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REPORT ON *Aedes aegypti* CONTROL

The XXXIX Directing Council of PAHO (1996) adopted Resolution CD39.R11, which urged the Member States to draw up national plans to expand and intensify efforts to combat *Aedes aegypti* with a view to its eventual eradication. It also established a task force made up of professionals in the field to develop the Hemispheric Plan.

In compliance with this Resolution, a task force consisting of experts from several countries met in Caracas, Venezuela, from 22 to 24 April 1997 to prepare the Hemispheric Plan. The plan to combat *A. aegypti* was based on the national plans that the countries had already prepared in response to the resolution of the Directing Council in 1996 (Annex A). The total annual cost of implementing the plan is US\$ 1,681,775,000, 85% of which corresponds to direct operations to combat the vector, 4% to epidemiological surveillance, and 11% to the remaining components of the plan.

This progress report was submitted to the 120th Session of the Executive Committee in June 1997 for its information and observations, and is now being submitted for the same purpose to the Directing Council. The Committee also adopted Resolution CE120.R19 (Annex B) and is submitting it to the Directing Council for consideration and approval.

CONTENTS

	<i>Page</i>
<i>1. Introduction</i>	<i>3</i>
<i>2. Historical Background</i>	<i>3</i>
<i>3. Current Situation</i>	<i>4</i>
3.1 Dengue	<i>4</i>
3.2 Dengue Hemorrhagic Fever	<i>4</i>
3.3 Yellow Fever	<i>5</i>
<i>4. Hemispheric Plan to Expand and Intensify Efforts to Combat Aedes aegypti</i>	<i>5</i>
<i>5. Total Cost of Implementing the Hemispheric Plan</i>	<i>6</i>
<i>6. Discussions during the Executive Committee Session</i>	<i>6</i>
<i>Annex A. HEMISPHERIC PLAN TO EXPAND AND INTENSIFY EFFORTS TO COMBAT AEDES AEGYPTI: Task Force Report</i>	<i>8</i>
<i>Annex B. CE120.R19 Dengue, Dengue Hemorrhagic Fever, and Yellow Fever</i>	<i>42</i>

1. Introduction

Dengue and dengue hemorrhagic fever are becoming an increasingly serious problem in the countries of the Region of the Americas, which have experienced sweeping and explosive epidemics in recent years. Even more alarming has been the emergence of dengue hemorrhagic fever, which appeared with the Cuban epidemic in 1981 and gradually spread to other countries in the Region. Since then more than 40,000 cases of dengue hemorrhagic fever have been reported in 25 countries.

Given the continuing deterioration in the situation, the XXXVIII Directing Council (1995) adopted Resolution CD38.R12 establishing a task force to study the feasibility, timeliness, and appropriateness of preparing a hemispheric plan for the eradication of *Aedes aegypti* in the countries of the Region.

Having seen the document prepared by this task force, the XXXIX Directing Council (1996) adopted Resolution CD39.R11, urging the Member States to draw up national plans to expand and intensify efforts to combat *A. aegypti* with a view to its future eradication and establishing a task force made up of professionals in the field to develop the Hemispheric Plan.

In compliance with this Resolution, a task force of experts from several countries met in Caracas, Venezuela, from 22 to 24 April 1997 to draw up the Hemispheric Plan.

2. Historical Background

The eradication of *A. aegypti* in the Americas has been the subject of debate since the 1920s. The I Directing Council of the Pan American Health Organization, held in Buenos Aires in October 1947, supported an eradication proposal and resolved to entrust PAHO with finding a solution to the hemispheric problem and implementing the program. Thus, hemispheric eradication became official policy.

The hemispheric campaign was organized by PAHO, its success reflected in the fact that, by 1962, eradication had been achieved in more than 20 countries.

Unfortunately, after 1962 only three more countries or territories eliminated the vector. More serious, however, was the fact that reinfestation began in the 1960s in the countries where eradication had been achieved. Not every country in the Hemisphere had been willing to eradicate *A. aegypti*. Those that were still infested became sources of reinfestation for those that had eradicated the vector.

The campaigns to combat *A. aegypti* in the Americas also eradicated urban yellow fever several decades ago. However, the ever-widening spread of this vector in the Americas since the 1970s has created the specter of the re-emergence of urban yellow fever in the Region.

Over time, the political importance of programs to combat *A. aegypti* waned in the majority of the countries that had achieved eradication, and surveillance of reinfestation gradually declined. After the remarkable successes of the 1950s and 1960s, the program ground to a halt, and now all the countries of the Hemisphere are infested, with the exception of Bermuda, Canada, and Chile. It is significant that Uruguay was reinfested this year after being free of *A. aegypti* for 39 years.

In 1985 the XXXI Directing Council adopted a resolution on the control or eradication of *A. aegypti* that was interpreted as the end of the policy to eradicate the vector in the Region.

3. Current Situation

3.1 Dengue

Dengue and dengue hemorrhagic fever are becoming an increasingly serious problem in the countries of the Region of the Americas, which have experienced sweeping and explosive epidemics in recent years. Even more alarming has been the emergence of dengue hemorrhagic fever, which appeared with the Cuban epidemic in 1981 and gradually spread to other countries in the Region. Since then more than 40,000 cases of dengue hemorrhagic fever have been reported in 25 countries.

In 1995 major dengue epidemics ravaged Central America, the Caribbean, and South America (particularly Brazil), with a total of 284,483 cases reported by 41 countries—the highest incidence of dengue since 1981. In 1996, 250,707 cases, some 80% of them in Brazil, were reported.

3.2 Dengue Hemorrhagic Fever

The greatest cause for alarm is the advance of the most serious form of the disease, dengue hemorrhagic fever. Cases of dengue hemorrhagic fever have been reported in the Americas every year from 1981 to 1996, with the exception of 1983.

During this period 25 countries reported a total of 41,669 cases of dengue hemorrhagic fever, with 576 deaths. The marked increase in the number of cases in the present decade compared to the past decade should be noted—28,434 versus 13,235.

3.3 Yellow Fever

Although there has been no urban transmission of the yellow fever virus in the Americas for over 40 years, the high density of the *A. aegypti* presence in urban centers located in enzootic areas for this disease poses the potential risk of its urbanization. The outbreak in Peru in 1995, with 492 cases and 192 deaths reported, is clear evidence of that risk.

4. Hemispheric Plan to Expand and Intensify Efforts to Combat *Aedes aegypti*

The Hemispheric Plan that was based on the national plans already drawn up by the countries in compliance with the resolution of the Directing Council in 1996 is attached as Annex A.

The Task Force took very much into account the analysis of the factors that had led to the failure of the campaigns to combat the vector and resulted in the reinfestation of the countries where eradication had been achieved, and it emphasized the countries' current situation in order to come up with an appropriate eradication strategy. The purpose of the resulting Hemispheric Plan is to eliminate the circulation of the dengue viruses in the Americas by combating *A. aegypti* in all countries currently infested and increasing surveillance in the countries that remain free of the vector.

