Integrated Management Strategy for Arboviral Disease Prevention and Control in the Americas

PAHO Pan American Health Organization World Health Organization
Integrated Management Strategy for Arboviral Disease Prevention and Control in the Americas

Washington D.C., 2020
Contents

Preface ......................................................................................................................................... iii
Methodology .................................................................................................................................. v
Acknowledgments .................................................................................................................. vi
Abbreviations and acronyms .................................................................................................. vii
1. Introduction .......................................................................................................................... 1
2. Epidemiological context of arboviral diseases in the Americas ........................................... 2
3. Background: from IMS-dengue to IMS-arbovirus .................................................................. 3
4. Goal, purpose, and components of IMS-arbovirus .............................................................. 6
   4.1 Goal and purpose of IMS-arbovirus .................................................................................. 6
   4.2 Management component ............................................................................................... 6
   4.3 Epidemiology component ............................................................................................. 10
   4.4 Patient care component ............................................................................................... 16
   4.5 Laboratory component .................................................................................................. 24
   4.6 Integrated vector management component ................................................................... 30
   4.7 Environment component .............................................................................................. 36
   4.8 Operations research and communication for behavioral impact .................................... 40
   4.9 Facilitating factors ......................................................................................................... 44
5. Directives for the implementation of the IMS-arbovirus ..................................................... 46
6. Monitoring and evaluation ................................................................................................... 48
References .................................................................................................................................... 50
Annexes ...................................................................................................................................... 54
   Annex A. SWOT analysis, by component ............................................................................. 54
   Annex B. Guides and documents ........................................................................................ 62
   Annex C. Technical consultation agenda ............................................................................ 67
   Annex D. List of participants in the technical consultation ................................................ 70
   Annex E. Agenda of the regional workshop ....................................................................... 74
   Annex F. List of participants in the regional workshop ........................................................ 79
Preface

Arthropod-borne viral diseases (known as arboviral diseases) have great potential to become epidemics and, ultimately, pandemics. They represent a constant threat to health worldwide and in the Region of the Americas.

The Region has a long and well-known history of addressing these diseases. The Pan American Health Organization/World Health Organization (PAHO/WHO) and its Member States have always been at the forefront, planning and implementing campaigns, programs, and strategies against arboviral diseases. In October 1947, PAHO’s first Directing Council adopted Resolution CD1.R1, which declared that the solution to the problem of urban yellow fever would be the eradication of Aedes aegypti throughout the Americas. The success of that large-scale campaign was demonstrated in 1962, when 18 countries and territories in Region were able to eradicate this vector.

However, by the late 1970s, Aedes aegypti was spreading once again in the Americas, demonstrating its great capacity to survive, adapt to urban and domestic life, and transmit several diseases. This has been confirmed with the recent introduction of chikungunya (2013) and Zika virus disease (2015), both of which broke out in the Americas and rapidly spread to almost all areas where the vector is present. The simultaneous circulation of several arboviral diseases poses new challenges for clinical diagnosis and management, laboratory diagnosis, and epidemiological surveillance.

A practically unknown factor that compounded the severity of the situation was the neurological damage caused in fetuses of pregnant women infected by Zika virus (ZIKV). Given this situation, in February 2016, WHO decreed a public health emergency of international concern (PHEIC). PAHO/WHO immediately called on its Member States and organized a response aimed at controlling the outbreak and minimizing its impact. Once a certain level of epidemic control had been achieved, the programmatic phase was implemented, using the Integrated Management Strategy for Dengue Prevention and Control (IMS-dengue) as a methodological model. IMS-dengue was adapted and expanded to become a useful tool to comprehensively tackle arboviral diseases.

It is important to consider the persistent social factors that continue to have a major impact on the outbreak of arboviral diseases, as well as the effects of climate change, which include longer and more intense rainy seasons and hurricanes, facilitating the persistence and rapid spread of these diseases. Furthermore, there are few available vaccines to prevent arboviral diseases and there is still no dengue vaccine recommended for use in immunization programs. As a result, the appearance and reappearance of these diseases can only be controlled through rigorous prevention and control measures. These measures must be sustainable and comprehensive in order to prevent the proliferation of disease-transmitting mosquitoes, provide timely clinical diagnosis, strengthen epidemiological surveillance that is coordinated with solid laboratory support, while actively including society in the control of the vector’s breeding sites. It is also necessary to promote research aimed at identifying critical aspects of basic research, clinical research, services, health systems, and public health, setting priorities and coordinating work to generate scientific knowledge that is useful for decision-making, and implementing efficient actions and programs for prevention and control.

This document, entitled Integrated Management Strategy for Arboviral Disease Prevention and Control (IMS-arbovirus), was prepared during technical consultation with the countries in Colombia in 2016, based on the experiences gained from best practices in each component of the national IMS-dengue strategies.
and the recommendations made by experts and scientists in the International Technical Group of Experts on Arboviral Diseases (GT-Arbovirus). IMS-arbovirus also includes the recommendations made by the countries of the Americas during the 55th PAHO/WHO Directing Council (2016) and in subsequent technical meetings held in Cuba (2016) and Guatemala (2018), with the participation of country managers and experts from each component of IMS-dengue.

This makes IMS-arbovirus a solid technical document, a model for methodological work aimed at developing and strengthening national strategies throughout the Region, and a valuable reference tool for the countries and territories of the Americas to plan activities for the prevention and control of arboviral diseases. National strategies should take a multidisciplinary approach within an extrasectoral framework that involves families and communities in solving the problem in order to mitigate the risk of transmission and control or reduce the negative health impact of outbreaks.
Methodology

The *Integrated Management Strategy for Arboviral Disease Prevention and Control* (IMS-arbovirus) is based on the IMS-dengue technical document published by PAHO/WHO. In the preparation of this document, two moments of particular importance stand out.

First, in August 2016, a technical consultation was held with representatives of the health ministries of the countries and territories of the Americas, members of GTI-Dengue (now known as GT-Arbovirus), and technical personnel of PAHO/WHO. The participants in this workshop expanded IMS-dengue to include other arboviral diseases of public health importance, organizing themselves in working groups according to their area of experience (managers, epidemiologists, clinicians, virologists, entomologists, social scientists, and communications specialists). As a result, IMS-arbovirus has a work model with five components: management, epidemiology, patient care, laboratory, and integrated vector management; and two cross-cutting linchpins for each component: operations research and communication for behavioral impact. Factors that facilitate implementation of the strategy at the regional and national levels are also included: advocacy, resource mobilization, partnerships, capacity building, monitoring, and evaluation.

In October of the same year, representatives of the health ministries of the 34 Member States and PAHO/WHO technical personnel presented and discussed the first draft at an international meeting in Havana, Cuba.

The second important moment in the development of IMS-arbovirus was a regional workshop in April 2018, where 14 countries and territories, members of GT-Arbovirus, and PAHO/WHO technical personnel reviewed and updated the IMS-arbovirus technical document, based on the lessons learned by the countries after almost two years of implementing their national programs for arboviral disease prevention and control. The working methodology was similar to the one used during the technical consultation described above, but with a new expert working group on the subject of the environment. This new environmental component of IMS-arbovirus considers the importance of interprogrammatic and intersectoral work, as well as socioenvironmental factors and determinants that play a significant role in the dynamics of the transmission of these diseases.

On both occasions, PAHO/WHO technical personnel were responsible for consolidating the information provided by the working groups, and for the review and final editing of the document.
Acknowledgments

PAHO/WHO would like to express its most sincere gratitude to the technical teams from the countries and territories of the Americas who, in the preparation of this document, shared their knowledge and lessons learned. PAHO/WHO also thanks the International Technical Group of Experts on Arboviral Diseases (GT-Arbovirus) for their technical support in reviewing and updating this document, and for their constant support in the technical cooperation activities provided to the countries and territories of the Americas on the subject of arboviral diseases.

The annexes to this document contain detailed lists of the health professionals who participated in the technical consultation and in the regional workshop for the review and update of IMS-arbovirus.

We offer special thanks to the ministers of health and representatives of the countries and territories of the Americas who attended the 55th PAHO/WHO Directing Council and adopted Resolution CD55.R6, demonstrating that 10 years of work on IMS-dengue provided the essential platform for organizing an integrated response to the complex situation posed by vector-borne diseases today.
### Abbreviations and acronyms

| Abbreviation | Description |
|--------------|-------------|
| Ae.          | *Aedes*     |
| CHIKV        | Chikungunya virus |
| COMBI        | Communication for behavioral impact |
| DENV         | Dengue virus |
| EQA          | External quality assessment |
| GT-Arbovirus | International Technical Group of Experts on Arboviral Diseases |
| GTI-Dengue   | International Technical Group of Experts on Dengue |
| IHR          | International Health Regulations |
| IMS-arbovirus| Integrated Management Strategy for Arboviral Disease Prevention and Control in the Americas |
| IMS-dengue   | Integrated Management Strategy for Dengue Prevention and Control |
| IVM          | Integrated vector management |
| NRL          | National reference laboratory |
| PAHO         | Pan American Health Organization |
| PHEIC        | Public health emergency of international concern |
| PLISA        | Health Information Platform for the Americas |
| RELDA        | Arbovirus Diagnosis Laboratory Network of the Americas |
| RELEVA       | Entomological-virological laboratories network of the Americas |
| SDGs         | Sustainable Development Goals |
| SWOT         | Strengths, weaknesses, threats, and opportunities |
| WHO          | World Health Organization |
| ZIKV         | Zika virus |
Epidemic and potentially pandemic diseases pose a permanent threat to global and regional health security. In recent years, the global incidence of arboviral diseases has increased despite the efforts that countries have made to control the vectors. The Region of the Americas is no exception, being affected not only by the presence of dengue virus (DENV), but also by the recent introduction of chikungunya virus (CHIKV) in late 2013 and Zika virus (ZIKV) in 2015. Tackling the simultaneous circulation of three arboviruses poses a new challenge in every country and territory of the Americas.

