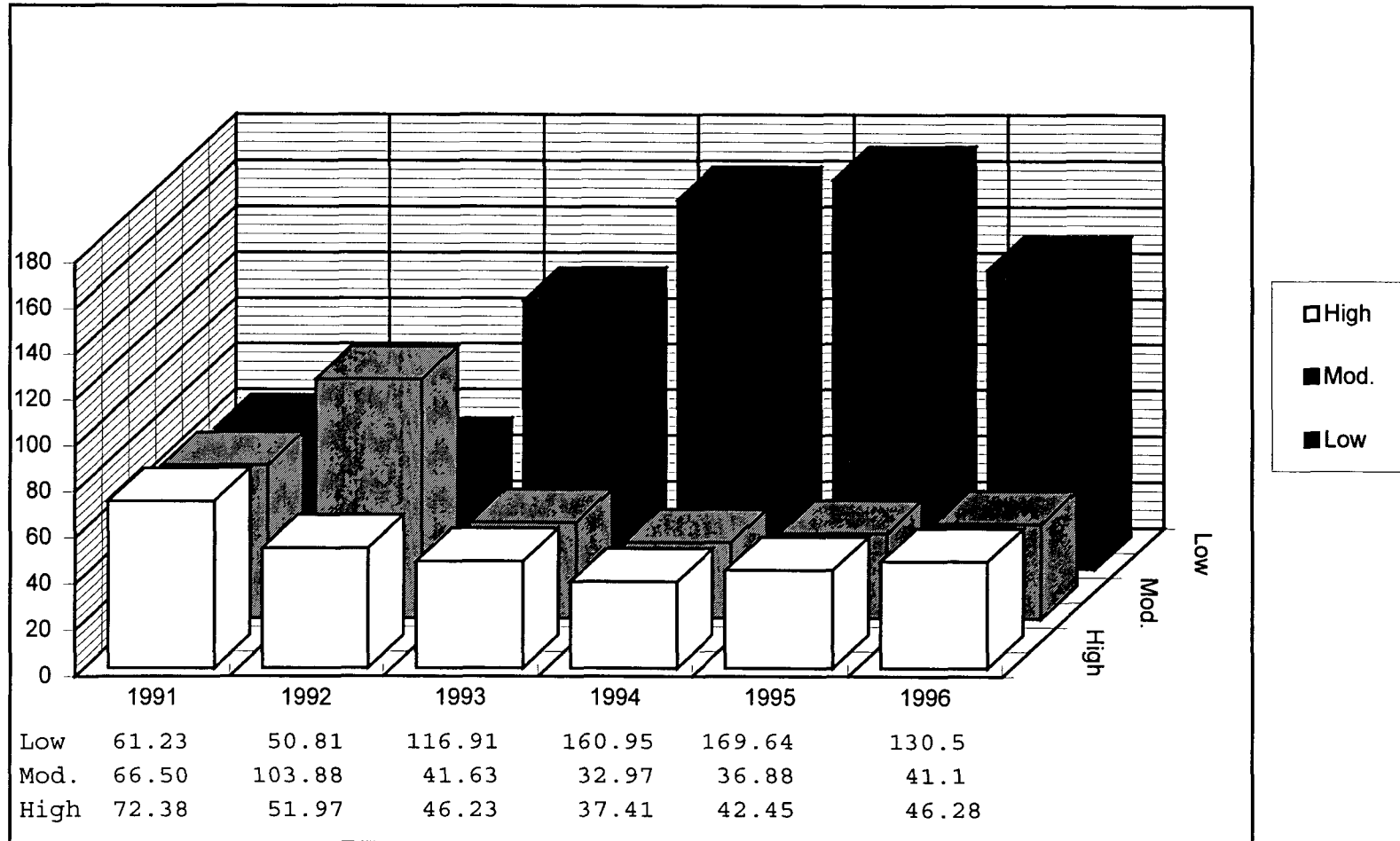
**TABLE 11**  
**NATIONAL BUDGET AND NON-BUDGETARY CONTRIBUTION**  
**TO MALARIA CONTROL PROGRAMS IN THE AMERICAS, 1993-1996**  
**(IN US\$)**