The Task Force noted the differences among the countries with respect to the status of their current programs and the activities to combat *A. aegypti* included in their national plans. In most of the countries, the strategies proposed and the resources allocated are inadequate for undertaking a program aimed at combating and eradicating the vector. In the Hemispheric Plan, the importance of resources in selecting a strategy to combat *A. aegypti* is evident.

These differences among the countries led the task force to recommend the application of a five-stage regional strategy to combat the vector, moving gradually from initial activities geared toward intensifying and expanding the struggle against *A. aegypti* to the eradication phase and, finally, to surveillance to prevent reinfestation.

The Task Force reaffirmed that eventual eradication of the vector will require efforts to solve problems and eliminate the adverse conditions existing in most of the countries, where strengthening the political will and obtaining the resources to support the implementation of this strategy should be given the highest priority if this undertaking is to meet with success.

5. Total Cost of Implementing the Hemispheric Plan

The table below shows the total cost of implementing the Hemispheric Plan: US\$ 1,681,775,000 a year. Direct operations to combat the vector represent 85% of the total cost; epidemiological surveillance, 4%; social participation and communication, 10%; and sanitation, 1%.

The definition of total annual costs to implement the Hemispheric Plan led participants to discuss the possible source of these funds. On the one hand, the financial difficulties confronting the countries were recognized; on the other, the international situation suggests that the potential for obtaining external funds for implementing the Plan is remote. Accordingly, implementation of this Plan will be subject to the provision of sufficient funds by the countries.

6. Discussions during the Executive Committee Session

The members of the Executive Committee commented on the importance of the subject, given the spread of the different dengue serotypes and the increasing risk of dengue hemorrhagic fever. However, they pointed out that the costs of an eradication program make its implementation difficult in the Region and underscored the need to intensify control activities and promote community participation in carrying them out.

The Director of PAHO mentioned that in 1995 the Organization had calculated the costs of an eradication program in the Central American Subregion at \$140 million over three years and that, while the amount was more modest than the figure currently being considered, it was impossible to mobilize resources of this magnitude. He also indicated that, at any rate, if the countries so desired, PAHO would increase efforts to mobilize external resources.

Annual Cost of Executing the Hemispheric Plan

Component	Cost (US\$)	Percentage
Direct operations	1,423,603,000	85.0
Epidemiological surveillance	72,495,000	4.0
Social participation and communication	168,177,000	10.0
Sanitation	17,500,000	1.0
Total	1,681,775,000	100.0

Annexes

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**HEMISPHERIC PLAN
TO EXPAND AND INTENSIFY EFFORTS
TO COMBAT *Aedes Aegypti***

TASK FORCE REPORT

**Caracas, Venezuela
April 1997**

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CONTENTS

	<i>Page</i>
Executive Summary	3
1. Introduction	5
1.1 Epidemiological Situation of Dengue, Dengue Hemorrhagic Fever, and Yellow Fever in the Americas	6
1.2 Current Status of Programs for the Control and Eradication of <i>Aedes aegypti</i>	8
2. Objectives	9
3. Goal	9
4. Orientations of Programs to Combat <i>Aedes aegypti</i>	9
4.1 Principles and Guidelines	9
4.2 Self-evaluation of the Current Status of the Countries: Operational and Technical Classification of Programs	10
4.3 Strategies to Combat <i>Aedes aegypti</i>	10
5. Components of the Plan	10
5.1 Elimination of Breeding Sites for <i>Aedes aegypti</i>	10
5.2 Emergency Control	15
5.3 Entomological Surveillance	16
5.4 Epidemiological Surveillance	17
5.5 Training	19
5.6 Research	19
5.7 Structure and Management	19
6. Costs of the Hemispheric Plan	22
7. Sequence of Activities in National Plans	25
8. Monitoring and Evaluation of the Plan	27
9. Role of PAHO	27
Bibliography	28
Annexes	

Dengue and dengue hemorrhagic fever are becoming an increasingly serious problem in the countries of the Americas, which have experienced sweeping and explosive epidemics in recent years. Even more alarming has been the emergence of dengue hemorrhagic fever, which appeared with the Cuban epidemic in 1981 and gradually spread to other countries of the Region. Since then, more than 40,000 cases of dengue hemorrhagic fever have been reported in 25 countries.

Although there has been no urban transmission of the yellow fever virus in the Americas for over 40 years, the high density of the *Aedes aegypti* presence in urban centers located in enzootic areas for this disease poses the potential risk of its urbanization. The outbreak in Peru in 1995, with 492 cases and 192 deaths reported, is evidence of that risk.

Campaigns to eradicate *A. aegypti*, based on the 1947 Resolution of the Pan American Health Organization (PAHO), met with great success in the 1950s and 1960s. By 1972, eradication of the vector had been achieved in 21 of the countries of the Region. However, by the 1970s, lack of support and, in some cases, the abandonment of the programs led to the reinfestation of the countries and a reversal of the efforts made in previous years.

In 1985, PAHO adopted a resolution recommending that the countries implement a strategy to control *A. aegypti*, but the dengue and dengue hemorrhagic fever situation continued to worsen in subsequent years.

Given continuing deterioration in the situation, the XXXVIII Directing Council (1995) adopted a resolution establishing a task force to study the feasibility, timeliness, and appropriateness of preparing a hemispheric plan for eradication of *A. aegypti* in the countries of the Region.

Having seen the document prepared by this task force, the XXXIX Directing Council (1996) adopted Resolution CD39.R11 urging the Member States to draw up national plans to expand and intensify efforts to combat *A. aegypti*, with a view to its future eradication, and establishing a task force made up of professionals in the field to develop the Hemispheric Plan.

In compliance with this resolution, a task force of experts from several countries met in Caracas, Venezuela, from 22 to 24 April 1997 to draw up the Hemispheric Plan. The Plan to combat *A. aegypti*, presented here, was based on the national plans that the countries had already prepared in response to the resolution of the Directing Council in 1996. The task force also took into account the analysis of those factors that had made for success during the initial eradication campaigns in the Region, as well as those leading to failure, with the reinfestation of countries that had achieved eradication.

The task force pointed out the differences between control and eradication programs because they require different strategies, methodologies, and targets. Control involves the efficient use of limited resources to combat the vector in areas where the risk is greater for epidemics of dengue or yellow fever. Eradication involves universal coverage of activities to combat the vector in order to achieve its total elimination and subsequent surveillance to prevent reinfestation.

The objective of the Hemispheric Plan developed is to increase activities to combat *A. aegypti* to achieve infestation levels of near zero with a view to eradicating the vector and eliminating circulation of the dengue viruses. The feasibility of a plan with these characteristics was analyzed, giving consideration to the principles and guidelines that must be applied by each country to interrupt the transmission of dengue.

The task force pointed out the differences among the countries with respect to the status of their current programs and activities to combat *A. aegypti*. In most cases, the strategies and resources allocated are inadequate for undertaking a program intended to achieve eradication.