In response to the epidemiological situation created by dengue, PAHO/WHO and its member countries jointly prepared the Integrated Management Strategy for Dengue Prevention and Control (IMS-dengue) in 2003. By 2015, IMS-dengue had been implemented in 26 countries and territories of the Americas and evaluated on 32 occasions. It had proven to be a flexible, adaptable, dynamic, and sustainable methodological model over time. However, with the emergence of new arboviral diseases in the Americas, it became necessary to expand the integrated approach beyond dengue to other arboviral diseases of public health importance. Accordingly, PAHO/WHO undertook the development of the Integrated Management Strategy for Arboviral Disease Prevention and Control (IMS-arbovirus), a strategy built on the basis of IMS-dengue and the lessons learned from the countries and territories facing this new epidemiological situation. The technical document for IMS-arbovirus was prepared through technical consultation (August 2016) and a subsequent review and updating process (April 2018), with the participation of countries and territories, experts in arboviral disease, members of GT-Arbovirus, and PAHO/WHO technical personnel.

The goal of this document is to help reduce the burden of disease caused by arboviruses, within the framework of the Sustainable Development Goals (SDGs) of the United Nations Development Program (UNDP). Through health promotion and the prevention, surveillance, and control of arboviral diseases, the aim is to reduce the morbidity, acute and chronic effects, birth defects, and deaths caused by these pathologies. The IMS-arbovirus work model proposes six components to address arboviral diseases: management, epidemiology, patient care, laboratory, integrated vector management, and environment. Operations research and communication for behavioral impact (COMBI) are cross-cutting linchpins of each component. Finally, the model relies on factors that facilitate implementation of the strategy at the regional and local levels.

Performance indicators and expected results have been developed for each component. In addition, necessary activities and tasks have been established and the persons responsible for implementing them has been specified. This document also provides detailed guidelines for implementation and for the respective monitoring and evaluation processes. IMS-arbovirus is designed mainly for health ministers, health managers, managers of national arboviral disease prevention and control programs, and directors of hospital and primary health care centers. This document provides them with the necessary high-level, practical, technical guidance to support and strengthen national and local management capacities for arboviral disease prevention and control.
In recent years, conditions in the Region of the Americas have been highly favorable for the introduction and spread of arthropod-borne viral infections (arboviral diseases). Although dengue has been circulating for over 400 years, the number of cases reported since the year 2000 represents an unprecedented increase, with four serotypes in circulation. Since that year, 19.6 million cases of dengue have been reported to PAHO/WHO, including more than 800,000 severe cases and over 10,000 deaths. In 2015 and 2016 alone, more than 4.8 million cases were reported, 17,000 of them severe, resulting in 2,000 deaths. Despite a 23% reduction in the dengue case-fatality rate in the last six years (from 0.069% to 0.053%), the continued risk of severe disease and even death poses a serious public health problem in the Americas.

Dengue continues to be the most prevalent arboviral disease in the Americas. However, in recent years our Region has been particularly affected by the appearance of other arboviruses, such as chikungunya and Zika. In December 2013, the chikungunya virus was detected for the first time in the French territory of Saint Martin. It spread rapidly from the Caribbean to the north coast of South America and Central America. By the end of 2015, the transmission of chikungunya virus was documented throughout the hemisphere, with an average cumulative incidence of 302 cases per 100,000 population.

Although it is not known exactly when and where Zika virus was introduced to the Americas, by November 2014 it had been observed in patients in northeastern Brazil who presented skin rashes compatible with the disease. In May 2015, national authorities officially reported the presence of Zika virus in Brazil, causing PAHO/WHO to issue an epidemiological alert advising the countries and territories of the Region to step up surveillance in preparation for a possible introduction of the virus in the entire continent. In the months following this epidemiological alert, most countries and territories in the Americas reported local transmission of the disease. Since its initial detection, more than one million cases of Zika virus disease have been officially reported throughout the Region.

It is no surprise that an outbreak of this magnitude has helped increase our understanding of the Zika virus, while expanding the observed clinical spectrum of the disease. Although Zika virus was identified for the first time in 1947, in Uganda, the current outbreak in the Americas has generated more knowledge about this pathogen than all previous outbreaks combined. However, questions persist regarding the overall magnitude of the outbreak, modes of transmission other than the vector, and the specific nature of the central nervous system anomalies caused both by primary infection and intrauterine infection.

Today, arboviruses present an extremely complex and unstable epidemiological situation, given the simultaneous epidemic circulation of three arboviral diseases and the risk that others could become epidemics, for example, Mayaro fever. Countries are aware that this complex situation can only be addressed with a comprehensive and multidisciplinary approach.
The development of IMS-arbovirus is part of a history of technical cooperation between PAHO/WHO and the countries and territories of the Americas. It is based on the lessons learned during the development and implementation of national IMS-dengue programs in recent years. This history of cooperation is not new. It dates back to October 1947, with the adoption of Resolution CD1.R1 during the first Directing Council of PAHO. This resolution stated that the solution to the problem of urban yellow fever would be the eradication of Ae. aegypti in the entire hemisphere. The success of that campaign was demonstrated in 1962, with the eradication of this vector in 18 countries in the Region and several Caribbean islands.

Unfortunately, the effectiveness of these efforts waned in the period 1962-1972 due to their lack of priority in public health policy and because of Ae. aegypti resistance to dichlorodiphenyltrichloroethane (DDT), the main residual pesticide used at the time. This gave rise to the reintroduction and rapid geographic spread of the mosquito, which soon resulted in epidemic outbreaks of dengue. In the 1990s, resolutions CD38.R12 (1995) and CD39.R11 (1996) were adopted as a vector control strategy, with the goal of preparing and implementing a hemispheric plan for Ae. aegypti eradication. However, a scarcity of resources and a lack of common criteria at the hemispheric level prevented adequate implementation of this hemispheric plan, and the expected results were not achieved.

In September 2001, the 43rd Directing Council of PAHO/WHO adopted Resolution CD43.R4 on the new generation of dengue prevention and control programs. Its aim was to strengthen implementation of social communication measures in national programs through an approach focused more on changing the behavior of the population than on disseminating information and knowledge. Thus, the Communication for Behavioral Impact (COMBI) strategy was created as a social mobilization and communication methodology with a behavioral approach to diseases, including dengue. The addition of the behavioral approach to the mobilization model guarantees that programs, whose budgets and human resources are often very limited, can optimize resources with respect to the actual impact they hope to have on the behavior of individuals and social groups.

In keeping with the approach proposed in 2001 to address the epidemiological situation of dengue and given the steady increase in cases of this disease in the Region, in 2003 PAHO/WHO adopted Resolution CD44.R9, which introduced a new prevention and control model known as IMS-dengue. This strategy included five basic components for the prevention and control of the disease: patient care, epidemiology, laboratory, integrated vector management, and social communication. Management, environment, and vaccine components were added later. As a result, in 2007 the Pan American Sanitary Conference adopted Resolution CSP27.R15, which urged the Member States to strengthen the implementation and evaluation mechanisms of IMS-dengue. In 2012, IMS-dengue was aligned with WHO’s updated global dengue prevention and control strategy, with the inclusion of facilitating factors for implementation at the national level. In 2014, at a meeting on the latest technical advances in dengue prevention and control in the Region of the Americas, held at PAHO/WHO Headquarters in Washington D.C., this strategy was reiterated and multilaterally reviewed by national health ministries, academia, private industry, and WHO collaborating centers in the Region, among others. Their conclusion was that implementation of IMS-dengue had provided countries and territories with a sound methodological tool for dengue prevention and control, thus improving their response to a complex situation in which multiple factors and social determinants interact in the transmission process.
Between 2003 and 2015, IMS-dengue was implemented in more than 26 countries and territories in the Region and evaluated on 32 occasions. IMS-dengue has been field-tested in different countries and epidemiological contexts, has been improved technically and operationally over time, and is a knowledge-based technical strategy that has political support. IMS-dengue has proven to be a flexible, adaptable, dynamic, and sustainable methodological model for the Region.

However, in light of the advance of dengue and the recent introduction of new arboviral diseases in the countries and territories of the Americas, it became necessary to take IMS-dengue and make it a useful tool to comprehensively tackle other arboviral diseases. In June 2016, during the 158th session of the Executive Committee, PAHO/WHO recommended adopting the Strategy for Arboviral Disease Prevention and Control (IMS-arbovirus). Resolution CD55.R6 urged Member States to strengthen their epidemiological and entomological surveillance systems, strengthen their capacity to diagnose and detect arboviral diseases, and prepare a strategy for integrated control of arboviral diseases, taking into account the critical components of IMS-dengue.

There are four strategic lines of action:

1. Foster an integrated approach for arboviral disease prevention and control;
2. Strengthen health services capacity for the differential diagnosis and clinical management of arboviral diseases;
3. Evaluate and strengthen country capacity for surveillance and integrated vector control;
4. Establish and strengthen the technical capacity of the Arbovirus Diagnosis Laboratory Network in the Region of the Americas (RELDA).