Countries	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
	1993	1993	1994	1994	1995	1995	1996	1996
Argentina	1,826,000	-	3,000,000	-	510,900	-	1,800,000	-
Bolivia	187,066	-	619,430	20,000	871,749	...	257,936	...
Brazil	97,124,000	5,500,000	12,117,647	24,400,000	35,294,157	35,633,326	28,488,629	7,498,145
Colombia	13,542,381	-	14,614,045	-	2,518,694	-	8,500,000	-
Costa Rica	1,714,017	344,310	138,000	393,308	1,527,035	1,065,088	1,012,859	367,346
Cuba	...	...	...	...	...	...	...	...
Dominican Rep.	599,334	517,815	667,171	...	758,525	113,717	719,784	117,651
Ecuador	4,963,244	-	5,253,888	-	6,057,590	-	...	-
El Salvador	1,220,930	1,023,255	1,314,286	682,571	1,321,838	402,299	4,597,701	-
Guatemala	2,434,719	166,985	...	288,703	...	41,000	372,795	-
Haiti	20,000	250,000	50,000	...	...	...	...	...
Honduras	2,016,013	283,072	1,611,927	576,382	956,146	40,000	1,295,788	-
Mexico	28,441,613	-	30,297,000	-	16,944,000	-	18,878,871	-
Nicaragua	...	301,647	...	386,004	...	250,000	...	...
Panama	3,719,976	71,000	3,633,545	124,224	3,742,203	145,683	3,686,553	74,973
Paraguay	6,405,522	-	1,030,831	-	1,362,444	-	6,949,609	-
Peru	...	...	3,062,696	-	2,865,431	-	...	-
Venezuela	6,976,914	4,600,000	24,233,445	25,319,792	...	...	...	...
<b>SUB TOTAL</b>	<b>171,191,729</b>	<b>13,058,084</b>	<b>101,643,911</b>	<b>52,190,984</b>	<b>74,730,712</b>	<b>37,691,113</b>	<b>76,560,525</b>	<b>8,058,115</b>
Guyana	538,535	-	295,483	-	...	...	...	...
Belize	477,919	100,000	617,462	79,407	-	760,819	331,513	760,819
Dominica	...	...	...	...	...	...	...	...
French Guiana	91,973	-	...	-	-	328,048	-	-
Grenada	...	...	...	...	...	...	...	...
Guadeloupe	...	...	...	...	...	...	...	...
Jamaica	...	...	...	...	...	...	...	...
Panama	...	...	...	...	...	...	...	...
St. Lucia	...	...	...	...	...	...	...	...
Suriname	...	...	5,494	...	49,000	758,525	45,544	195
Trinidad & T.	...	...	...	...	...	...	...	...
<b>SUB TOTAL</b>	<b>1,108,427</b>	<b>100,000</b>	<b>918,439</b>	<b>1,847,392</b>	<b>49,000</b>	<b>1,847,392</b>	<b>377,057</b>	<b>761,014</b>
<b>TOTAL</b>	<b>172,300,156</b>	<b>13,158,084</b>	<b>102,562,350</b>	<b>54,038,376</b>	<b>74,779,712</b>	<b>39,538,505</b>	<b>76,937,582</b>	<b>8,819,129</b>
<b>Grand Total</b>		<b>185,458,240</b>		<b>156,600,726</b>		<b>114,318,217</b>		<b>85,756,711</b>
<b>Funds/Person in Malarious Areas (US\$/person)</b>		<b>\$0.64</b>		<b>\$0.68</b>		<b>\$0.80</b>		<b>\$0.65</b>