In each component of the Hemispheric Plan, estimated cost aspects are emphasized to underscore the vital importance of resources in any strategy to eradicate *A. aegypti* in the Region. Thus the total cost of implementing the Plan is US\$ 1,681,775,000 per year. Of this sum, 85% is for direct operations to combat the vector, 4% is for epidemiological surveillance, 10% is for social participation and communication, and 1% is for sanitation activities.

Although there was consensus among the members of the task force that most of the funds for executing the Plan will be from national sources, PAHO will support and advise the Member States and cooperate with them in preparing and executing the national plans, making available the technical information that will permit the greatest impact that is technically possible.

The differences among the countries led the task force to recommend the application of a five-stage regional strategy, moving gradually from initial activities geared toward intensifying and expanding efforts to combat the vector to the eradication phase and, finally, to surveillance to prevent reinfestation.

It became evident that there was a need to work on solving problems and eliminating the adverse factors existing in most of the countries, where political will translated into resources to carry out this strategy should receive the highest priority in every country of the Region.

1. Introduction

According to the World Health Organization (WHO), two-fifths of the world's population is at risk of infection with dengue and more than 100 countries have been affected by epidemics of dengue or dengue hemorrhagic fever. WHO estimates that there are more than 50 million cases of dengue and dengue hemorrhagic fever, 500,000 cases hospitalized, and 20,000 deaths annually. Children account for 95% of these cases; infection rates are as high as 64 for every 1,000 inhabitants. Disease control is expensive, and epidemics have a significant adverse impact on the countries' socioeconomic development.

Between 1948 and 1972, *A. aegypti*, the mosquito vector of dengue and yellow fever, was eradicated in 21 of the countries of the Hemisphere. In 1997 virtually all the countries of the Americas are reinfested, including the southern United States, and there have been numerous epidemics of dengue and dengue hemorrhagic fever in the Region, which has become a growing health problem.

The ministers of health of the countries in the Region recognized the gravity of this situation. They discussed the topic and adopted Resolution CD39.R11 during the XXXIX Directing Council (1996). The Resolution establishes the mandate for Member States to collaborate in the definition of the general guidelines for a hemispheric plan to expand and intensify efforts to combat *A. aegypti* with a view to the eventual eradication of the vector in the Americas.

To carry out this Resolution, in December 1996 the Program on Communicable Diseases (HCT) of PAHO's Division of Disease Prevention and Control convened a meeting at Headquarters, bringing together various experts to draw up a formguide which was sent to the countries of the Region in January 1997 to assist them in preparing national plans to expand and intensify efforts to combat *A. aegypti*. These plans would serve as the basis for the Hemispheric Plan.

From 22 to 24 April 1997, a Task Force consisting of experts from several countries met in Caracas, Venezuela, to prepare the Hemispheric Plan on the basis of the national plans. The members of the task force are listed in Annex 1.

1.1 *Epidemiological Situation of Dengue, Dengue Hemorrhagic Fever, and Yellow Fever in the Americas*

1.1.1 *Dengue*

The re-emergence of dengue in the Americas began in the 1960s with major epidemics in Venezuela and several Caribbean islands, including Jamaica and Puerto Rico.

In the second half of the 1970s, dengue 1 was reintroduced in the Americas, causing a pandemic that struck countries in Central America (El Salvador, Guatemala, and Honduras), Mexico, the United States of America (State of Texas), the countries of northern South America

(Colombia, French Guiana, Guyana, Suriname, and Venezuela), and virtually all the islands of the Caribbean. This pandemic occurred between 1978 and 1980, and while 700,000 cases were reported, it is estimated that several million people were affected by dengue 1.

In the 1980s, several major epidemics were again recorded in endemic countries, and the expansion of dengue 1 to South America was particularly significant. Thus, outbreaks were seen in five countries (Bolivia, Brazil, Ecuador, Paraguay, and Peru) that had been free of the disease for several decades or had never reported the disease. It is estimated that several million people in the five countries were infected, and a number of deaths were reported.

The last two tropical countries infested with *A. aegypti* that had been free of dengue (Costa Rica and Panama) reported indigenous transmission of the disease in 1993. Dengue 3 was reintroduced in the Americas the following year. This serotype was detected almost simultaneously in Panama and Nicaragua, and Nicaragua is the country where an epidemic of dengue and dengue hemorrhagic fever originated. In 1995, dengue 3 spread to other countries of Central America (except for Belize) and to Mexico, leading to significant outbreaks. Since dengue 3 had not circulated in the Americas since 1978 (a 16-year absence), it was estimated that 200 million susceptible people reside in areas infested with *A. aegypti*. Thus, there is a risk that the serotype will spread, resulting in major epidemics.

In 1995 there were dengue epidemics in Central America, the Caribbean, and South America (particularly Brazil), with a total of 284,483 cases reported by 41 countries. This represents the highest incidence of dengue since 1981. In 1996, 250,707 cases were reported, about 80% of them in Brazil.

1.1.2 *Dengue Hemorrhagic Fever*

The epidemiological and social conditions that fostered the worsening of dengue hemorrhagic fever in Asia are currently present in Latin American countries. It is important to note that the situation in the Region of the Americas is evolving in a manner similar to that of Asia in the 1950s.

The first and most serious epidemic of dengue hemorrhagic fever in the Americas was caused by dengue 2 in Cuba in 1981. During that epidemic, 344,203 cases of dengue and dengue hemorrhagic fever were reported, with 10,312 serious cases and 158 deaths. The second most important epidemic was recorded in Venezuela in 1989-1990, in which 5,990 cases and 70 deaths were reported. The viruses in circulation were serotypes 1, 2, and 4, although in the fatal cases only dengue 2 was detected. Some two-thirds of the cases and deaths from dengue hemorrhagic fever reported by Cuba and Venezuela were among children under 14 years of age. With the exception of 1983, cases of dengue hemorrhagic fever were reported in the Americas in all years between 1981 and 1996. During that period, a total of 41,669 cases of dengue hemorrhagic fever were reported by 25 countries, with 576 deaths. There has been a marked increase in the number of cases in this decade (28,434) over the previous decade (13,235). The 25 countries reporting suspected or confirmed cases of dengue hemorrhagic fever were as follows: Venezuela (22,170), Cuba (10,312), Colombia (3,446), Nicaragua (2,641), Mexico

(1,467), Brazil (597), Puerto Rico (305), El Salvador (287), Dominican Republic (174), Jamaica (108), French Guyana (53), Honduras (37), Guatemala (20), Dominica (11), Suriname (11), Guadeloupe (7), Trinidad and Tobago (7), Grenada (3), Martinique (3), Panama (3), Aruba (2), Barbados (2), Costa Rica (1), Saint Kitts and Nevis (1), and Saint Lucia (1).

The growing hyperendemicity of dengue, with the circulation of several serotypes, poses a serious risk that the current situation in the Region will worsen.