IMS-arbovirus consists of five components (management, epidemiology, integrated vector management, patient care, and laboratory), a cross-cutting linchpin for each component (operations research and communication for behavioral impact), and facilitating factors (advocacy, resource mobilization, partnerships, capacity-building, monitoring, and evaluation). Unlike IMS-dengue, this version of IMS-arbovirus did not include an environment or vaccine component.

After the health emergency declared by WHO due to the Zika epidemic had ended in November 2016, it was necessary to update IMS-arbovirus and focus it on the countries’ programmatic work. To accomplish this, representatives of health ministries of 14 countries and territories of the Americas, GT-Arbovirus members, and PAHO/WHO technical personnel held a technical workshop in Guatemala City in April 2018. This IMS-arbovirus document is the product of that workshop, where it was reviewed and updated with a new component: environment (Figure 3-1).
Figure 3-1. The Integrated Management Strategy for Arboviral Disease Prevention and Control (IMS-arbovirus)

In the IMS-arbovirus model, each of the four strategic lines of action are harmonized and aligned.

- **Strategic line of action “1”** (Foster an integrated approach for arboviral disease prevention and control) is reflected in the IMS-arbovirus as a whole. It involves the components of management, epidemiology, integrated vector management, laboratory, and patient care, and the linchpins of operations research and communication for behavioral impact.

- **Strategic line of action “2”** (Strengthen health services capacity for the differential diagnosis and clinical management of arboviral diseases) seeks to ensure timely clinical identification and differential diagnosis. It is reflected mainly in the patient care component.

- **Strategic line of action “3”** (Evaluate and strengthen country capacity for surveillance and integrated vector control) is reflected in the components of epidemiology, environment, and integrated vector management, as well as in the facilitating factors (monitoring and evaluation).

- **Strategic line of action “4”** (Establish and strengthen the technical capacity of RELDA) is reflected in the laboratory, patient care, and epidemiology components.

The goal, purpose, components, and facilitating factors of IMS-arbovirus are detailed below.
4. Goal, purpose, and components of IMS-arbovirus

4.1 Goal and purpose of IMS-arbovirus

Goal:
Help to reduce the burden of arboviral diseases within the framework of the Sustainable Development Goals (SDGs) of the United Nations Development Program (UNDP).

Purpose:
Implement the Integrated Management Strategy for Arboviral Disease Prevention and Control in the countries of the Region, including health promotion, prevention, surveillance, and arboviral disease control in order to reduce the morbidity, acute and chronic effects, birth defects, and deaths caused by these pathologies.

4.2 Management component

Integrated management is a methodological model for the planning, organization, implementation, monitoring, and evaluation of strategies for the surveillance, prevention, and control of arboviral diseases, based on an integrated, intra- and inter-institutional, multidisciplinary, and cross-sectoral vision.

The implementation of IMS-arbovirus contributes to decision-making at the following levels:

• **Political**: to advocate for defined roles and functions in the sectors involved in arboviral disease prevention and control, based on the information provided by the health sector (regulatory institution). This level is linked with maintaining and fostering political will and financial commitment at the highest decision-making levels.

• **Strategic**: to develop the technical guidelines for each step and in the different socioeconomic and epidemiological scenarios at the regional, country, and subregional levels.

• **Operational**: to plan, implement, monitor, and evaluate interventions against arboviral diseases in a way that is consistent with decisions at the political and strategic level; and to facilitate the adaptation and operationalization of processes to local circumstances.
Table 4-1. Results, indicators, verification sources, assumptions, and risks: management component

| Results | Indicators | Verification sources | Assumptions/Risks |
|---------|------------|----------------------|-------------------|
| R1      | All countries in the Region have adopted, adjusted, and implemented IMS-arbovirus | National IMS-arbovirus document adjusted to the country’s special features and adopted by ministerial resolution | Assumptions: Countries maintain political commitment and allocation of financial resources for implementation of IMS-arbovirus |
|         |            | IMS-arbovirus annual operating plans | Health resources are reorganized or reorganizable for adequate implementation of IMS-arbovirus |
|         |            | Report on implementation of the annual operating plan | Institutional, sectoral, and intersectoral coordination and integration exists or is feasible, with a multidisciplinary approach and with the participation of social stakeholders |
|         |            | Report on PAHO/WHO visit to the countries confirming fulfillment of IMS-Arbovirus | Risks: Economic or political fluctuations in the countries may affect continuous implementation of IMS-arbovirus |
|         |            |                          | Limited political will may limit sectoral and extra-sectoral participation |
|         |            |                          | Persistence of a work culture unamenable to integration |

Table 4-2. Results and activities: management component

| Results | Activities |
|---------|------------|
| R1      | R1A1 Prepare a new national document adapting the regional IMS-arbovirus to the characteristics, needs, and capacities of each country |
|         | R1A2 Implement the national IMS-arbovirus |
|         | R1A3 Develop and execute an IMS-arbovirus monitoring and evaluation plan in each country |
|         | R1A4 PAHO/WHO support for countries in the process of adjusting and implementing their national IMS-arbovirus |
|         | R1A5 Establish permanent, evidence-based improvement processes during implementation |
Table 4-3. Activities, tasks, time frames, and responsible institution or person: management component

| Activities | Tasks | Time frame* | Responsible institution / person | Observations |
|------------|-------|-------------|----------------------------------|--------------|
|            |       | S | M | L | | | |
| **R1A1** Prepare a new national document adapting the regional IMS-arbovirus to the characteristics, needs, and capacities of each country | 1. Designation of a national coordinator for IMS-arbovirus | X | | | Ministry of Health or its equivalent | |
|            | 2. Creation of a national technical group of experts on arboviral diseases (national GT-Arbovirus) and of the steering group (coordinator) of the national IMS-arbovirus | X | | | Ministry of Health or its equivalent, with support from the international GT-Arbovirus and PAHO | GT-Arbovirus should consist of representatives of each component of IMS-arbovirus and partners, if necessary. The steering group of the national IMS-arbovirus should consist of directors of key areas (epidemiology, health services, laboratory, health promotion, environment, planning). |
|            | 3. Adaptation of the national IMS-arbovirus, based on the regional document | X | | | Ministries of Health, IMS-arbovirus coordinator, national GT-Arbovirus with support from PAHO and international GT-Arbovirus | |
| **R1A2** Implement the national IMS-arbovirus | 1. High-level authorities help to identify and call on extra-sectoral actors to establish commitments, roles, and functions | X | | | Ministry of Health | |
|            | 2. Arrange for the necessary resources for correct implementation | X | | | National coordinator of IMS-arbovirus and national GT-Arbovirus | It is necessary to take into account the budgets of other involved sectors, in addition to the health sector. |
| Activities | Tasks | Time frame* | Responsible institution / person | Observations |
|------------|-------|-------------|-----------------------------------|--------------|
|            |       | S           | M       | L       |                           |              |
| 3. Implement the national IMS-arbovirus | X   | X           | X       |         | National coordinator of IMS-arbovirus, national GT-Arbovirus, and subnational managers | This task includes the use of existing national operating plans |

**R1A3**
Develop and execute an IMS-arbovirus monitoring and evaluation plan in each country

| Tasks | Time frame* | Responsible institution / person |
|-------|-------------|----------------------------------|
| 1. Convene the national GT-Arbovirus to develop the monitoring and evaluation plan, including external evaluations | X | National IMS-arbovirus coordinator |
| 2. Implement monitoring and evaluation of all components of IMS-arbovirus, based on the regional evaluation instrument | X | National GT-Arbovirus and external evaluators |

**R1A4**
PAHO/WHO support for countries in the process of adjusting and implementing their national IMS-arbovirus

| Tasks | Time frame* | Responsible institution / person |
|-------|-------------|----------------------------------|
| 1. Disseminate the new version of IMS-arbovirus with the countries | X | PAHO/WHO |
| 2. Hold regional meetings to bring together the different national GT-Arbovirus groups, to conduct revisions and move forward with implementation | X | PAHO and countries |
| 3. Hold regional workshops to educate national IMS-arbovirus managers | X | PAHO and countries |
| 4. Support the countries with lines of technical cooperation that respond to the emerging needs identified during the adjustment and implementation process | X | PAHO |

**R1A5**
Establish permanent, evidence-based improvement processes

| Tasks | Time frame* | Responsible institution / person |
|-------|-------------|----------------------------------|
| 1. Define the lines of operations research, based on a needs diagnosis for each component of the IMS-arbovirus and each country | X | National IMS-arbovirus coordinator and national GT-Arbovirus |
| 2. Form a network to research arboviral diseases in the Americas | X | PAHO and national GT-Arbovirus |
| Activities                                                                 | Tasks                                                                 | Time frame* | Responsible institution / person                                                                 | Observations |
|---------------------------------------------------------------------------|----------------------------------------------------------------------|-------------|-------------------------------------------------------------------------------------------------|--------------|
| 3. Establish guidelines for the call for operations research proposals    | X X X                                                               | National IMS-arbovirus coordinator and national GT-Arbovirus          |                                                        |              |
| 4. Offer the countries generic protocols for operations research          | X X X                                                               | PAHO        |                                                                                                 |              |
| on the different components, taking into account bioethical aspects       |                                                                      |              |                                                                                                |              |

*Time frame: S=short-term (1 year), M=medium-term (2-4 years), L=long-term (5+ years)

4.3 Epidemiology component

The integrated epidemiological surveillance system for arboviral diseases is one of the basic and essential elements for managing arboviral disease prevention and control programs in the countries of the Region of the Americas. A timely and effective integrated surveillance system provides information for identifying high-risk situations and facilitates the design of interventions both in ordinary situations and in response to outbreaks and epidemics. The information generated by this surveillance system should permit a comprehensive analysis of information from the different components: epidemiology, integrated vector management, laboratory, environment, and patient care.

