PAN AMERICAN HEALTH ORGANIZATION
WORLD HEALTH ORGANIZATION

126th SESSION OF THE EXECUTIVE COMMITTEE

Washington, D.C., 26-30 June 2000

Provisional Agenda Item 4.11

CE126/18 (Eng.)
9 May 2000
ORIGINAL: ENGLISH

MALARIA

Of the 39 Member States of PAHO, 21 have malaria transmission. In these countries, 88 million people live in areas of moderate and high risk malaria transmission, producing approximately l.5 million cases per year. Since 1992 these countries have adopted the Global Malaria Control Strategy, though with some limits to its complete implementation. The Roll Back Malaria initiative aims at the creation of a movement at the global, regional, national, and local levels to further strengthen the implementation of the Global Malaria Control Strategy.

Roll Back Malaria encourages the use of evidence-based strategies, community-level action, and effective joint action between governments and national and international development agencies. It recognizes that sustained success in rolling back malaria inevitably calls for development of the health sector, so that it can better address a range of priority health problems. It seeks to mainstream efforts to roll back malaria throughout the range of community-level health activities already being carried out by societies at risk of malaria. The initiative is expected to evolve into a social movement on a global scale and to engage local communities that are not yet rolling malaria back.

Malaria control should be an integral function of an effective health system supported by strong community involvement. Vector control is part of this effort, through the application of targeted, site-specific methods that are cost-effective. The utilization of a mix of methods aims to reduce the reliance on residual insecticide spraying over the next few years.

This document intends to bring the technical background on the need for the implementation of the new global initiative to Roll Back Malaria in the Americas to the Executive Committee for its discussion and recommendations.

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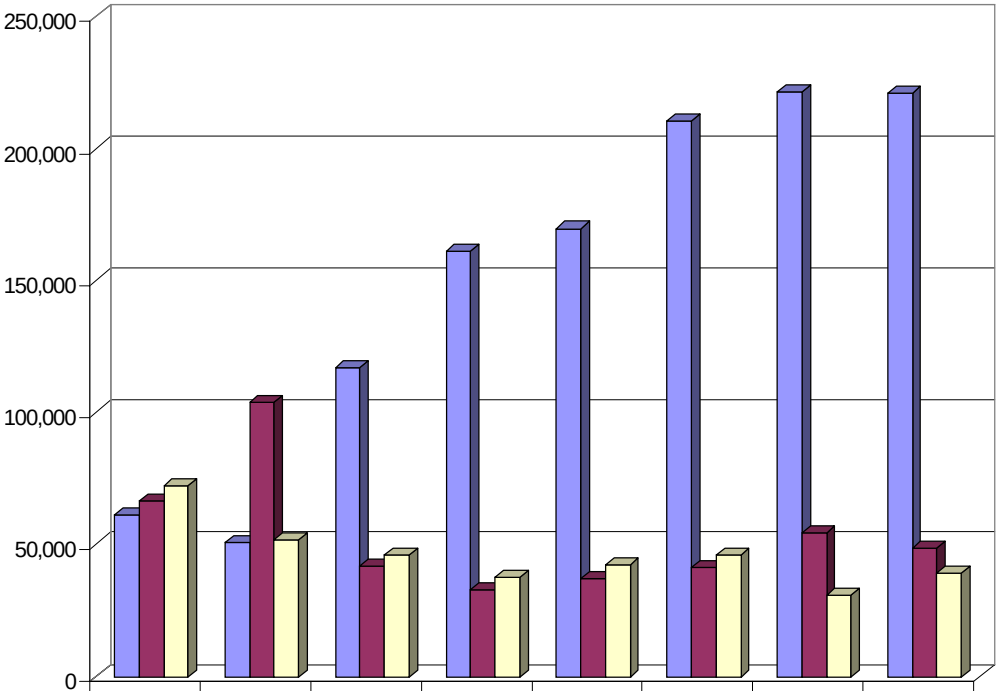
1. Current Malaria Situation

In 1998, there were 803 million people living in the Region of the Americas. Of 460 million people in the 21 countries with active malaria transmission, 219 million (47.5%) live in areas with some risk of transmission. However, of these, 131 million (59.8%) are exposed to low or extremely low risk of malaria transmission. The remaining 88 million people (19.0% of the total population of these 21 countries) live in areas with moderate and high risk of transmission (Figure 1).