Note: Funds/person only from reported data

FIGURE 1

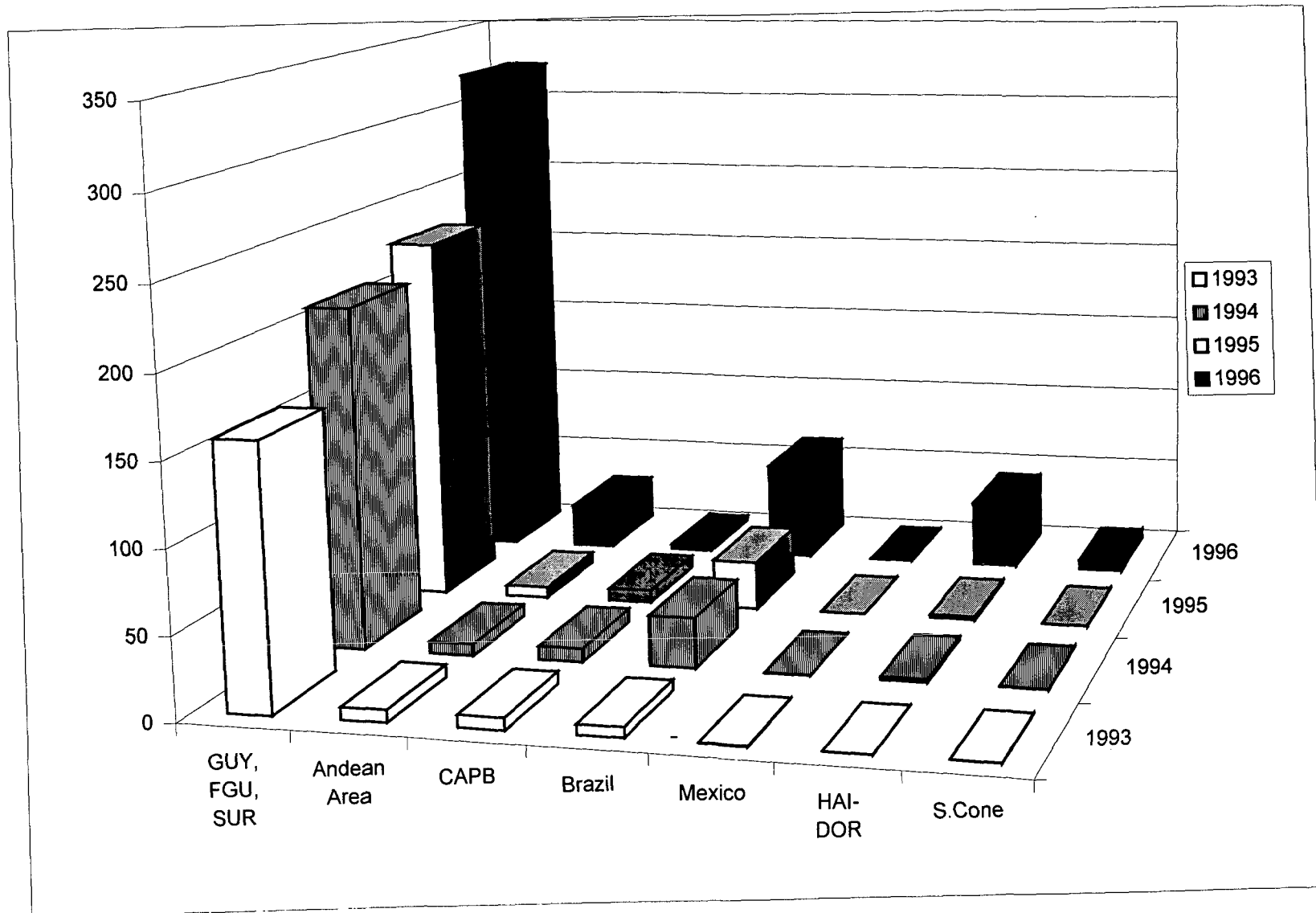
**POPULATION LIVING IN MALARIA ENDEMIC AREAS  
ACCORDING TO TRANSMISSION LEVEL, 1991-1996\***