Integrated epidemiological surveillance means:

- The process of integrating information among the subsystems of the different components on a single platform or through a platform interface;
- Comprehensive information analysis;
- Developing prevention and control activities based on the generated information.

The evaluations of the national IMS-dengue strategies have shown progress in the environment component, including greater availability of information for calculating incidence and case-fatality, information on circulating viruses, and entomological surveillance data, as well as the development of tools that facilitate the acquisition of real-time information. IMS-arbovirus will help consolidate this progress, improving the information on the circulating chikungunya and Zika viruses. Although this information is currently limited to a few countries, it will be of great help in developing a regional proposal for a generic protocol for integrated epidemiological surveillance of arboviruses (dengue, chikungunya, and Zika) in the Americas. The content of this protocol would not be limited to epidemiological surveillance of dengue, chikungunya, and Zika, but would also include indicators from other subsystems of entomological and laboratory surveillance, as well as the inclusion of social and environmental indicators related to the dynamics of transmission of these diseases.
A critical issue identified in the Region’s integrated epidemiological surveillance is the lack of standard operational definitions and risk indicators to facilitate, among other things, stratification, a more accurate estimate of the burden of these diseases, and comparison of the data from all countries and territories.

The objectives of the integrated epidemiological surveillance system for arboviral diseases are to:

- Identify outbreaks and epidemics in a timely manner;
- Provide data for assessing the social and economic impact on affected communities;
- Monitor trends in the distribution and spread of dengue, chikungunya, and Zika in time, place, and person;
- Describe the circulation of the different DENV, CHIKV, and ZIKV serotypes and lineages and their potential clinical correlation with cases occurring in the same period;
- Include environmental, clinical, laboratory, and entomological surveillance information in the epidemiological analysis;
- Monitor the effectiveness of clinical management and improve the clinical characterization of diseases;
- Detect and characterize deaths from dengue, chikungunya, and Zika; and ensure surveillance of populations at risk, such as pregnant women, and other complications caused by arboviruses;
- Provide the necessary information to evaluate the effectiveness of dengue, chikungunya, and Zika prevention and control programs in order to facilitate planning and resource allocation, capitalizing on the lessons learned from the IMS-dengue evaluation in the different countries;
- Generate information that permits timely decision-making for actions to prevent and control arboviral diseases.

The integrated epidemiological surveillance system could include sentinel surveillance, a modality that until now has not usually been included in epidemiological surveillance systems. Sentinel surveillance will help monitor viral circulation, introduction of new serotypes, vector presence and behavior, and characterization of patients with serious forms of the disease, among other aspects. Furthermore, the generic protocol for integrated epidemiological surveillance of dengue, chikungunya, and Zika will become a tool to facilitate the comparison of data between countries and to improve the design of prevention and control actions.
Table 4-4. Results, indicators, sources, assumptions, and risks: epidemiology component

| Results                                                                 | Indicators                                                                 | Verification sources                                                                 | Assumptions/Risks                                                                 |
|------------------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| **R1** Having an integrated epidemiological surveillance system for arboviruses that optimizes information analysis to improve decision-making, with a view to having an impact on prevention and control activities | Number of countries implementing the integrated arbovirus surveillance system/ Total number of countries in the Region | Periodic country reports for the Region                                               | A standard regional protocol is accompanied by relevant instruments and routines for integrated arbovirus surveillance |
|                                                                        | Number of countries conducting an integrated analysis of arboviruses/ Total number of countries with integrated surveillance systems | Health Information Platform for the Americas (PLISA)                                 | There is an up-to-date standard for arbovirus surveillance in the countries, consistent with the regional protocol |
|                                                                        | Number of countries that make decisions using the generated information in the integrated system/ Total number of countries that have integrated surveillance systems | Report on external evaluations of the integrated arbovirus surveillance system in the countries | It is compulsory to report arbovirus in the countries of the Region               |

Table 4-5. Results and activities: epidemiology component

| Results                                                                 | Activities                                                                 |
|------------------------------------------------------------------------|----------------------------------------------------------------------------|
| **R1** Having an integrated epidemiological surveillance system for arboviruses that optimizes information analysis to improve decision-making, with a view to having an impact on prevention and control activities | **R1A1** Situation assessment of arboviral disease surveillance systems in the countries |
|                                                                        | **R1A2** Implementation of a single, standardized, integrated arbovirus surveillance system |
|                                                                        | **R1A3** Monitoring and evaluation of implementation of the epidemiological surveillance system for arboviral diseases |
|                                                                        | **R1A4** Analysis of information on the epidemiological risk of arboviral disease outbreak |
| Activities | Tasks | Time frame* | Responsible institution / person | Observations |
|------------|-------|-------------|--------------------------------|--------------|
| **R1A1** Situation assessment of arboviral disease surveillance systems in the countries | 1. Preparation of methodological guidelines for the situation assessment of the arboviral disease surveillance systems | X | International GT-Arbovirus and PAHO | Creation of international GT-Arbovirus |
| | 2. Inventory of arboviral disease surveillance systems | X | PAHO and national GT-Arbovirus | Information subsystems include laboratory, epidemiology, integrated vector management (entomological surveillance/control), health services, and health promotion |
| | 3. Preparation of a regional proposal for the integration of the surveillance information subsystems | X | PAHO and international GT-Arbovirus | Based on the results of the inventory and on evaluation of the technological capacity for integration |
| | 4. Approval of the proposal by countries | X | Ministries of Health, coordinator of the national GT-Arbovirus, steering group of the national IMS-arbovirus, with support from PAHO country office | Approved by the highest health authority in the country |
| **R1A2** Implementation of a single, standardized, integrated arbovirus surveillance system | 1. Preparation of the generic protocol for integrated epidemiological surveillance of arboviral diseases in the Americas | X | International GT-Arbovirus and PAHO | Adaptation of the generic dengue protocol to arboviral diseases, which will include surveillance of pregnant women and of other complications of arboviral disease Approved by the member countries |
| | 2. Management of resources to implement and maintain integrated surveillance systems | X | PAHO and Ministry of Health | Identifies the human resources and equipment needed to implement the integrated system |
| Activities | Tasks | Time frame* | Responsible institution / person | Observations |
|------------|-------|-------------|---------------------------------|--------------|
|            |       | S | M | L | National GT-Arbovirus with support from PAHO | When preparing the situation assessment of the existing subsystems and of the protocols and integration tools, the aim is to identify a methodology that harmonizes the integration of the arbovirus information system |
| 3. Implementation and maintenance of the surveillance system based on the generic protocol for integrated epidemiological surveillance of arboviral diseases in the Americas, adjusted to the situation in each country | | X | X | X | National GT-Arbovirus with support from PAHO |
| 4. Staff training with emphasis on the integrated analysis of the arboviral diseases | | X | X | X | International and national GT-Arbovirus with support from PAHO |
| 5. Preparation of reports based on standardized indicators that facilitate the comparison within the country (provinces, states, departments, etc.) and among the countries of the Region | | X | X | X | National GT-Arbovirus and PAHO |
| R1A3 Monitoring and evaluation of implementation of the epidemiological surveillance system for arboviral diseases | 1. Establish indicators for evaluating the quality and timeliness of information reported to the integrated epidemiological surveillance system for arboviral diseases | | | National GT-Arbovirus with support from the international GT-Arbovirus and PAHO | The reports consolidate the information from all subsystems for the preparation of an integrated report and analysis Health workers develop capacity to analyze existing information for timely decision-making |
| Activities                                                                 | Tasks                                                                 | Time frame* | Responsible institution / person                                                                 | Observations                                                                                           |
|---------------------------------------------------------------------------|----------------------------------------------------------------------|-------------|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| 2. Monitoring the operation of the surveillance system through integrated analysis | X X X                                                             | National GT-Arbovirus with support from the international GT-Arbovirus and PAHO | Verifies the operation of the integrated surveillance system                                       |
| 3. Preparation of at least two operations research activities a year, with a view to evaluating national or regional surveillance systems, including product evaluations | X X X                                                             | National GT-Arbovirus with support from the international GT-Arbovirus and PAHO | National team collaborates with evidence-based operations research                                   |
| 4. Feedback to contributing subsystems                                     | X X X                                                             | National GT-Arbovirus                                                   | Ensures the sustainability and usefulness of the integrated system                                |
| R1A4 Analysis of the information on the epidemiological risk of arboviral disease outbreak |                                                                    |                                                         |                                                                                                   |
| 1. Updating the epidemiological situation room to analyze the risk of arboviral disease outbreaks | X X X                                                             | General Directorate of Epidemiology and PAHO                            | In the situation room, risk would be assessed using all components of standardized instruments for the Region |
| 2. Preparation of timely epidemiological alerts                           | X X X                                                             | General Directorate of Epidemiology and PAHO                            | Consistent with the International Health Regulations (IHR-2005)                                   |
| 3. Work with the national GT-Arbovirus and the steering group of the national IMS-Arbovirus to adapt the information in existing communications plans (routine, risk, and crisis communication) | X X X                                                             | General Directorate of Epidemiology, IMS-Arbovirus coordinator, national GT-Arbovirus, and steering group of the national IMS-Arbovirus, with support from PAHO | Depending on the magnitude of the outbreak or epidemic, the risk and/or crisis communications plan is activated |
|                                                                          |                                                                    |                                                         | The team receives training in communication                                                       |
| Activities | Tasks | Time frame* | Responsible institution / person | Observations |
|------------|-------|-------------|----------------------------------|--------------|
| R1A4       | 4. Provision of information and guidance to the respective entities (political and technical levels, and general population) | X | X | X | Ministry of Health, IMS-arbovirus coordinator, national GT-Arbovirus, steering group of the national IMS-arbovirus, and groups or individuals responsible for communication in the Ministry of Health | For example, to other sectors beyond health, the news media, etc. |
|            | 5. Activation of the risk communication plan in response to an outbreak or epidemic in the Region | X | X | X | Ministry of Health with support from the IMS-arbovirus coordinator, steering group of the national IMS-arbovirus, and national GT-Arbovirus with support from PAHO | |
|            | 6. Monitoring and evaluation of interventions, and impact assessment | X | X | X | Ministry of Health, IMS-arbovirus, GT-Arbovirus coordinator, with support from PAHO | |