1.1.3 *Yellow Fever*

During the eighteenth and nineteenth centuries and the first three decades of the twentieth century, there were major epidemics of urban yellow fever with high mortality in the Americas, especially in the port cities. While there has been no urban transmission of the yellow fever virus in the Americas for over 40 years, each year cases of the wild form of the disease are reported in at least five countries (Bolivia, Brazil, Colombia, Ecuador, and Peru). Eighty percent of the cases reported in the 1980s and 1990s occurred in Bolivia and Peru. The high-density presence of *A. aegypti* in many urban centers located in enzootic areas of wild yellow fever poses a potential risk for the urbanization of the disease. This risk was particularly significant during the epidemic that ravaged Peru in 1995, when 492 cases (192 deaths) were reported, with many hospitalizations in areas infested with *A. aegypti*.

1.2 *Current Status of Programs for the Control and Eradication of Aedes aegypti*

In 1947, PAHO adopted a resolution on eradication of *A. aegypti* in the Americas; by 1972 the species had been eradicated in 21 countries. Unfortunately, most of these countries have been reinfested due to lack of adequate surveillance.

In 1985, PAHO adopted a resolution recommending that the countries carry out their programs based on a strategy of *A. aegypti* control. In its publication, *Dengue and Dengue Hemorrhagic Fever in the Americas: Guidelines for Prevention and Control* (1995), the control strategy is defined as the efficient use of limited resources to prevent dengue and dengue hemorrhagic fever epidemics. In 1995, the Directing Council adopted Resolution CD38.R12 recommending that a task force be established immediately to study the feasibility, timeliness, and appropriateness of drawing up a hemispheric plan for the eradication of *A. aegypti*, as an effective means of controlling dengue and urban yellow fever in the Americas. In 1996, Resolution CD39.R11 was adopted, instructing PAHO and the countries to prepare the Hemispheric Plan to Expand and Intensify Efforts to Combat *A. aegypti*, with a view to its eventual eradication.

The specific activities of the health services and control programs are hindered, with varying degrees of complexity, by economic, political, social, and administrative factors. Moreover, the official priority of dengue prevention and control is not applied in the field. Activities to control the vector are not sustainable, due to the absence of an institutionalized program, intra- and intersectoral integration, and community participation.

Most programs have been placed under the ministries of health as the *A. aegypti* and

yellow fever service or combined with the malaria or vector control service. There is usually limited communication and collaboration with other departments or divisions of the ministry (epidemiology, sanitation, education), and with other ministries, governmental and nongovernmental organizations (NGOs) and agencies and community groups. There is also little training of program staff and practically no operations research.

The countries' efforts to combat the vector primarily involve pesticides. Larvicides are frequently applied to containers that could be destroyed or collected, and there is excessive use of Ultra-low-volume (ULV) adulticides in areas where there is no transmission of dengue. This method is useful for suppressing epidemics but not for routine efforts to combat the vector.

2. Objectives

The purpose of the Hemispheric Plan is to increase activities to combat *A. aegypti* to reach infestation levels of close to zero, with a view to the eventual eradication of the vector.

3. Goal

The goal of the Hemispheric Plan to combat *A. aegypti* will be to halt the spread of dengue in the Americas through the progressive reduction of areas infested with *A. aegypti*.

4. Orientations of Programs to Combat *Aedes aegypti*

4.1 *Principles and Guidelines*

To conclude and carry out the Hemispheric Plan to Combat *A. aegypti* in order to halt the spread of dengue, the following principles must be applied:

- institutionalization and legal backing for the program by the ministries of health and governments;
- elimination of the social and environmental conditions that foster proliferation of the vector;
- effective community participation;
- strengthening of the central level with the necessary restructuring and reorganization;
- decentralization, strengthening, and adaptation to local structures;
- integration and intra- and intersectoral management;
- integration of governmental and nongovernmental institutions;
- universality and synchronization in applying the Hemispheric Plan;

- reorganization of available resources at all levels;
- integration and compliance with the technical guidelines set forth in guides and manuals;
- participation of research and training centers.

4.2 *Self-evaluation of the Current Status of the Countries: Operational and Technical Classification of Programs*

Annex 2 lists the essential components of programs to combat *A. aegypti*, and a percentage is assigned to each component. Thus, each country will determine its situation and what areas should be improved to meet the established targets.

4.3 *Strategies to Combat Aedes aegypti*

Control and eradication are strategies with different methodologies and targets.

An eradication strategy involves universal coverage of all mosquito-breeding sites in every house in every infested locality in the country for total elimination of the vector, and subsequent ongoing surveillance to prevent reinfestation. The initial cost of this strategy is high, but once the mosquito is eliminated, the cost of surveillance to prevent reinfestation is much lower and transmission of dengue and urban yellow fever is totally prevented.

A control strategy involves the efficient use of limited resources to prevent epidemics and mortality from dengue and urban yellow fever. The areas at highest risk are identified, and efforts are concentrated there to reduce but not eradicate the vector. A control strategy is less costly than the attack phase of an eradication strategy, but more than the maintenance phase of an eradication strategy (surveillance to prevent reinfestation). Over a period of several years, the cost of control could be greater than the cost of eradication.

An intermediate strategy between control and eradication, when there are not enough resources for universal coverage, would be total elimination of the vector in a few high-risk areas, progressive expansion of these vector-free areas, and surveillance to prevent reinfestation in the same areas.

5. Components of the Plan

5.1 *Elimination of Breeding Sites for Aedes aegypti*

The control of artificial receptacles such as disposable containers, tires, and barrels where the *A. aegypti* mosquito breeds is the cornerstone of any effort to prevent dengue. Effective control of breeding sites for *A. aegypti* includes environmental sanitation, social participation, communication, health education, and chemical and biological control. Development of an effective strategy requires the collaboration of such diverse disciplines as entomology, engineering, behavioral psychology, communication health education, and medical sociology anthropology. The basis for any effective action is knowledge of the principal breeding sites at the local level and an understanding of the factors that permit or foster their existence. The best way to achieve control is by modifying two principal factors: (1) the quality of basic services (environmental sanitation) and (2) human behavior at the household level. Chemical measures should be considered a complementary component to the physical elimination of *A. aegypti* breeding sites.

5.1.1 *Role of Environmental Sanitation*

Environmental sanitation activities are geared primarily toward elimination of breeding sites and deal mainly with two specific areas: water and solid waste. When there is no supply of drinking water or it is irregular or of poor quality, water is usually stored in tanks, barrels, and other containers that can produce large numbers of mosquitoes. When collection is irregular or poor, the accumulation in backyards of refuse such as cans, bottles, and tires is more frequent and yields similar results, i.e., greater numbers of mosquitoes.