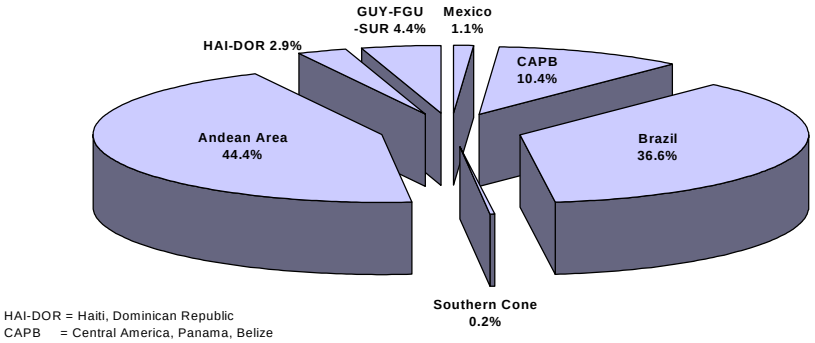
Figure 1: Population Living in Malaria-Endemic Areas According to Transmission Level, 1991-1998*



	1991	1992	1993	1994	1995	1996	1997	1998
Low	61,235	50,801	116,914	160,947	169,643	210,519	221,341	220,702
Mod.	66,504	103,885	41,631	32,967	36,881	41,332	54,358	48,537
High	72,381	51,974	46,225	37,409	42,454	46,227	30,822	39,084

The API (Annual Parasite Index) in the Region ranges from a low of 0.42/1,000 in Mexico to 310.2/1,000 in Suriname. An analysis by subregion indicates that Brazil reported the greatest absolute number of malaria cases (36.6%), followed by the countries of the Andean Subregion, which accounted for 44.4% of all cases (Figure 2).

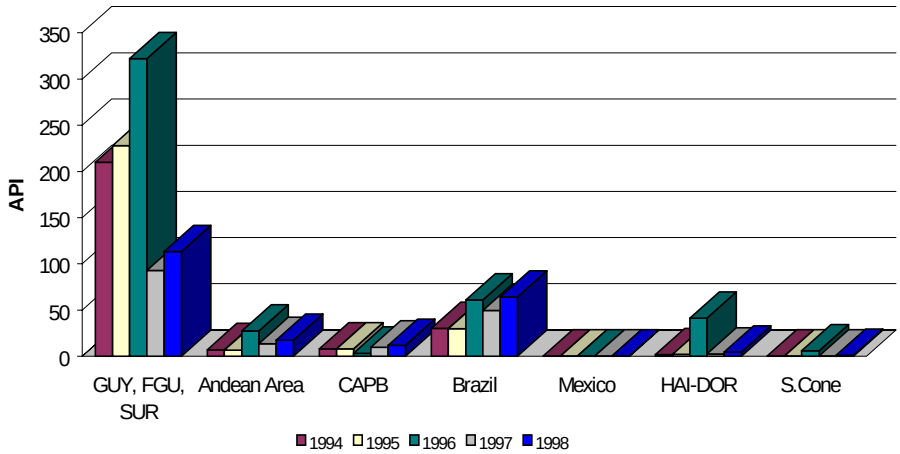
Figure 2: Distribution of Malaria Cases in the Americas Region, 1998



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
Note: preliminary information for Haiti

However, the greatest risk of transmission was registered in the subregion including areas of French Guiana, Guyana, and Suriname (API = 101.3/1,000), followed by parts of Brazil (API = 64.0/1,000), as shown on Figure 3.