*Time frame: S=short-term (1 year), M=medium-term (2-4 years), L=long-term (5+ years)

### 4.4 Patient care component

Dengue is the most widespread mosquito-borne viral disease in the Americas and the one most frequently suspected in febrile patients. However, the recent introduction of two new arboviruses (CHIKV in late 2013 and ZIKV in 2015) has created a new challenge for public health in the Americas. These three arboviral diseases (dengue, chikungunya, and Zika virus disease) occur epidemically and have similar clinical manifestations, causing an illness that may be mainly febrile (dengue, chikungunya) or exanthematous (Zika). Other common symptoms are headache and body ache, including myalgia and joint manifestations, or they can cause joint pain (dengue), arthritis (chikungunya), or both (Zika). Edema of the extremities (chikungunya and Zika) and non-purulent conjunctivitis (Zika) may also occur. It is important to bear in mind that infection with any of these arboviruses may be asymptomatic or oligosymptomatic (60-80%) and that they may even occur simultaneously with other infections, further hindering differential diagnosis.

In dengue virus (DENV) infections, the identification of warning signs, nearly always during or after the fever dissipates, aids in clinical diagnosis and helps to categorize the severity of the illness and decide on proper patient care. In the vast majority of cases arboviral diseases are self-limiting, but they can
occasionally take severe forms, causing shock, hemorrhage (in mucus or organs), or serious organ damage that can lead to death. Chikungunya virus (CHIKV) infections can also be clinically severe. However, chikungunya patients can also develop post-acute or chronic joint disease lasting 21 to 90 days or from three months to more than two years, respectively; these sequelae can be incapacitating. Any of these three arboviral diseases can lead to autoimmune disease of the central nervous system (Guillain-Barré syndrome, encephalopathy, or other conditions) and visual impairment from optic neuritis. To date, ZIKV seems to be the only virus capable of producing congenital malformations, such as microcephaly.

The manifestations of these arboviral diseases are complex. Thus, IMS-Arbovirus includes contains key aspects aimed at improving clinical diagnosis and timely case management, early detection of warning signs of suspected dengue (mainly by personnel at the first and second level of care), and a well-managed first-line response. All this is critical for obtaining good clinical outcomes and reducing the number of unnecessary hospitalizations and progression to severe cases of these arboviral diseases. An important aspect of IMS-Arbovirus is training health workers to identify patients with severe arboviral disease, with emphasis on the third level of care (hospital care). When planning the frequency of these training activities, consideration should be given to such factors as staff turnover and recently graduated physician cohorts in order to ensure their ability to make the diagnoses. Timely management of arbovirus sequelae (chikungunya and Zika virus) is included in the training that health professionals should receive, with a view to improving patient care and facilitating the rehabilitation process.

IMS-Arbovirus contains communication strategies targeting the general public within the framework of health promotion in order to disseminate clear messages on prevention, seeking immediate care, and recognizing the warning signs of suspected dengue. These messages will encourage the population to visit health centers for timely, comprehensive medical care, which not only includes clinical management of the patient, but also allows health workers to offer recommendations on vector control to the family and community.

IMS-arbovirus seeks to develop lines of operations research to improve policies, interventions, and strategies for patient care in order to facilitate the characterization of severe cases and deaths from these diseases. It also seeks to strengthen research on the physiopathology of arboviral diseases in pregnant patients and newborns.

The goal is to reduce case-fatality from dengue, chikungunya, and Zika virus through these actions:

• Improve clinical and differential diagnosis for timely management of severe dengue, chikungunya, and Zika virus cases in order to prevent deaths from arboviral diseases;

• Boost the response capacity of primary and secondary services to reduce hospital overcrowding, which often impedes proper management of seriously ill patients;

• Improve the organization or reorganization of health services during outbreaks and epidemics, keeping up-to-date contingency plans in endemic countries and implementing these plans to prevent deaths from these diseases;

• Develop and strengthen the capacities of health care personnel and establish quality assurance in both public and private health services;

• Prepare and implement science-based training materials, maintaining a continuous education plan;
Within one week of a death, conduct an investigation (including autopsy information) to establish the primary cause of death and be able to identify circumstances and aspects of medical care that could be corrected or to which technical/administrative measures could apply, in accordance with each country’s laws.

There are currently no biomarkers for predicting which patients are likely to develop severe disease. However, more detailed information can be collected through integrated epidemiological surveillance using the sentinel site modality. It is often difficult to make a differential clinical diagnosis among arboviral diseases, which makes it necessary to conduct operations research to clinically characterize these diseases, based on reliable laboratory evidence.

**Table 4-7. Results, indicators, sources, assumptions, and risks: patient care component**

| Results                                                                 | Indicators                                                                                           | Verification sources                                                                                     | Assumptions/Risks                                                                                           |
|------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| R1 Improvement in the quality of clinical diagnosis, differential diagnosis, and integrated case management of suspected dengue, chikungunya, Zika, and other arboviral diseases in the Americas | Number of physicians trained in clinical diagnosis, differential diagnosis, and integrated case management of suspected dengue, chikungunya, Zika, or other arboviral diseases/ Total number of physicians in training plan | Registry of trained physicians                                                                        | Health workers lack the interest or commitment to participate in trainings                                    |
|                                                                        | Number of nurses trained in integrated case management of suspected dengue, chikungunya, Zika, or other arboviral diseases/ Total number of nurses in training plan | Registry of trained nurses                                                                             | Training program has guidelines and protocols for evaluating adherence                                     |
|                                                                        | Number of trained physicians and nurses who correctly follow the guidelines and protocols for case management of suspected dengue, chikungunya, Zika, and other arboviral diseases/ Total number of trained physicians and nurses | Results of the evaluations of trained personnel, based on audit reports on the quality of patient care and death audits | Job security of personnel                                                                                  |
|                                                                        | Number of public and private health facilities that correctly follow the guidelines and flow charts for patient care/ Total number of health facilities in the country | Death records                                                                                           | Frequent turnover in health staff                                                                         |
|                                                                        | Number of public health facilities that have and implement contingency plans/ Total number of public health facilities in the country | Registry of health facilities that follow the guidelines and flow charts for patient care               | Commitment of managers in public and private health facilities                                           |
|                                                                        | Case-fatality rate for each arboviral disease                                                       | Updated records of the implementation of the contingency plan in the health services                    | Sufficient supply of human, material, and financial resources                                            |
|                                                                        |                                                                                                     | Case records of units that treat the complications and sequelae of arboviral diseases                   | Existence and availability of updated guidelines for the care of patients with suspected arboviral disease, and contingency plans for arboviral disease outbreaks or epidemics |
|                                                                        |                                                                                                     | Epidemiological bulletins based on data                                                                 | Financing and structure available for integrated care of patients with sequelae or complications of arboviral disease |
|                                                                        |                                                                                                     |                                                                                                          | Lack of information on: trained physicians and nurses, deaths from dengue, units with                    |
| Results | Indicators | Verification sources | Assumptions/Risks |
|---------|------------|----------------------|-------------------|
|         |            | from surveillance systems | contingency plans, medical units with capacity to treat severe cases of arboviral disease |