(a) drinking water:

- barrels and other receptacles where people deposit drinking water either because they lack household service or because the network operates irregularly;
- community or individual storage tanks for drinking water;

(b) solid waste management, whose problems center around the development of breeding sites in:

- residences, due to refuse in the form of containers, bottles, and tires, usually found in gardens, laundry areas, and rooftop terraces;
- public areas, in containers and tires left in inadequate final disposal locations, on river banks, in illegal dump sites, and alongside roads;
- industry, due to the storage of industrial materials, primarily in the tire retread industry.

According to PAHO data, the sanitation situation in the Region with respect to drinking

water is the following:

	1995
Coverage of urban drinking water	84%
Coverage of rural drinking water	41%
Urban sewers	80%
Solid waste disposal	40%
Refuse collection	70%
Final refuse disposal	30%
Housing shortage	16%
Inadequate housing	38%
Housing that can be improved	21%

The countries=responses to the survey conducted by the task force that drew up the Plan in early 1997 yielded the following data:

Urban coverage of drinking water	83%
Percentage of houses that require water storage	36%
Municipalities with refuse collection	80%
Adequate refuse disposal (<i>A. aegypti</i> approach)	59%

The coverage varies in each country, and the impact of these factors on the development of breeding sites differs depending on local conditions. In addition, these data are for municipios, which does not mean 100% coverage of the residences within each one. The main sanitation activities that should be considered for a program to eliminate *A. aegypti* are:

- improvement of the water supply system;
- adequate solid waste management (refuse collection and recycling);
- elimination of natural or artificial breeding sites;
- an active environmental surveillance system.

Other actions and tasks that relate less directly to control of *A. aegypti* are sewerage systems, urban drainage, and rodent control. However, they should be considered fundamental to improving the population's quality of life, and not simply measures to control endemic disease.

5.1.2 *Role of Social Participation and Communication*

It is understood that social participation is a component of programs to combat *A. aegypti* and is used in combination with all the other components, especially environmental sanitation and chemical control activities. Community participation is not an isolated and specific activity but a steady, ongoing process that can be used to develop an integrated program. This means that social participation requires ongoing discussions between communities and program personnel to yield activities that can modify the customs and behaviors that foster the proliferation and continued existence of potential breeding sites for *A. aegypti*.

Breeding sites cannot be eliminated solely by improving basic services. Many sites owe their existence to specific human behaviors that foster their existence. These include:

- storing water (this occurs even when the water supply is of good quality);
- storing of used materials such as tires, cans, and bottles, either because of their potential usefulness and/or value or because they are difficult to dispose of;
- keeping water in drinking troughs for dogs, cats, chickens, and other animals;
- keeping water in plant holders such as vases and flowerpots.

In order to modify these behaviors, an integrated strategy is needed that takes into account the advantages and disadvantages of current and alternative behaviors, as well as cultural and social barriers to behavioral change.

Social participation involves the participation of organized community groups (associations, neighborhood committees), as well as institutions and organizations such as civic clubs, churches, schools, and nongovernmental organizations. Social participation is needed to improve basic services and promote changes in human behavior. Health communication education employs several channels of communication such as schools, the mass media (television, radio), and printed matter to support improvements in basic services and promote changes in human behavior.

In communities lacking basic services, where the principal breeding sites are water storage tanks and disposable containers, a community development strategy in which the community identifies its own problems and collaborates with the government organizations and/or NGOs in the search for solutions is usually advisable. Control of other types of breeding sites such as water bowls or troughs for animals or plant holders (flowerpots, drinking vessels, vases) is achieved through the use of specific channels of communication such as people with high credibility (veterinarians, botanists) or stores where such products are sold for pet and/or plant use. While the first type of action takes place at the local level, the second is often organized at the national level with support from local groups.

The private sector is an important group. Its participation can take several forms, such as sponsoring information programs (printing pamphlets, sponsoring television air time) and/or activities at the community level, printing instructions or messages on high-risk products, i.e., products that often become breeding sites (cans, plant holders, water bowls, tires), recycling used

materials and communicating to promote recycling (tires, glass, cans), and social marketing of anti-mosquito products (larvicides, barrel covers, netting).

5.1.3 *Role of Chemical Control*

Operations to combat the *A. aegypti* mosquito should be conducted, whenever possible, with minimal use of pesticides, selecting products that are safer and have a very low level of toxicity with the potential for minimal or no environmental pollution.

Focal treatment is the basic operation of the attack phase of a program to combat the *A. aegypti* mosquito. It includes eliminating or modifying breeding sites with community participation and application of larvicides to water deposits that cannot be eliminated. When a health worker conducts door-to-door focal treatment, adequate inspection both of the interior of the house and the surrounding area is important.

Larvicides such as *Temephos* are used in grains of sand at 1% concentration and will be applied in doses of 1 ppm to all standing water that cannot be eliminated and/or destroyed within and around houses. These deposits or reservoirs can be classified, according to their use, as useful to man, unusable (in other words, that can be eliminated), and natural.

When a water deposit is treated, it is measured by calculating its total volume, and the pesticide is applied on this basis. Part of the pesticide that has been applied will settle to the bottom of the deposit where it will be released as a new supply of water arrives (see technical information on *Temephos*).

Health workers who carry out the focal treatment should also serve as health educators for residents, showing them what is expected and how they should cooperate by keeping the larvicide where it was placed to prevent the formation of mosquito breeding sites.

5.2 *Emergency Control*

Adulticides should be used during epidemic outbreaks of some diseases transmitted by the vector. Control of adult mosquitoes is conducted through utilization of a chemical compound, almost always as an emergency measure. The use of adulticides to combat the vector is limited to epidemics and should not be routine.

As a precaution, it is advisable that the program acquire and maintain a certain number of portable heavy equipment units and pesticides for space spraying.

Actions to combat the adult *A. aegypti* are carried out as follows:

5.2.1 *Space Spraying with Heavy Equipment*

In emergencies resulting from epidemic outbreaks of dengue or dengue hemorrhagic fever or some other disease transmitted by *A. aegypti*, space spraying with cold or hot pesticides

(ULV or thermal fogging, respectively) is appropriate for rapidly reducing mosquito densities by killing infected females. These treatments are applied from the street, using heavy machines fitted on vehicles.

Short-term cycles (3 to 5 days) should be applied and repeated until a consistent reduction in the number of patients is attained. The hours most suitable for treatment are dawn to the early hours of the morning, and dusk, when temperatures reverse.

Space spraying at ultra-light volumes (ULV) are appropriate for urban areas in medium- or large-size cities with flat, paved streets. Maintenance and cleaning of equipment are essential for the proper operation and long life of the machines.

5.2.2 Household Space Spraying with Portable Equipment

These adulticide treatments are carried out during daylight hours to back up applications with heavy equipment in areas that are inaccessible to the vehicle carrying the generator. Applications are made room by room, spraying an aerosol jet for three seconds toward the upper part of each room as well as the backyard.

5.2.3 Perifocal Treatment

This is a type of emergency treatment involving an adulticide with a residual effect, in suspension form. The chemical is applied to the outside and inside of containers that cannot be destroyed, as back-up for treatment with larvicides. This is usually done in areas with higher mosquito density.