\* Population in thousands of inhabitants

FIGURE 2

ANNUAL PARASITIC INDICES (API)\* BY GEOGRAPHIC SUBREGION, 1993-1996

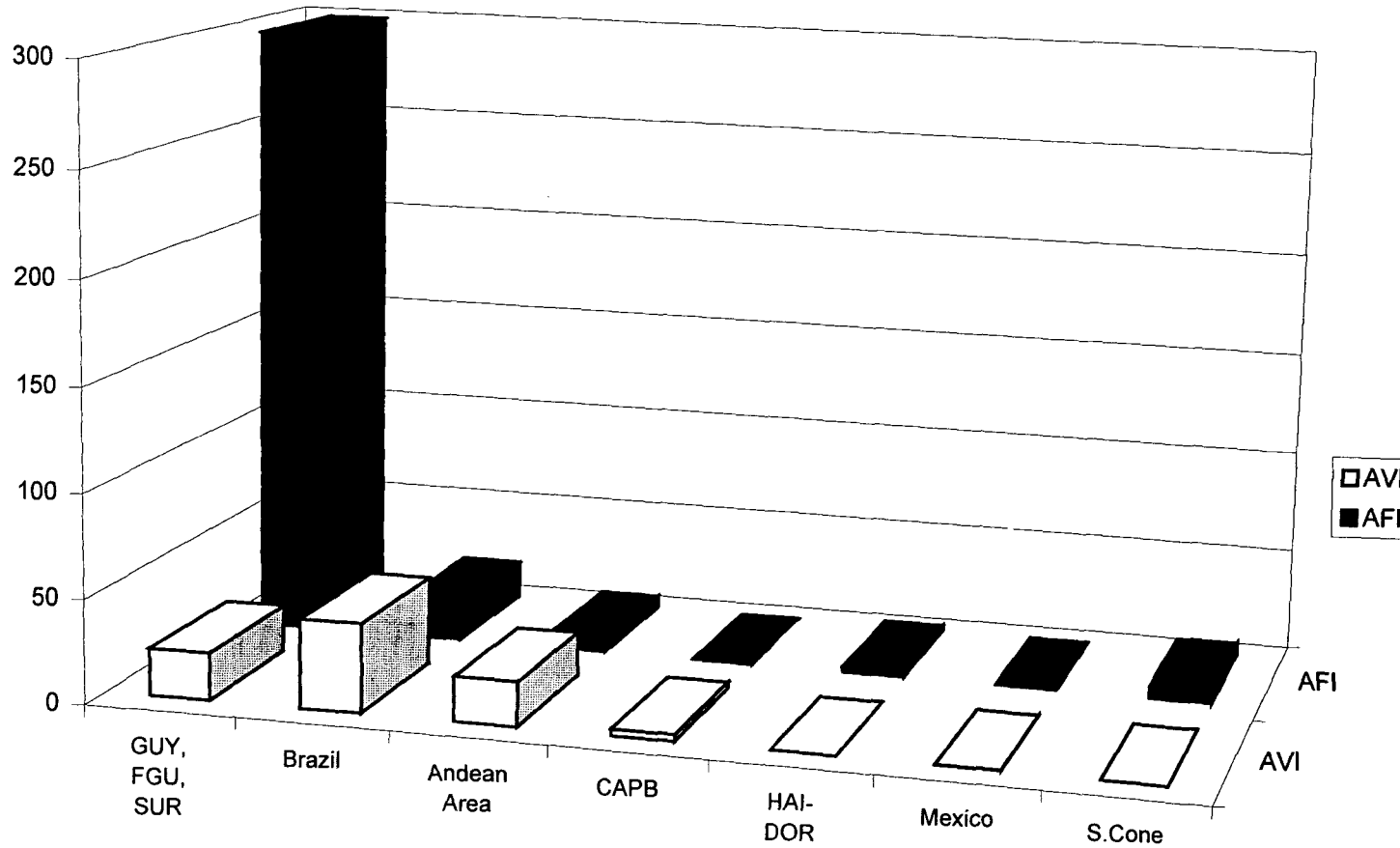


\* Based on population in malarious areas  
 CAPB = Central America, Panama, Belize  
 HAI-DOR = Haiti, Dominican Republic

$$\text{API} = \frac{\text{Number of confirmed cases}}{\text{Population of malarious areas}} \times 1000$$