**Table 4-8. Results and activities: patient care component**

| Results | Activities |
|---------|------------|
| **R1**  |            |
| Improvement in the quality of clinical diagnosis, differential diagnosis, and integrated case management of suspected dengue, chikungunya, Zika, and other arboviral diseases in the Americas | |
| **R1A1** | Timely and comprehensive management and proper monitoring of patients with suspected dengue, chikungunya, Zika and other arboviral diseases, based on the care guidelines and flow charts recommended by PAHO/WHO |
| **R1A2** | Preparation of health worker training modules containing the patient-care component of IMS-arbovirus, and the patient and community education component |
| **R1A3** | Reorganization of health services at the different levels of patient care during outbreaks/epidemics |
| **R1A4** | Achieving integration between epidemiological/laboratory surveillance and patient care; improving the final classification of deaths in cases of suspected dengue, chikungunya, Zika, and other arboviral diseases |
| **R1A5** | Development of lines of research to improve policies, interventions, and strategies for the clinical care of patients with suspected dengue, chikungunya, Zika, and other arboviral diseases |
| Activities | Tasks | Time frame* | Responsible institution / person | Observations |
|------------|-------|-------------|----------------------------------|--------------|
| **R1A1**  | Timely and comprehensive management and proper monitoring of patients with suspected dengue, chikungunya, Zika and other arboviral diseases, based on the care guidelines and flow charts recommended by PAHO/WHO | | | |
| **R1A1**  | 1. Adapt national guidelines, based on updated PAHO/WHO recommendations (Dengue guidelines for patient care, 2nd edition; Tool for the diagnosis and care of patients with suspected arboviral diseases; and Clinical arboviral diseases guidelines for patient care, 1st edition) | X | Ministry of Health at the national and subnational level, national GT-Arbovirus with support from the international GT-Arbovirus and PAHO | These guidelines include the management of severe cases and special conditions (pregnant women, newborns, older adults, comorbidities) |
|          | 2. Promote timely, quality reporting of clinical and laboratory information on cases of suspected dengue, chikungunya, Zika, and other arboviral diseases (following care guidelines and flow charts recommended by PAHO/WHO) by health care workers to the surveillance system | X | Epidemiological surveillance directors and managers in medical care units at the primary, secondary, and tertiary levels | |
| **R1A1** | Timely and comprehensive management and proper monitoring of patients with suspected dengue, chikungunya, Zika and other arboviral diseases, based on the care guidelines and flow charts | | | |
|          | 3. Develop and promote the use of comprehensive online clinical courses to facilitate the continuous training of available health workers in the different countries | X | PAHO, with support from the international GT-Arbovirus | Based on the prepared guidelines |
|          | 4. Provide training in screening, clinical diagnosis, and timely management, primarily for health personnel at all levels of care | X | PAHO at the sub-regional level, countries and Ministry of Health at the national and subnational levels, all with support from the international and national GT-Arbovirus | |
| Activities | Tasks | Time frame* | Responsible institution / person | Observations |
|------------|-------|-------------|---------------------------------|--------------|
| recommended by PAHO/WHO | 5. Strengthen the clinical laboratory network to accompany case management of suspected dengue, chikungunya, Zika, and other arboviral disease | X | X | Health ministries, with support from PAHO | Examinations are essential for proper case management |
| | 6. Evaluate the quality of care provided to patients with suspected dengue, chikungunya, Zika, or other arboviral diseases, including severe cases and deaths | X | X | Health ministries, case review committees in medical care units at all levels, national and international GT-Arbovirus, and PAHO | This evaluation should be carried out by the local, national, and international committees |
| | 7. Guarantee the distribution and implementation of guidelines, including the development of new technologies (applications for mobile devices) to allow easy access to the guidelines | X | X | Health ministries, National GT-Arbovirus, with support from the international GT-Arbovirus and PAHO |
| R1A2 Preparation of health worker training modules containing the patient-care component of IMS-arbovirus, and the patient and community education component | 1. Review and standardize the case definition and the diagnostic and clinical laboratory criteria for severe cases caused by other arboviruses, as currently exist for dengue | X | X | PAHO, health ministries, and the international and national GT-Arbovirus | Based on operations research to clinically characterize laboratory-confirmed cases |
| | 2. Dissemination and distribution of the contents of training modules | X | X | PAHO and health ministries |
| | 3. Include or strengthen undergraduate and graduate education curricula for health professionals on the subject of dengue, chikungunya, Zika, and other arboviral diseases | X | X | Health and education ministries at the regional, national, and local level | Prioritize subjects according to local epidemiology |
| Activities | Tasks | Time frame* | Responsible institution / person | Observations |
|------------|-------|-------------|---------------------------------|--------------|
| R1A2       | 4. Train physicians and other health professionals in communications for clear messaging to the population on prevention, immediate treatment and management of warning signs of dengue, and severe manifestations of dengue, chikungunya, Zika, and other arboviral diseases, according to the clinical phase of each disease | X X X | Groups or individuals responsible for communication in the Ministry of Health and international and national GT-Arbovirus, with support from PAHO | This involves how to prepare health workers to give key messages in the mass media |
| R1A3       | 1. Train health facility managers in health service management and organization | X X X | Ministry of Health, coordinator of the IMS-arbovirus and National GT-Arbovirus, with support from PAHO | Involve the local and regional health authorities |
|            | 2. Organize the screening, patient flow, clinical monitoring, and hospitalization areas in every institution, by level of care | X X | Directors of health units | |
|            | 3. Maintain adequate integrated vector control in health institutions at all levels | X X X | Directors of health and vector control units | |
|            | 4. Annually review and adjust hospital contingency plan | X X X | Ministry of Health, directors of health units and national GT-Arbovirus | |
| Activities | Tasks                                                                 | Time frame* | Responsible institution / person | Observations                                                                                                                                 |
|------------|-----------------------------------------------------------------------|-------------|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
|            | 5. Continuous training workshops for public and private health personnel on the organization of health services, including outbreak response | X X X | PAHO and health ministries, with support from the international and national GT-Arbovirus at regional, national, and local levels | PAHO will be responsible for regional training. Health ministries will be responsible for national training                                   |
| R1A4       | Achieving integration between epidemiological/laboratory surveillance and patient care; improving the final classification of deaths in cases of suspected dengue, chikungunya, Zika, and other arboviral diseases | 1. Strengthen systems for sending specimens, accompanied by all requested clinical information, on patients, severe cases, deaths, and pregnant women with suspected dengue, chikungunya, Zika, or other arboviral diseases | X X | Directors of primary, secondary, and tertiary care units | This plays an important role in ensuring that the case is properly classified in the medical unit |
|            | 2. Prepare or improve guidelines and protocols for post-mortem research and diagnosis of cases with suspected dengue, chikungunya, Zika, and other arboviral diseases | X X | Ministry of Health at the national level, with support from GT-Arbovirus and PAHO |                                                                                            |
|            | 3. Create a commission for the review of suspected deaths from dengue, chikungunya, Zika, and other arboviral diseases, at the local, regional, and national level | X X X | Ministry of Health at all levels | Consisting of: clinical physicians, laboratory personnel, epidemiologists, pathologists                                                                 |
| R1A5       | Development of lines of research to improve policies, interventions, and clinical research activities | 1. Include academia (universities, institutes) in clinical research activities | X X X | PAHO, Ministry of Health, international and national GT-Arbovirus |                                                                                            |
| Activities | Tasks | Time frame* | Responsible institution / person | Observations |
|------------|-------|-------------|----------------------------------|--------------|
| strategies for the clinical care of patients with suspected dengue, chikungunya, Zika, and other arboviral diseases | 2. Clinically characterize patients with dengue, chikungunya, Zika, and other arboviral diseases based on reliable laboratory evidence that supports the differential diagnosis | X X X | PAHO, health ministries, international and national GT-Arbovirus, with support from academia | Characterize all cases (mild, moderate, severe) |
| | 3. Use existing and available databases to generate the information needed to improve health policies, interventions, and strategies | X X | Ministry of Health and academia | |
| | 4. Strengthen research on the physiopathology of arboviral diseases | X X X | Academia and health ministries | |

*Time frame: S=short-term (1 year), M=medium-term (2-4 years), L=long-term (5+ years)

4.5 Laboratory component

Laboratories play a key role in generating timely and quality information for decision-making on integrated epidemiological surveillance, through the serological and molecular diagnosis of circulating arboviruses. IMS-arbovirus strategically strengthens the national reference laboratories (NRLs) with support from PAHO/WHO collaborating centers (WHOCCs) for arbovirus diagnosis and centers of excellence, facilitating the exchange and transfer of technology throughout the Americas. In this regard, priority is given to strengthening national laboratories and their internal networks, with particular attention to quality management systems aimed at ensuring proper laboratory surveillance, while promoting the harmonization of diagnostic algorithms and case classification of circulating arboviruses (DENV, CHIKV, and ZIKV, among others).
| Results | Indicators | Verification sources | Assumptions/ Risks |
|---------|------------|----------------------|-------------------|
| R1      | Number of national reference laboratories or laboratories designated by the national authorities that are RELDA members/ Number of national reference laboratories or laboratories designated by the national authorities | RELDA annual reports and website | Commitment of authorities |
|         | Number of national reference laboratories or laboratories designated by the national authorities with an established quality management system/ Number of national reference laboratories or laboratories designated by the national authorities | Epidemiological bulletins and laboratory reports | High turnover of skilled workers |
|         | Number of national reference laboratories or laboratories designated by the national authorities with algorithms and protocols aligned with the laboratory diagnosis manual in the context of PAHO IMS-arbovirus/ Number of national reference laboratories or designated laboratories | RELDA report on the survey of capacities of member laboratories in the network | Availability of economic resources |
|         | Number of national reference laboratories or laboratories designated by the national authorities with installed platforms for serological diagnosis/ Number of national reference laboratories or designated laboratories | System manual on institutional quality management | Capacity to procure and distribute critical reagents |
|         | Number of national reference laboratories or laboratories designated by the national authorities with installed platforms for molecular diagnosis/ Number of national reference laboratories or designated laboratories | Manual on standard laboratory operating procedures | Country regulations on imports and exports of biologicals |
|         | Number of national reference laboratories or laboratories designated by the national authorities with capacity for diagnosing and monitoring DENV, CHIKV, and ZIKV/ Number of national reference laboratories or designated laboratories | External evaluation report on the quality of national laboratories | |
|         | Number of national reference laboratories or laboratories designated by the national authorities with capacity for detection of yellow fever virus (YFV)/ Number of national reference laboratories or designated laboratories | National laboratory human resources training plan (reference laboratories or laboratories designated by the national authorities for arbovirus diagnosis and surveillance) and RELDA | |
|         | Number of national reference laboratories or laboratories designated by the national authorities with capacity for detection of yellow fever virus (YFV)/ Number of national reference laboratories or designated laboratories | Laboratory contingency plan for epidemics | |

The Arbovirus Diagnosis Laboratory Network (RELDA) ensures the operation of the laboratory component of IMS-arbovirus. RELDA was created in 2008 to strengthen the scientific and technical capacities of the Region’s national laboratories and to establish a standard protocol for the diagnosis of dengue and other arboviruses.
RELDA will support the implementation of a sustainable training plan that includes serological and molecular diagnosis, biosafety, good laboratory practices, and technology transfer, to increase the number of laboratories capable of producing reagents of the necessary quality for arbovirus diagnosis.