5.3 Entomological Surveillance

5.3.1 Goals

- Establish infestation or reinfestation indexes in each locality.
- Determine the relative importance of the different types of containers in mosquito breeding.
- Investigate the presence of other vectors (*Aedes albopictus*) as a risk factor in the transmission of dengue.
- Monitor the level of susceptibility of the *Aedes* mosquito to pesticides.

5.3.2 Stages

- Determine the distribution and indices of *A. aegypti* in order to define the risk of dengue transmission.

- Establish entomological surveillance methods to determine levels of infestation and detect new infestations.

5.3.3 *Activities*

The principal methods of infestation surveillance used to date are house inspections and the use of egg and larva traps. House inspections consist of examining all containers inside and outside houses and microscopic identification of the larvae that are discovered. The results are expressed as the house index (the percentage of houses with *A. aegypti* in larval stages) and the Breteau index (the number of infested containers for every 100 houses inspected).

Egg traps are containers with water placed in houses by inspectors to lure the mosquitoes to deposit eggs. The two most common types of traps are made with sections of radial tires and plastic or glass flasks. They are particularly useful for the detection of new infestations or reinfestations and are more economical in terms of the inspectors' time. Results are expressed as a percentage of positive traps.

To determine the level of infestation, it is not necessary to inspect all houses in a locality. Depending on the size of the area surveyed and the desired position on the index, a sample can be taken of the houses (usually between 10% and 33%) in accordance with PAHO's guidelines on dengue (1995). The houses to be inspected should be distributed uniformly throughout the locality.

To detect new infestations, periodic visits can be made to the strategic points in each locality, i.e., places with greater probability of being infested and generating foci to infest the rest of the locality (for example, cemeteries, tire-mounting establishments, and automobile graveyards).

5.4 *Epidemiological Surveillance*

5.4.1 *Basic Concepts*

The objective of the epidemiological surveillance system for dengue is early detection of cases to permit the rapid application of control measures, interruption of transmission, and prevention of epidemics. To achieve this objective, suspected cases must be identified through an active search and epidemiological studies.

In the *Guidelines for Prevention and Control of Dengue and Dengue Hemorrhagic Fever*, the specific concepts and activities for conducting surveillance for the particular epidemiological situations currently affecting the countries of the Region are described in detail.

In integrated control of dengue and efforts to combat *A. aegypti*, the guidelines for epidemiological surveillance are established, emphasizing that in order to achieve the objectives of the Hemispheric Plan, the following areas should be strengthened:

- prioritize and systematize active surveillance as the primary instrument for early

detection of cases or epidemic outbreaks;

- strengthen active surveillance at all state and private, local, and health institutions and hospitals with properly trained personnel;
- establish sentinel sites or centers to monitor the disease and determine what serotypes are in circulation (in this regard, it is important to consider early identification of serotype 3 of the dengue virus in areas where it has not been detected to date);
- expand dissemination and improve knowledge of differential diagnosis, clinical classification, and treatment of dengue for medical personnel at all levels of health care;
- conduct comprehensive analysis of the behavior of febrile syndromes and the local entomological situation to intensify the active search for cases;
- conduct stratification of the different geographical areas based on risk factors, considering characteristics such as population density, points of entry to the country, the entomological situation, environmental sanitation, water supply, and the history of dengue in the area;
- apply the technical standards of the Guidelines for consolidating serological and virological monitoring of suspected cases;
- provide feedback on laboratory results to the local level;
- increase the coverage of the laboratory network; decentralize serological diagnosis, taking into account epidemiological characteristics, communications, access routes, and the socioeconomic situation in each country; and maintain the quality control of the network.

5.4.2 *Implementation of Epidemiological Surveillance*

The basic instruments for epidemiological surveillance of dengue are:

- collection of specimens in the active search for febrile cases at the community level or verification of clinical diagnosis, providing information on the date the fever began and the patient's place of residence;
- processing of specimens in the laboratory, which will provide information on the viral serotype involved, to be reported immediately to medical centers;
- determination of the presence of *A. aegypti* or *A. albopictus* or entomological surveillance;
- epidemiological research;
- information system;

- training;
- evaluation.

Epidemiological surveillance of dengue tends to be included in the countries= national epidemiological monitoring systems, and it is recommended that the epidemiology services be strengthened in the short term at the different levels of the health systems.

5.5 Training

The reorientation of current national programs for the control of dengue and *A. aegypti* will require the training of personnel. Thus, workshops and seminars should be held for the exchange of information, promotion of new strategies, and ongoing discussion on standardization of activities.

It is recommended that personnel be trained in:

- clinical diagnosis, laboratory techniques, and case management;
- entomological surveillance;
- environmental sanitation;
- management of emergencies;
- management and processing of epidemiological and operational information;
- techniques for promoting community participation.

5.6 *Research*

The methods and combinations of methods for controlling the vector that are low-cost and applicable require operations research on the identification, classification, and seasonal frequency of the mosquito sources or breeding sites; determining geographical areas and populations at high risk for dengue outbreaks; adequate dosage for the chemical treatment of larvae; and alternatives for the biological control of the transmitter's larvae.

In addition, studies or research must be conducted to determine the social factors that influence community practices with respect to the sources or breeding sites for mosquitoes and an epidemiological alert situation.

5.7 *Structure and Management*

5.7.1 *Management Structure*

To develop an effective breeding site control strategy, it is necessary to strengthen and integrate technical (managerial) capability at both the national and local levels. At the national level, it is necessary to establish or strengthen a multidisciplinary task force consisting of professionals with experience in education, sanitation, chemical control, entomology, and epidemiological surveillance, who will perform the following functions:

- integration with other ministries (education, environment);
- support for legislation to guarantee fulfillment and execution of the program, e.g., health codes and laws that promote the sale of returnable containers;
- selection of differentiated and appropriate strategies for each principal breeding site, such as chemical or biological control, recycling, and environmental sanitation;
- development, implementation, and evaluation of plans (strategies) for communication at the national level, including development and validation of radio and television spots;
- operations research to understand behavior that fosters the existence of various breeding sites;
- technical support for the development of programs at the local level;
- collaboration with private enterprise at the national level;
- collaboration with NGOs at the national level;
- development of training programs for the various program components;

- acquisition of national and international resources for sanitation, social participation, and chemical control.

During the first stage of its work, the group will design an initial control plan control for each principal breeding site. This plan has two components: (1) differentiated and appropriate technical strategies, such as chemical or biological control, recycling, sanitation and legislation; and (2) strategies to modify specific human behaviors. In addition, the task force will conduct a diagnosis of existing human and organizational resources for implementing activities (communication, improvement of basic services) in the area of breeding site control. An agenda and materials for discussion of the plan will be prepared with various institutions. This will be followed by raising awareness and a call for institutions and representatives of society at the national level that could play a role in the program, such as service clubs, bishops= conferences, national NGOs, and national companies. After this meeting, the initial plan will be modified and a timetable will be developed for its implementation.