Figure 3: Annual Parasitic Indices (API)* by Geographic Subregion, 1994-1998



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

API = Number of confirmed cases x 1000
Population at High and Medium Risk

The epidemiological distribution of malaria in the Americas has changed due to a decrease in the prevalence of *Plasmodium falciparum* malaria in the Brazilian Amazon. This decrease is tied to an improvement in case management by means of early diagnosis and immediate treatment, a decrease in uncontrolled mining activity, and less population movement as a result of the stabilization of agricultural colonization projects. The decrease in the Brazilian Amazon has been accompanied by an increase in the prevalence of *P. falciparum* in the forested areas of the Andean subregion, mainly in the Amazon basin. The Pacific coast of Peru, Ecuador, and Colombia has experienced a sizable increase in both the number and spread of malaria cases, especially *P. falciparum* malaria. The heavy rains of the El Niño phenomenon in 1997-1998, which disrupted basic health and social infrastructure hampering the capacity to respond, exacerbated this epidemic. This resulted in an increase of 84,740 (79%) *P. falciparum* cases for a total increase of 107,468 cases for the whole Region of the Americas.

The major operational improvement associated with the reduction in the *P. falciparum* death rate is the increase in coverage with second- and third-line treatments. Table 1 shows the remarkable availability of treatment that followed the El Niño phenomenon along the Andean Pacific coast, despite the inaccessibility of populations exposed to *P. falciparum* and epidemics. It displays the availability of treatment per diagnosed case, which ranges from 0.77 to 310.2 first-line treatments per case reported.

On the other hand, chloroquine resistance is highly prevalent in South America, although there is still some clinical response to chloroquine in the Andean countries. The number of reported treatment failures is increasing, having reached approximately 20% in some areas of the Peruvian Amazon. The right column of Table 2 presents the current anti-malarial drug regimens recommended by each endemic country. Sulfadoxine/ pyrimethamine resistance is also widespread and quinine and tetracycline are increasingly being used as first-line antimalarials in Colombia and the Guyanas. Peru has defined three different antimalarial drug regimens for its national drug policy, due to the various levels of *P. falciparum* resistance in the country. In the Brazilian Amazon, mefloquine has been introduced as first-line treatment of *P. falciparum* infections, following diagnosis with a dipstick test. Artemisinine derivatives are still reserved for severe and complicated malaria. Isolated chloroquine treatment failures of *Plasmodium vivax* infections have been reported recently but not confirmed by epidemiological studies.

2. Current Malaria Control Strategy Situation

The Region of the Americas has endorsed the Global Malaria Control Strategy (GMCS), which was adopted by the Ministerial Conference of 1992. The 21 countries with malaria (mentioned in Table 1) have been reorienting their control programs in keeping with the GMCS adopted in Amsterdam in 1992.

Table 1. Antimalarial Treatment Completed in 1998

Countries and Territories by Geographic Subregion	Treatments complete @ 1,500 mg of 4-amino quinolines	Number of reported cases	Number of first-line treatments available per case reported	Number of *P. falciparum* treatments completed	Number of *P. falciparum* and mixed cases reported	Number of second-line treatments available per case
Mexico	664,705	14,451	46.00	---	21	---
Belize	15,498	2,614	5.93	---	223	---
Costa Rica	49,320	5,148	9.58	---	15	---
El Salvador	366,671	1,182	310.21	---	11	---
Guatemala	130,772	47,689	2.74	---	2,341	---
Honduras	438,102	42,979	10.19	---	1,067	---
Nicaragua	1,929,800	33,903	56.92	---	3,187	---
Panama	19,600	1,039	18.86	700	125	5.60
Dominican Republic	137,359	2,006	68.47	5	1,999	0.00
Haiti ^	95,100	34,449	2.76	…	34,449	…
French Guiana	…	…	…	…	2,658	…
Guyana	31,667	41,200	0.77	35,143	22,799	1.54
Suriname	13,930	12,412	1.12	24,348	10,193	2.39
Brazil	684,000	471,892	1.45	152,967	101,534	1.51
Bolivia	77,551	73,913	1.05	13,200	11,414	1.16
Colombia	289,200	185,455	1.56	257,853	99,085	2.60
Ecuador	150,000	43,696	3.43	24	21,448	0.00
Peru	896,647	247,004	3.63	111,414	84,289	1.32
Venezuela	131,217	21,862	6.00	7,837	5,248	1.49
Argentina	802	339	2.37	---	0	---
Paraguay	…	2,091	…	…	3	…