FIGURE 3

MALARIA PARASITIC INDICES BY GEOGRAPHIC SUBREGION, 1996\*



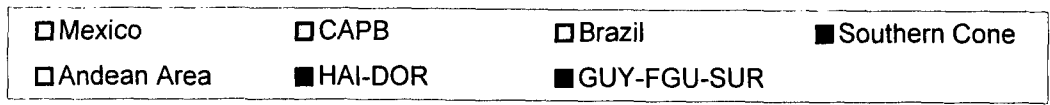
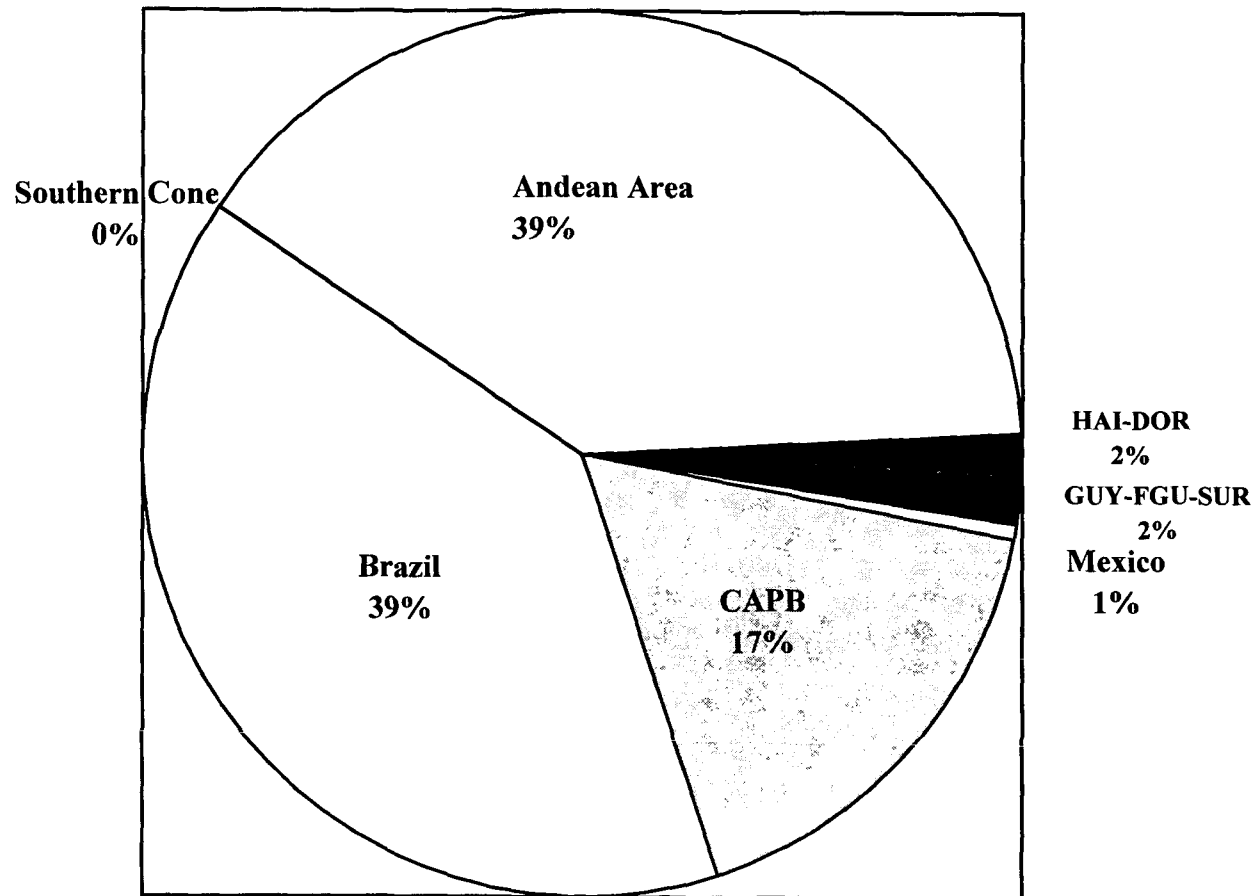
\* Based on population exposed in malarious areas  
 CAPB=Central America, Panama, Belize  
 AFI=Annual P.falciparum Index  
 AVI=Annual P.vivax Index