5.7.2 *Local Level*

In each specific geographic area, the work should be initiated by integrating all social actors with a view to developing a cooperation agreement that recognizes and defines responsibilities within the scope of the established goals. At the local level, a multidisciplinary group is also needed to coordinate and conduct program activities. The national level should promote and follow up the organization of such operational groups. The group will take into account the type of social community organization, the available resources, and principal breeding sites in order to develop an initial plan of physical and chemical control. Thus, a local coordination group or team should implement the following activities:

- promote meetings with sanitation, education, and health institutions in the area;
- increase the awareness of the human resources involved in the different program areas so that they will develop their role as health educators;
- conduct activities (meetings, forums, distribution of educational material) with area residents to foster an ongoing educational process, whose primary focus will be on changing behaviors and practices linked with the proliferation of *A. aegypti*;
- develop programs for training and awareness of environmental and health risks, including risks to workers in the health services resulting from excessive pesticide use;
- conduct health education and school campaigns on environmental health aimed at dengue control;
- conduct periodic public clean-up campaigns along rivers and roads, with support from sanitation services and social participation;
- make arrangements with the respective local authorities to extend the coverage of refuse

collection and drinking water services to areas where they do not exist;

- negotiate with local drinking water services regarding the provision of uninterrupted service;
- motivate those responsible for final refuse disposal services to ensure that landfills at least comply with the requirements for preventing the development of breeding sites for *A. aegypti*;
- integrate with projects that employ a comprehensive approach in health, such as the “Healthy Municipios” programs.

6. Costs of the Hemispheric Plan

Spending on programs to combat *A. aegypti* in 1996 are presented by country and by component in Table 1. Spending on social participation was not included due to the lack of reliable data. For the 23 countries that reported expenditures, the total was \$329,909,105. Brazil and Cuba, the two countries with current eradication programs, spent 84% of the total for the Hemisphere.

It can be seen that direct combat operations account for 97% of total expenditures. If Brazil and Cuba are excluded from the total, direct operations has 85% of the total, communications 14% of the total, and training and research less than 1% each. In these countries, average spending in sanitation was six times higher than spending on programs to combat *A. aegypti*.

Table 2 shows total expenditures for all components per year for each country. Not counting Brazil and Cuba, the average cost of the programs increases slightly from \$2,493,536 in 1996 to \$2,598,289 scheduled for 1999.

In the last column of Table 2, the estimated cost per year for complete coverage is recorded for each country. This estimate is based on four basic components:

- cost based on a model of direct operations activities required to treat all houses in infested areas twice monthly (85% of the total);
- epidemiological surveillance costs (4% of the total);
- cost of social participation and communication (10% of the total);
- cost for promotion of sanitation (1% of the total).

Annex 3 describes the calculations used for estimating the cost of the Hemispheric Plan and differentiates the various components of the Plan.

The annual cost of total coverage in the 22 countries that furnished complete information is estimated at \$1.3 billion. These 22 countries, with a population of 422 million, represent roughly 59% of the total population of the Americas. Estimates indicate that the areas susceptible to infestation in the 11 Latin American countries that did not report, added to the one-third of the United States that is similarly susceptible, would increase the cost of the Plan by \$400 million, for a grand total of \$1.7 billion.

to Combat *Aedes aegypti*, by Component, 1996 (US\$)

COUNTRY	DIRECT CONTROL OPERATIONS	COMMUNICATION	TRAINING	RESEARCH	TOTAL
North and Central America					
Costa Rica	2,694,126	591,500	50,090	5,000	3,340,716
El Salvador	5,265,863	*	*	2,300	5,268,163
Guatemala	1,385,465	1,389	*	*	1,386,854
Honduras	3,285,390	30,744	*	*	3,316,134
Mexico	6,468,324	4,920,000	138,800	140,000	11,667,124
Nicaragua	2,670,111	*	*		2,670,111
Caribbean					
Anguilla	33,700	600	*	*	34,300
Antigua and Barbuda	477,337	*	*	*	477,337
Barbados	*	10,000	*	*	10,000
Cuba	22,252,948	865,300	10,800	*	23,129,048
Dominica	151,080	*	*	*	151,080
Grenada	82,297	3,350	*	*	85,647
Montserrat	56,285	5,200	*	*	61,485
St. Lucia	591,504	30,000	*	*	621,504
St. Vincent and the Grenadines	125,888	1,100	*	*	126,988
Trinidad and Tobago	321,402	*	*	*	321,402
South America					
Argentina	8,130,004	1,400,000	*	*	9,530,004
Bolivia	489,055	4,000	*	*	493,055
Brazil	254,380,800	*	35,000	*	254,415,800
Colombia	4,535,772	400,000	*	*	4,935,772
Ecuador	4,979,134	100,000	1,000	*	5,080,134
Paraguay	2,250,842	*	1,000	*	2,251,842
Venezuela	516,763	14,842	1,000	2,000	534,605
Total	321,144,090	8,378,025	237,690	149,300	329,909,105
Average	14,597,459	523,627	33,956	37,325	14,343,876
Percentage	97.3	2.5	0.1	0.0	100.0
WO Brazil and Cuba					
Total	44,510,342	7,512,725	191,890	138,500	52,364,257
Average	2,225,519	536,623	38,378	69,250	2,493,538
Percentage	85.0	14.3	0.4	0.3	100.0

* Insufficient information

Table 2. Total Cost of All Components in Programs to Combat *Aedes aegypti*

versus Projected Spending for Total Coverage (US\$)

COUNTRY	1996	1997	1998	1999	FOR COMPLETE COVERAGE
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The estimated cost of the different components of the Hemispheric Plan are described in Table 3.

Table 3. Cost of Components of the Hemispheric Plan

Component	Cost (US\$)	Percentage
Direct operations	1,423,603,000	98%
Epidemiological surveillance	72,495,000	1%
Social participation and communication	168,177,000	1%
Sanitation	17,500,000	0%
Total	1,681,775,000	100%

The determination of the annual costs of implementing the Hemispheric Plan prompted the participants to discuss possible sources of funding. The financial difficulties facing the countries were recognized, and international reality suggests that the possibilities of obtaining external funds for executing the Plan are remote. Accordingly, implementation of this Plan will be subject to the provision of adequate funding by the countries.

7. Sequence of Activities in National Plans

The decision of the countries to expand and intensify their programs to combat *A. aegypti* had already been made when the ministers of health adopted Resolution CD39.R11 in September 1996. Most countries have already analyzed their epidemiological and entomological situation and have drafted their new national plans. The next steps will be directed to forming a multidisciplinary national commission to coordinate program activities, identify both national and international funds for implementing the plans, purchase the necessary materials, equipment, and pesticides, and hire and train personnel.