… No information available
^ Haiti - Partial information only

Table 2. *Plasmodium falciparum* in the Americas, 1994–1998

Countries	Years	Proportion at high risk as a proportion of the total population	*P.falciparum* Cases 1994/1998 (% of total number of cases)	Deaths from Malaria 1994/1998		*P. falciparum* Drug Policy (in order of therapeutic lines)
Bolivia	1994 1998	0.5% (34K/7.0M) 1.9% (147K/7.9M)	4,700 (13.8%) 11,414 (15.5%)	29 27*		1) Quinine 7 days + Tetracycline 7; 2) Mefloquine.
Brazil	1994 1998	2.3% (3.7M/159M) 1.5% (2.5M/165M)	172,000 (30.5%) 101,721 (22.6%)	413 110*		1) Quinine 7days + Tetracycline 7; 2) Mefloquine; 3) Artemisinine.
Colombia	1994 1998	8.4% (2.9M/34.5M) 5.3% (2.0M/37.7M)	31,000 (24.4%) 96,201 (54.2%)	81 33*		1) Amodiaquine + Primaquine; 2) Sulfa + Pyrimethamine; 3) Quinine 7 + Tetracycline 7 days.
Ecuador	1994 1998	7.6% (853K/11.2M) 10.6% (1.3M/12.2M)	10,000 (33.3%) 20,359 (51.4%)	67 16*		1) Chloroquine + Primaquine; 2) Sulfa + Pyrimethamine.
French Guiana	1995 1998	6.2% (9.1K/147K) 7.0% (11.7K/166K)	4,100 (97.6%) 2,658 (76.8%)	– 2*		1) Quinine 3 days + Doxycyclin; 2) Halofantrine + Doxycyclin.
Guyana	1994 1998	6.5% (53K/825K) 52.4% (449K/856K)	22,000 (56.4%) 22,799 (65.2%)	150 34*		1) Quinine 3 days + Clindamycin; 2) Sulfa + Pyrimethamine.
Peru	1994 1998	9.1% (2.1M/23M) 12.9% (3.2M/24.8M)	21,000 (17.2%) 84,002 (34.0%)	39 52*		1) Quinine 3 days + Tetracycline 7; 2) Sulfa + Pyrimethamine
Suriname	1994 1998	7.6% (32K/418K) 10.2% (45K/442K)	4,300 (91.5%) 10,193 (81.7%)	20 7*		1) Sulfa + Pyrimethamine; 3) Quinine 3 days + Clindamycin
Venezuela	1994 1998	0.7% (143K/21M) 2.6% (616K/23.2M)	3,300 (24.1%) 4,980 (22.8%)	17 26*		1) Chloroquine + Primaquine 2) Sulfa + Pyrimethamine; 3) Quinine 3 days + Tetracycline 7
						CRUDE MORTALITY RATE
TOTAL 1994		**3.4% (9.8M/289.9)**	**268,000 (24.0%)**	**816**		**8.3/100,000 exposed population**
TOTAL 1998		**3.7% (10.2M/272.3M)**	**354,327 (27.3%)**	**307***		**3.0/100,000 exposed population**

K = 1,000 M = 1,000,000 * Preliminary Data

The major thrust of the GMCS was to shift the traditional emphasis away from vector control, toward an adequate management of human disease. This move required that the traditional disease eradication objective be integrated into a multiple disease approach with the consequent expansion of basic health service coverage to secure early diagnosis and immediate treatment of the population at risk of acquiring malaria.

The four basic elements for GMCS implementation are to: (1) provide early diagnosis and immediate treatment; (2) plan and implement preventive and sustainable measures, including vector-control; (3) detect, contain, and prevent epidemics promptly; and (4) strengthen the capability of local health services to periodically evaluate the epidemiological situation in the Region and enable control programs to reduce the social and economic burden of malaria on the population. Of these four technical elements, in some countries only the first one has been implemented fully.

Implementation of this first element of the GMCS in the Region has resulted in a significant drop in the malaria-specific mortality rate. In 1994, the first year with comparable records, the *P. falciparum* crude mortality rate was 8.3 per 100,000 exposed population. By 1998, the mortality rate dropped to 3.0 per 100,000 exposed population, a decrease of 62% in the total number of registered deaths.