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

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

FIGURE 4

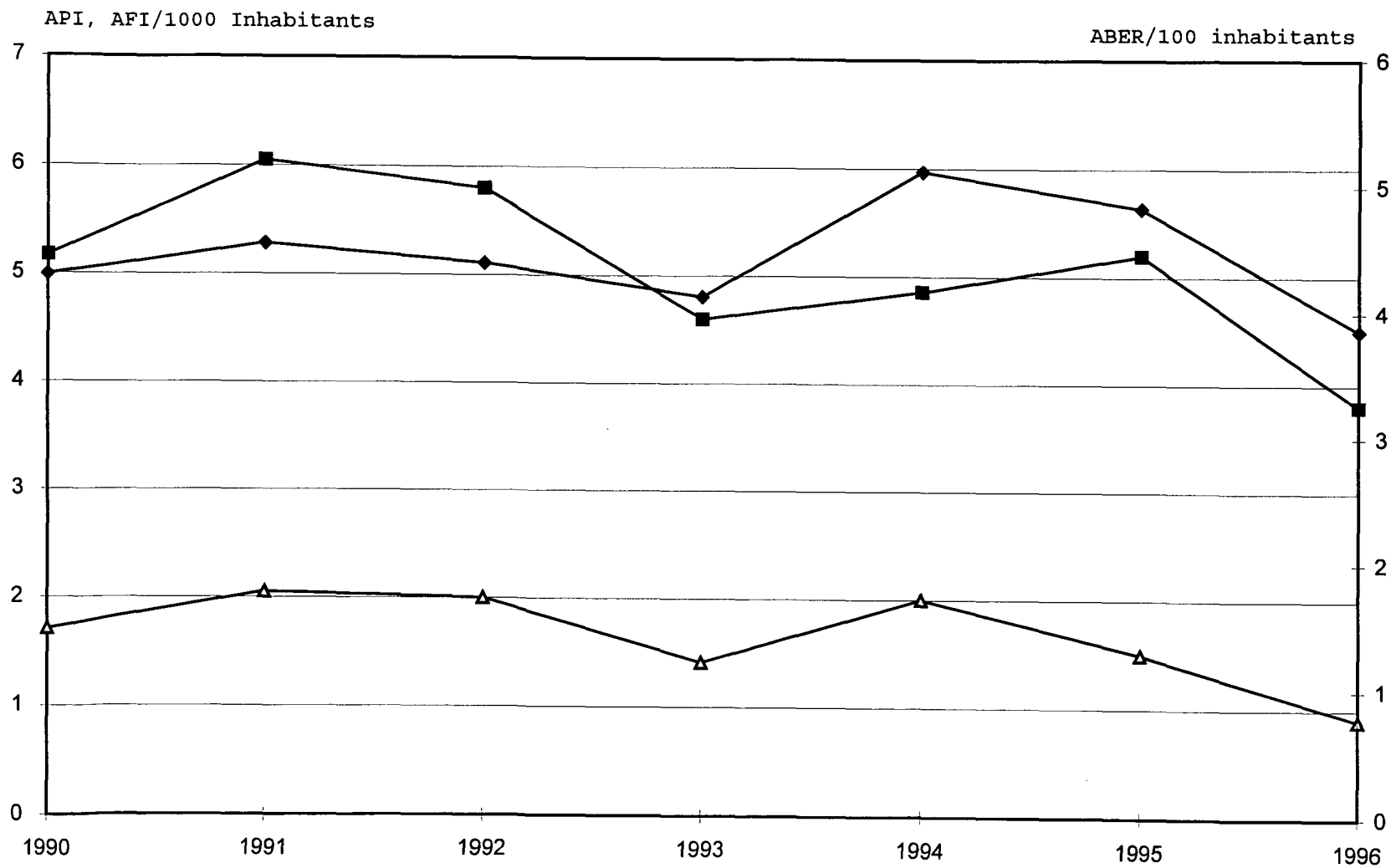
DISTRIBUTION OF MALARIA CASES IN THE AMERICAN REGION, 1996



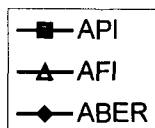
HAI-DOR=Haiti, Dominican Rep.  
CAPB=Central America, Panama, Belize

FIGURE 5

MALARIOMETRIC INDICES OF 21 COUNTRIES OF THE AMERICAS, 1990-1996\*



\*Based on population exposed in malarious areas.  
 ABER shown on right scale  
 ABER=Annual Blood Examination Rate



ABER =  $\frac{\text{Number of slides examined}}{\text{Total pop.in areas ecologically propitious for transmission}} \times 100$