Within each country, there may be areas with differing epidemiological situations where different stages can be carried out, stepping up the pace of the program so that it becomes an eradication program. The stages described below can be carried out simultaneously or sequentially, depending on the local situation. They are planned to:

- prevent epidemics of dengue, dengue hemorrhagic fever, and urban yellow fever through epidemiological surveillance and combating *A. aegypti* in high-risk areas;
- prevent outbreaks of dengue by reducing infestation by *A. aegypti* to the point where less than 1% of dwellings are affected;
- halt the transmission of dengue;
- eradicate *A. aegypti*;
- monitor reinfestation of areas free of the vector.

Regardless of the stage in progress, adequate entomological surveillance is needed to permit early detection of the vector in areas considered free of infestation.

An eradication program is divided into four phases: preparatory phase, attack phase, consolidation phase, and maintenance phase.

(a) *Preparatory Phase*: considers all special preparations for the campaign, such as the procurement of materials and training of personnel.

(b) *Attack Phase*: in addition to all the activities mentioned for the intensification and expansion of efforts to combat the vector, for eradication all infested areas are covered in bimonthly or quarterly cycles. Once entomological surveys indicate that an area has been free of infestation for a year, the program proceeds to the consolidation phase.

(c) *Consolidation Phase*: inspection of a sample of houses is continued on a bimonthly basis, but no treatment is applied unless an infected house is found. If this occurs, all houses are inspected and treated within a radius of 300 meters of the focal point. If other houses are infested, the area returns to the attack phase. After a second year without infestation, the area proceeds to the maintenance phase.

(d) *Maintenance Phase*: surveillance against reinfestation is done only through egg traps and inspection of strategic points.

When all locations within a country are in the maintenance phase, a group of experts visits the country, reviews the data, and, if applicable, declares that *A. aegypti* has been eradicated from the country.

Since the countries are at different points in their programs to combat *A. aegypti*, depending on the resources available, it is likely that the transition from the intensification stage to expansion and, finally, eradication will not be the same in all countries. In the initial eradication campaigns, a single country was declared free of the vector one year after the official start of the hemispheric program in 1947. The last country was not declared eradicated until 24

years after the campaign had begun.

Regarding the stages of the Hemispheric Plan, the group of experts has felt that, given the cumulative experience over the last 50 years during which eradication and control strategies have been applied without distinction, the success of this Plan will depend on all countries in the Region, and not just some of them, making a commitment to its execution and deciding to support the activities with the national funds that will be needed for implementation.

8. Monitoring and Evaluation of the Plan

Using the epidemiological and entomological situation and the level of activities in the dengue programs of each country as the point of departure, when implementation of the national plan begins, a monitoring system will be established to make it possible to identify progress, impasses, and setbacks in terms of results and impact. This will make it possible to effect the modifications and strengthening needed to ensure that, from a technical perspective, each national plan has the greatest possible impact.

In this way, a set of indicators will be established for monitoring. The principal indicators will be: incidence of classical dengue, incidence of dengue hemorrhagic fever, and the number of houses infested with *A. aegypti*. However, evaluation in terms of impact will take place in accordance with the stage in which the plan of the respective country is engaged (of the five stages suggested as preceding attainment of the goal).

The information for this monitoring and evaluation will come from the epidemiological and entomological surveillance systems that the countries will establish or strengthen as a part of the implementation of their national plans.

9. Role of PAHO

As resources permit, PAHO will support and advise the Member States and cooperate with them in the preparation and execution of the respective national plans. In addition, it will monitor implementation of the Hemispheric Plan, evaluating the progress in executing the plan, and will make the technical information available to the countries that will allow them to allocate resources in a manner conducive to achieving the greatest impact that is technically possible.

In order to promote technical cooperation and information exchange among countries, periodic subregional meetings will be held, when advisable, establishing a working forum where national experiences are shared and lessons relating to achievements and difficulties in moving toward attainment of the goal are assimilated.

Although there was consensus among the members of the task force that most of the funds for executing the plan will be of national origin, PAHO will play an active role with the countries in mobilizing the external resources needed to implement the Plan. Cost estimates indicate that, except for Brazil and Cuba, which are already setting up intensive programs to combat *A. aegypti*, most countries would need to multiply the amount of the resources they devote to the struggle against the vector several times if they intend to protect the entire

population living in areas at risk of dengue.

Bibliography

Ministry of Health, Brazil. 1996. Plan Diretor de Erradição de *A. aegypti* do Brasil.

PAHOWHO Resolution CD39.R11. *A. aegypti*. September 1996.

PAHOHCTCHT95.049 Revision 1. Alternativas para la prevención y control del dengue y dengue hemorrágico en los países de Centroamérica. June 1995.

PAHO. 1996. Meeting of the Task Force on *A. aegypti*. Rio de Janeiro, April 1996, on programs for eradication and control of *A. aegypti* in the Americas.

PAHOWHO. CE11816. 6 May 1996. Study on the Feasibility of Eradicating *A. aegypti*.

PAHOWHO 1994. Dengue and Dengue Hemorrhagic Fever in the Americas: Guidelines for Prevention and Control. Scientific Publication #584.

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Annex 1

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**HEMISPHERIC PLAN
TO EXPAND AND INTENSIFY EFFORTS
TO COMBAT *AEDES AEGYPTI***

TASK FORCE REPORT

**Caracas, Venezuela
April 1997**

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CE120.R19

Dengue, Dengue Hemorrhagic Fever, and Yellow Fever

THE 120TH MEETING OF THE EXECUTIVE COMMITTEE,

Having examined the report on dengue, dengue hemorrhagic fever, and yellow fever (Document CE120/21),

RESOLVES:

To recommend that the Directing Council adopt a resolution along the following lines:

THE XL MEETING OF THE DIRECTING COUNCIL,

Having seen the report on dengue, dengue hemorrhagic fever, and yellow fever (Document CD40/);

Considering the marked increase in the magnitude of the dengue and dengue hemorrhagic fever problem in the Region of the Americas, and the serious risk of yellow fever epidemics;

Recognizing the public health, social, and economic impact of these diseases in this Hemisphere;
and

Recognizing the need for cost-effective, sustainable programs,

RESOLVES:

1. To urge Member States to:
 - (a) approve the Hemispheric Plan for combating *Aedes aegypti* prepared by a Task Force during its meeting in Caracas in April 1997, and adapt the Plan to the prevailing national conditions, taking into account Dengue and Dengue Hemorrhagic Fever in the Americas: Guidelines for Prevention and Control (1994);
 - (b) identify human and financial resources necessary for the implementation of the Plan, while recognizing the importance of mobilizing and empowering communities to create clean and safe environments;
 - (c) include yellow fever vaccine in their national immunization programs in all areas at risk of transmission of the disease.

2. To request the Director to:
 - (a) collaborate with Member States in the implementation of the Hemispheric Plan and related strategies, as resources permit;
 - (b) promote mechanisms of communication and collaboration among Member States to optimize the implementation of the Plan;
 - (c) cooperate with Member States in seeking external funds in support of national activities to implement the Plan.

*(Adopted at the seventh plenary session,
26 June 1997)*