The implementation of the GMCS is ongoing, with a high degree of variability among countries of the Region. Some of countries have greatly decreased their malaria mortality rates over the last four years and have shown that the emphasis on human disease management is a more cost-effective investment than the traditional vector control approach, particularly where the malaria parasite *P. falciparum* is more prevalent. However, in areas and countries where *P. vivax* parasite is the prevalent species, as well as in areas where *P. falciparum* transmission has been brought under control, *P. vivax* prevalence and incidence continues to increase or is little affected. This effect is caused by several factors, which vary from the relapsing nature of *P. vivax* to the extrinsic conditions favoring transmission caused by the “ruralization” of the periphery of larger cities.

The improvements in the availability of second- and third-line therapy in Bolivia, Brazil, Colombia, Guyana, Peru, and Venezuela compared with previous years may be the result of broader coverage of the GMCS, which calls for an emphasis on optimal clinical management of the disease. Table 3 shows the results of the microscopic examination of 6.5 million suspected cases. The local health services, which includes the community health worker network (volunteer collaborators), had a high diagnostic efficiency, confirming 11.2% of suspected cases, whereas active surveillance continues to show a low diagnostic efficiency and high operational cost, confirming 3.4% of "recent fever" cases. Efforts continue to be made to improve microscopic diagnosis at the referral level of the general

health services, through training of laboratory technicians in malaria diagnosis and redeployment of trained microscopists. In countries where *P. falciparum* resistance is prevalent, the use of rapid diagnostic tests is becoming increasingly common as a measure to assure adequate treatment in areas that are hard to reach. Nevertheless, routine active case detection continues to absorb about 26% of the malaria microscopic resources of the countries, in spite of its recognized low efficiency.

Table 3. Comparison Between Passive and Active Case Detection, 1998

Countries and Territories by Geographic Subregion	PASSIVE DETECTION						ACTIVE DETECTION		
	General health services & hospitals			Volunteer Collaborators			Epidemiological investigations and follow-ups		
	Examined	Blood slides Positive	SPR	Examined	Blood slides Positive	SPR	Examined	Blood slides Positive	SPR
Mexico	591,404	4,381	0.74	267,385	6,066	2.27	900,437	3,991	0.44
Belize	...	628	...	21,600	1,630	7.55	6,445	1	0.02
Costa Rica	7,561	1,633	21.60	7,023	659	9.38	89,392	2,856	3.19
El Salvador	68,121	341	0.50	86,906	805	0.93	6,873	36	0.52
Guatemala	33,693	6,838	20.30	160,320	31,929	19.92	3,720	782	21.02
Honduras	---	---	---	230,222	42,708	18.55	6,000	271	4.52
Nicaragua	270,287	13,022	4.82	170,025	12,647	7.44	13,191	5	0.04
Panama	33,042	207	0.63	318	114	35.85	153,695	718	0.47
Dominican Rep.	48,978	571	1.17	21,364	212	0.99	193,751	282	0.15
Haiti^	18,797	4,899	26.06	...	...	...	...	...	...
French Guiana	...	...	...	...	...	...	...	...	...
Guyana	192,423	30,467	15.83	---	---	---	110,925	10,733	9.68
Suriname	72,671	12,360	17.01	---	---	---	810	52	6.42
Brazil	...	...	...	...	...	...	...	...	...
Bolivia	54,455	28,801	52.89	89,857	35,251	39.23	64,052	31,711	49.51
Colombia	...	...	...	...	...	...	...	...	...
Ecuador	217,170	34,885	16.06	39,528	4,074	10.31	44,054	4,737	10.75
Peru	1,724,473	238,087	13.81	218,057	15,103	6.93	...	...	...
Venezuela	180,690	17,507	9.69	---	---	---	153,096	3,539	2.31
Argentina	1,731	217	12.54	118	18	15.25	7,492	104	1.39
Paraguay	2,433	332	13.65	24,976	1,437	5.75	15,535	322	2.07
T O T A L	3,517,929	395,176	11.23	1,337,699	152,653	11.41	1,769,468	60,140	3.40

--- Not applicable
... No Information available
^ Haiti: Partial information only
SPR = Slide Positivity Rate

Considerable conceptual and operational changes are required for successful implementation of the GMCS to ensure that measurable impact is achieved. While these changes take place as an integral part of the health sector reform process in the Region, implementation of the GMCS has provided a major opportunity to strengthen local health services capacity and to expand coverage.