FIGURE 6

**NATIONAL vs. MALARIOUS AREA API, 1970-1996**

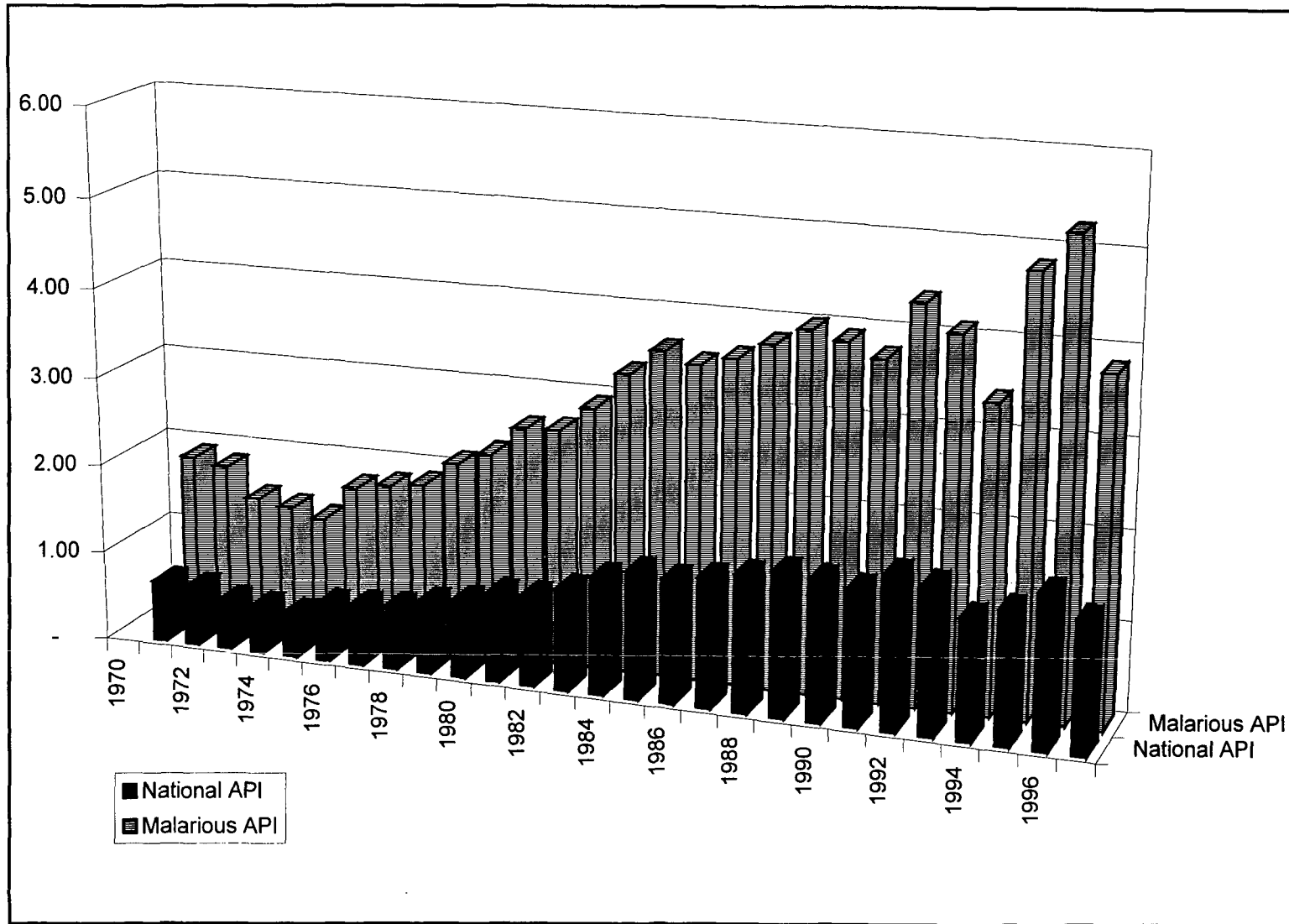




FIGURE 7

FUNDS/PERSON IN MALARIOUS AREAS AS COMPARED TO THE NATIONAL API AND MALARIOUS API FOR 1970-1996