IMS-arbovirus will make it possible to evaluate all RELDA member laboratories, as well as laboratories with quality management policies and standard protocols. The PAHO/WHO website has a RELDA page with key information on each center and laboratory, structures, resources, technical expertise, and research projects to make updated information accessible to every country and territory.

**Table 4-11. Results and activities: laboratory component**

| Results | Activities |
|---------|------------|
| R1      | R1A1: Strengthen the response capacity of national laboratories and their networks |
|         | R1A2: Ensure the flow of information from the national laboratories and their networks to the different health system stakeholders and IMS-arbovirus components |
|         | R1A3: Harmonize regional algorithms and protocols for arboviral disease detection and surveillance with PAHO technical guidance on arbovirus diagnosis |
|         | R1A4: Strengthen quality management system processes |
|         | R1A5: Establish priority lines of operations research to strengthen both the diagnosis and integrated epidemiological surveillance of arboviral diseases |

**Table 4-12. Activities, tasks, time frames, and responsible institution or person: laboratory component**

| Activities | Tasks | Time frame* | Responsible institution / person | Observations |
|------------|-------|-------------|----------------------------------|--------------|
| R1A1       | 1. Prepare and disseminate technical guidance on arbovirus diagnosis | X | PAHO, PAHO/WHO collaborating centers, RELDA, centers of excellence and national reference laboratories of the health ministries | |
| Activities | Tasks                                                                 | Time frame* | Responsible institution / person |
|------------|-----------------------------------------------------------------------|-------------|---------------------------------|
| **R1A1**  | Strengthen the response capacity of national laboratories and their networks |             | PAHO, RELDA PAHO/WHO collaborating centers and centers of excellence, health ministries, international and national GT-Arbovirus |
|            | 2. Develop a sustainable training plan that includes serological, molecular, and virologic diagnosis, biosafety, good laboratory practices, sequencing and analysis, and phylogenetic analysis | X           | RELDA, PAHO/WHO collaborating centers and centers of excellence, health ministries |
|            | 3. Transfer technology to increase the number of laboratories with in-house capacity to produce reagents of the necessary quality for the diagnosis of arboviral diseases | X           | PAHO, RELDA, PAHO/WHO collaborating centers and centers of excellence, health ministries |
|            | 4. Identify collaborating centers and centers of excellence to prepare and store an essential minimum volume of biologicals for immediate distribution to the countries in emergencies | X           | PAHO/WHO collaborating centers and centers of excellence, health ministries |
|            | 5. Increase the capacity for viral detection in mosquitoes in the entomo-virologic surveillance network. | X           | PAHO/WHO collaborating centers and centers of excellence, national reference laboratories or laboratories designated by the national authorities for arbovirus diagnosis and surveillance, vector control programs, and national GT-Arbovirus | Close collaboration with the Integrated Vector Management (IVM) component |
|            | 6. Transfer new diagnostic technologies based on availability and epidemiological situation | X           | RELDA, PAHO, PAHO/WHO collaborating centers and centers of excellence, Ministry of Health | New protocols/platforms |
|            | 7. Develop a model laboratory contingency plan for epidemics | X           | PAHO, RELDA, Ministry of Health, and National GT-Arbovirus | Guidelines of the contingency plan (annex) |
| Activities                                                                 | Tasks                                                                 | Responsible institution / person                                      | Observations                                                                                                                                                                                                |
|---------------------------------------------------------------------------|-----------------------------------------------------------------------|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8. Strengthen national laboratory networks for diagnosis and surveillance through decentralization | X  X  X                                                              | PAHO, health ministries, national reference laboratories               |                                                                                                                                                                                                             |
| **R1A2** Ensure the flow of information from the national laboratories and their networks to the different health system stakeholders and IMS-arbovirus components | **1. Participate in the drafting of national protocols for integrated epidemiological surveillance** | Coordinator of the IMS-arbovirus, national reference laboratories or laboratories designated by the national authorities for arbovirus diagnosis and surveillance, departments of epidemiological surveillance |                                                                                                                                                                                                             |
| **2. Participate in periodic IMS-arbovirus monitoring meetings**           | X  X  X                                                              | IMS-arbovirus coordinator, national reference laboratories or laboratories designated by the national authorities for arbovirus diagnosis and surveillance, and other components of IMS-arbovirus |                                                                                                                                                                                                             |
| **3. Integrate case and laboratory surveillance information systems to guarantee the flow and availability of information at different national levels** | X  X                                                                  | PAHO, national reference laboratories or laboratories designated by the national authorities for arbovirus diagnosis and surveillance, and epidemiological surveillance departments of the health ministries |                                                                                                                                                                                                             |
| **4. Create a system for collecting regional virologic data and information** | X  X  X                                                              | PAHO, RELDA, international GT-Arbovirus                               | Integrated surveillance system includes laboratory indicators                                                                                                                                                   |
| **5. Periodically update the RELDA website**                              | X  X  X                                                              | PAHO, RELDA coordinator                                               |                                                                                                                                                                                                             |
| **6. Participate in annual meetings of RELDA**                            | X  X  X                                                              | PAHO and RELDA laboratories                                            |                                                                                                                                                                                                             |
| Activities | Tasks | Time frame* | Responsible institution / person | Observations |
|------------|-------|-------------|----------------------------------|--------------|
| **R1A3** Harmonize regional algorithms and protocols for arboviral disease detection and surveillance with PAHO technical guidance on arbovirus diagnosis | 1. Prepare, update, and disseminate protocols and algorithms for the detection and diagnosis of arboviral diseases, based on the national, regional, and global epidemiological situation | X X X | PAHO, national reference laboratories or laboratories designated by the national authorities for arbovirus diagnosis and surveillance, RELDA, PAHO/WHO collaborating centers, international GT-Arbovirus | |
| | 2. Prepare protocols and guidelines for the evaluation of diagnostic methodologies | X X | PAHO, national laboratories (of reference or designated by the national authorities for arboviral diagnosis and surveillance) | |
| | 3. Evaluation current diagnostic algorithms | X X | PAHO, RELDA, international GT-Arbovirus | |
| **R1A4** Strengthen quality management system processes | 1. Implement quality management systems in laboratories | X X | National reference laboratories or laboratories designated by the national authorities for arbovirus diagnosis and surveillance, PAHO/WHO collaborating centers, RELDA | |
| | 2. Conduct visits to review and evaluate quality assurance procedures associated with laboratory surveillance of arboviral diseases | X X X | PAHO/WHO collaborating centers, RELDA, national laboratories, international and national GT-Arbovirus | |
| | 3. Organize external quality assurance (EQA) programs | X X X | PAHO/WHO collaborating centers, RELDA, national reference laboratories or laboratories designated by the national authorities for arbovirus diagnosis and surveillance | |
| | 4. Participate in national and international external quality assurance (EQA) programs | X X X | PAHO/WHO collaborating centers, RELDA, national reference laboratories or laboratories designated by the national authorities for arbovirus diagnosis and surveillance, international and national GT-Arbovirus | |
| Activities                                                                 | Tasks                                                                 | Time frame* | Responsible institution / person                           | Observations                                                                 |
|---------------------------------------------------------------------------|----------------------------------------------------------------------|-------------|------------------------------------------------------------|-----------------------------------------------------------------------------|
| R1A5 Establish priority lines of operations research to strengthen both the diagnosis and integrated epidemiological surveillance of arboviral diseases | 1. Multicenter evaluations of commercial kits (including rapid tests) | X X X       | PAHO/WHO collaborating centers, RELDA                      | To submit proposals for small grants and subsidies                          |
|                                                                           | 2. Evaluate the usefulness of different biological specimens, viral kinetics, and prognostic markers | X X X       | PAHO/WHO collaborating centers, RELDA, national reference laboratories or laboratories designated by the national authorities for arbovirus diagnosis and surveillance |                                                                             |
|                                                                           | 3. Develop and evaluate new serological tools                        | X X X       | PAHO/WHO collaborating centers, RELDA                      |                                                                             |
|                                                                           | 4. Evaluate viral detection in mosquitoes as an entomovirologic indicator within comprehensive epidemiological surveillance | X X X       | PAHO/WHO collaborating centers, RELDA, national reference laboratories or laboratories designated by the national authorities for arbovirus diagnosis and surveillance | In coordination with the integrated vector management and epidemiology components |
|                                                                           | 5. Implementation strategies for arboviral genomic surveillance      | X X X       | PAHO/WHO collaborating centers, RELDA, national reference laboratories or laboratories designated by the national authorities for arbovirus diagnosis and surveillance | VIGENDA: Project for genomic monitoring of dengue virus in the Americas        |

*Time frame: S=short-term (1 year), M=medium-term (2-4 years), L=long-term (5+ years)

4.6 Integrated vector management component

Integrated vector management (IVM) is a rational decision-making process to optimize the use of resources in entomological surveillance and vector control. For this reason, its structure includes the appropriate management of available resources (human, logistic, and methodological, among others) for planned, sustainable technical coordination of actions in vector control programs. These interventions are
strengthened by integrating various control, surveillance, communication, and community participation methodologies, and by the participation of other sectors beyond the health sector.