3. Major Problems and Constraints

There are three major barriers to the implementation of a successful malaria control strategy. The first is the institutional resistance to change resulting from the deep-rooted idea that malaria control is achieved through insecticide spraying, which can only be accomplished by a major operational institution.

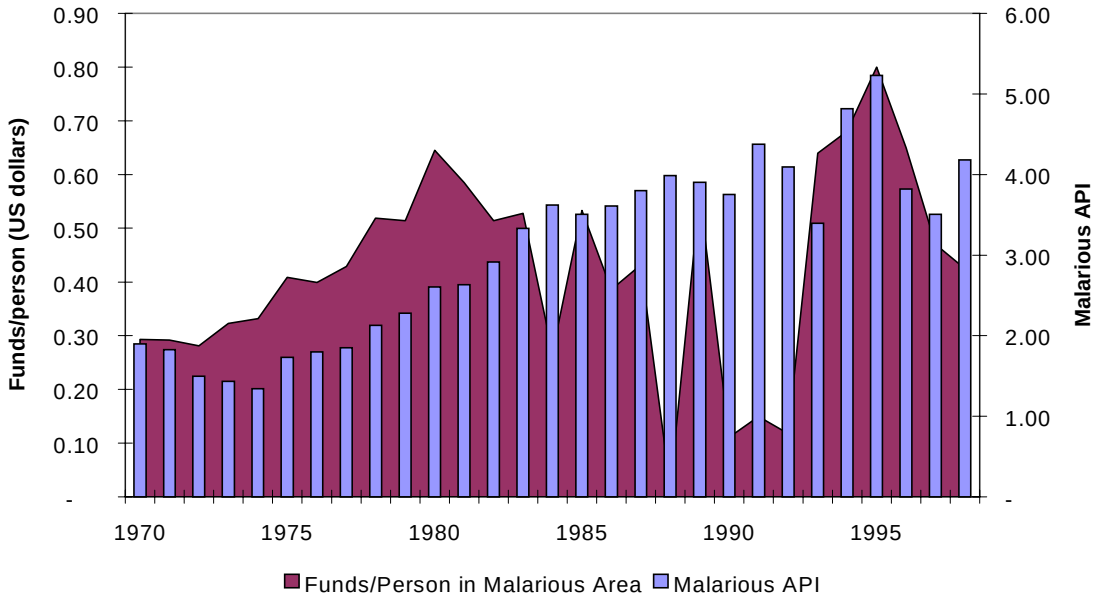
The second barrier is the lack of trained human resources capable of ensuring the implementation of effective vector control/vector interception measures to follow up and complement the successful prevention of mortality and reduction of morbidity in a decentralized health sector.

The third major constraint is the drastic reduction in central budgets and the effective application of the available resources, concomitant with the major administrative process of decentralization of health services.

Figure 4 shows that the funds utilized by the control programs have varied greatly over the last five years. However, expenditure per person in malarious areas continues to decrease. In 1998, expenditure reached as low as US$ 0.40 per person for the 16 countries that reported their budget for malaria control to PAHO. This represents a 50% decrease compared to 1995 ($0.80), a 38% decrease compared to 1996 ($0.65), and a 2.4% decrease over funds available last year.

On the socioeconomic side, GMCS implementation in the Region has shown an increase in the effectiveness of control measures in decreasing *P. falciparum* transmission and reducing the cost of its execution. An economic evaluation of GMCS implementation in the Region took place in Brazil and showed that the cost of traditional vector-based malaria control programs is more than double that of the GMCS for the same effectiveness achieved. The study assessed the cost of malaria control per Disability Adjusted Life Year (DALY) over an eight-year period. In the initial four years, malaria control was implemented under the traditional comprehensive vector control. These operations used 78.7% of the resources available for the period ($352,794,720), with only 21.3% utilized in diagnosis and treatment operations. The second four-year period used $160,588,742, of which 47.4% was used for epidemiologically targeted vector control operations and 52.6% was used to expand the coverage of diagnosis and treatment operations.

Figure 4: Funds/Person in Malarious Areas vs. Malarious API - 1970-1998



Both periods saved Brazil a similar total number of DALYs: 4,041,439 DALYs in the first four-year period and 4,730,948 DALYs in the second period. However, the cost per DALY saved was $87.29 in the first period, while each DALY saved in the second period cost the country $33.94.

In an effort to capitalize on these early results and reinforce the countries' capability to achieve greater measurable impact based on the principles of the GMCS, PAHO has joined the WHO global initiative "Roll Back Malaria."

4. The Roll Back Malaria Initiative

The Roll Back Malaria (RBM) Initiative is a social movement whose objective is to significantly reduce the global burden of malaria through the promotion of interventions adapted to local needs and through the reinforcement of the health sector. The initiative brings the world's attention to the regions affected by malaria by promoting the mobilization of resources and intensifying the application of existing tools for malaria transmission control.

The Global Partnership to Roll Back Malaria is committed to enabling people to halve the burden they experience as a result of malaria by the year 2010 through these six elements:

- evidence-based decisions;

- early diagnosis and prompt treatment;

- well coordinated actions;

- multiple prevention;

- dynamic global movement;

- focused operational research.

RBM is a pathfinder for PAHO/WHO in developing initiatives directed at other health and development problems. As a coordinated approach to sustainable control of infectious diseases, RBM will develop and sustain the necessary inter-sector collaborations between the health and other sectors to meet the needs of rolling back malaria.

RBM encourages evidence-based strategies, community-level action and effective joint action between governments and development agencies. It recognizes that sustained success in rolling back malaria inevitably calls for the development of health sectors so that they can address a range of priority health problems. It seeks to mainstream efforts to roll back malaria throughout the range of community-level health activities being undertaken by societies at risk of malaria. RBM is expected to mobilize households and communities and other partners for appropriate action.

PAHO/WHO will provide strategic support to a functioning partnership with a range of organizations at the global, regional, and country levels, that results in developing a sustained capacity to address malaria and other health priorities. At the country level, RBM will support the creation of coalitions for action and assist countries in building and supporting community-level partnerships that engage multiple partners and all providers of health care for malaria. Technical cooperation support is at the core of the RBM approach.

Now that progress has been achieved and fewer people are dying from malaria in the Americas, there is an important and urgent political demand for transmission control. It is necessary to keep in mind that morbidity and mortality rates are heavily influenced by cases of malaria and other communicable diseases originating in impoverished areas and particularly in areas inhabited by indigenous populations.

The methods proposed by PAHO/WHO are: (1) an integrated vector control called Selective Control of Malaria Vectors (SCMV) and (2) the Plan for Simultaneous and Intensive Activities (PAIS). These are new and simplified techniques: the integrated vector control for local-level workers and the Mexican PAIS place the emphasis on the simultaneity of actions to reduce human and vector reservoirs.

PAIS can be a good approach and a cost-effective solution if it is developed and applied together with early diagnosis and immediate treatment. The SCMV is based on the need to use selective tools, chosen for each specific situation. In other words, these tools must be developed according to each region's specificity, and they should be effective, low cost, and affordable, to allow a sustainable decrease of vector transmission.

In addition to the transfer of adequate financial and material resources and trained personnel from the malaria programs, a major challenge for health managers is to have regular and timely information at the local level to facilitate their priority-setting and decision-making. To do so, local health services will have to make more use of the methods available to observe and monitor the health condition of the population and the environment.

5. Conclusions

This report shows that the present situation of GMCS in the Americas needs an intensified effort to overcome the detected barriers to its implementation.

The GMCS implementation is tremendously complex and calls for:

- changing from the traditional approach characteristic of vertical organizations and programs;

- organizing health services in areas of difficult access;

- preparing human resources for the effective implementation and sustainability of the adopted measures;

- providing adequate financial and material resources in quantity and on time.

The challenge is even greater in a decentralized health system context. Only joint commitment and collaboration of all interested partners can achieve this goal. The Roll Back Malaria initiative provides a mechanism to do this and it is essential for the Americas.