Within the framework of IMS-arbovirus, IVM includes the following processes:

- Contribution of entomological surveillance results to ensure evaluation of entomological risks and transmission dynamics based on integrated entomological surveillance (i.e., a system that considers data from epidemiological, laboratory, entomological, environmental, and clinical sources, among others, analyzed in the context of IMS-arbovirus), factors that favor vector proliferation and dispersion, and vectoral capacity;

- Selection of internationally validated and accepted vector prevention and control methods that are based on the best available evidence on the biology of the vector, the environment, and the transmission and morbidity of the disease;

- Utilization of multiple types of interventions, with defined frequency and coverage, in synergistic and synchronized combination;

- Interaction of the health sector with other public and private sectors related to environmental management, education, nongovernmental organizations (NGOs), tourism, and agriculture, among others whose work has an impact on preventing and reducing the risk of vector-borne transmission;

- Integration, in terms of shared responsibility of individuals, families, and communities to strengthen and ensure the sustainability of vector surveillance and control processes at the local level;

- Establishment of a legal framework that permits the implementation of IVM as a theoretical and practical model that can help to control arboviral diseases.

Despite the efforts that countries have made to develop and implement IMS-dengue, and due to various factors, the adoption and development of entomological surveillance and vector control, along with the other components, has not been sufficient to stop the transmission of dengue and other arboviruses. As a result, IMS-arbovirus seeks to strengthen the operationality of IVM through the methodological standardization of entomological surveillance strategies and vector prevention and control activities, both between epidemics and during outbreaks and epidemics. IMS-arbovirus is a methodological tool that enables countries to consolidate interactions between the components of national control programs and other sectors (education, environment, NGO, public, private, etc.) strengthening entomological surveillance and vector prevention and control, based on IVM.

It is equally important to consider that IMS-arbovirus proposes operations research as a way to acquire basic operational knowledge to provide feedback for decision-making. This will permit timely, effective interventions and, in turn, can improve the tools used to measure the impact of these interventions. Furthermore, IVM helps to strengthen comprehensive entomological surveillance systems in which several indicators are monitored, such as resistance to insecticides and viral circulation in mosquitoes, among others. Countries can make use of existing capacities at PAHO/WHO collaborating centers to update their records on the vectors’ response to the insecticides used in control activities, or to map sentinel areas of viral circulation in mosquitoes. In order to achieve this strengthening, it is essential to
provide workers with continuous training so that they have the technical and operational capacities to ensure the proper use of surveillance and control techniques, supervision, monitoring, and evaluation of entomological surveillance and vector control activities. Finally, community empowerment in the prevention and control of arboviral diseases can be achieved through behavioral impact, which is one of the key elements of IVM.

Table 4-13. Results, indicators, sources, assumptions, and risks: integrated vector management component

| Results                                      | Indicators                                                                 | Verification sources                                                                 | Assumptions/Risks                                                                 |
|----------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| **R1** Integrated arbovirus vector management implemented | Number of countries that have implemented an integrated entomological surveillance system / Total number of countries | Periodic country reports                                                             | Plan of Action on Entomology and Vector Control 2018-2023 implemented by countries |
|                                              | Number of countries that have reviewed and updated manuals on entomological surveillance and vector control, based on IVM / Total number of countries | Field evaluation by expert teams                                                     | Political acceptance by countries                                                 |
|                                              | Number of countries with at least one interinstitutional agreement for IVM implementation / Total number of countries | Published documents on IVM-based entomological surveillance and vector control       | Sufficient technical and operational capacity                                    |
|                                              | Number of countries that have implemented a system for continuous training on entomological monitoring and vector control / Total number of countries | Documents on interinstitutional agreements                                           | Vector control programs structurally strengthened                                |
|                                              |                                                                          | Documents on training activities held                                               | Operational entomological surveillance system                                    |

Table 4-14. Results and activities: integrated vector management component

| Results                                      | Activities                                                                 |
|----------------------------------------------|---------------------------------------------------------------------------|
| **R1** Integrated arbovirus vector management implemented | **R1A1** Implement an integrated entomological surveillance system |
|                                              | **R1A2** Adjust transmission prevention and vector control strategies to new epidemiological and methodological scenarios in order to implement integrated, targeted, effective, and timely interventions |
**Table 4-15. Activities, tasks, time frames, and responsible institution or person: integrated vector management component**

| Activities                              | Tasks                                                                 | Time frame* | Responsible institution / person                                           | Observations                                                                                                                                                                                                 
|-----------------------------------------|----------------------------------------------------------------------|-------------|---------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| **R1A1**                                | Implement an integrated entomological surveillance system            |             | PAHO, health ministries, international and national GT-Arbovirus,        | It is important to include recommendations on the development of indicators to evaluate behavioral changes in the human beings; the academy should be invited these meetings                                                |
|                                         | 1. Hold meetings with experts to:                                   | X           | PAHO/WHO collaborating centers                                            |                                                                                                                                                                                                     |
|                                         | a. Define a set of indicators (eggs, larvae, pupae, and adults) in  |             |                                                                           |                                                                                                                                                                                                     |
|                                         |   coordination with the epidemiology teams, for decision-making     |             |                                                                           |                                                                                                                                                                                                     |
|                                         |   based on entomological monitoring                                 |             |                                                                           |                                                                                                                                                                                                     |
|                                         | b. Define, standardize, and prepare documents that describe the     |             |                                                                           |                                                                                                                                                                                                     |
|                                         |   methodologies for integrated entomological monitoring of vectors   |             |                                                                           |                                                                                                                                                                                                     |
|                                         |   within the framework of IMS-Arbovirus                             |             |                                                                           |                                                                                                                                                                                                     |
|                                         | c. Share entomological surveillance methodologies with the countries | X           |                                                                           |                                                                                                                                                                                                     |
|                                         |   in order to operationalize them                                    |             |                                                                           |                                                                                                                                                                                                     |
|                                         | 2. Evaluate installed capacity and the need for entomological       | X           | Health ministries at the national and subnational level, national        | Design an evaluation of needs for the vector control                                                                                                                                                    |
|                                         |   surveillance                                                      |             | GT-Arbovirus                                                             |                                                                                                                                                                                                     |
|                                         | 3. Participate in a regional network for surveillance of insecticide | X X X       | PAHO, health ministries, international and national GT-Arbovirus,        | Articulation in existing networks Generate a comprehensive plan of surveillance and management of insecticide resistance                                                                           |
|                                         |   resistance                                                        |             | PAHO/WHO collaborating centers                                            |                                                                                                                                                                                                     |
|                                         | 4. Based on the results obtained in point 2 (above), implement a    | X X X       | PAHO, health ministries, international and national GT-Arbovirus,        | It is essential for countries to have the necessary human and technical resources to maintain this system                                                                                             |
|                                         |   continuous training program on integrated entomological           |             | PAHO/WHO collaborating centers                                            | National capacity-building plans should be aligned with the regional plan and be mutually supportive                                                                                                  |
|                                         |   surveillance to strengthen programs and technical capacities at   |             |                                                                           |                                                                                                                                                                                                     |
|                                         |   the managerial and operational levels                              |             |                                                                           |                                                                                                                                                                                                     |
| Activities | Tasks | Time frame* | Responsible institution / person | Observations |
|------------|-------|-------------|----------------------------------|--------------|
| 5. Participate in the entomovirologic laboratory network of the Americas |     | X X         | PAHO, health ministries, international and national GT-Arbovirus, PAHO/WHO collaborating centers, and academia | Adapted to countries’ needs, priorities, and interests. Take advantage of existing installed capacities (RELDA). Make the PAHO guide available. |
| 6. Promote operations research to guide decision-making on entomological surveillance actions and activities |     | X X X       | PAHO, health ministries, international and national GT-Arbovirus, PAHO/WHO collaborating centers, and academia | Investigate improving/developing entomological indicators to better predict entomological risk. Support the development of new technologies for entomological surveillance and vector control. |
| **R1A2** Adjust transmission prevention and vector control strategies to new epidemiological and methodological scenarios in order to implement integrated, targeted, effective, and timely interventions | 1. Hold meetings with experts to: a. Refocus the use of vector control methods in alignment with PAHO’s new operational guidelines b. Prepare documents that describe, standardize, and evaluate vector control methodologies c. Share vector control methodologies with the countries in order to operationalize them | X X X       | PAHO, health ministries, international and national GT-Arbovirus, PAHO/WHO collaborating centers, and academia | Support pilot projects for implementation of the new operational model for *Aedes* control developed by PAHO. This is a continuous process. |
| | 2. Evaluate vector control capacities and needs | X     | National and subnational health ministries, national GT-Arbovirus | Should be linked to R1A1, task 2. |
| Activities | Tasks                                                                                                                                                                                                 | Time frame* | Responsible institution / person                                                                 | Observations                                                                                                                                                                                                 |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| R1A2       | Adjust transmission prevention and vector control strategies to new epidemiological and methodological scenarios in order to implement integrated, targeted, effective, and timely interventions                              |             | PAHO, Ministry of Health, international and national GT-Arbovirus, PAHO/WHO collaborating centers, and academia | Some guidelines on new technologies are available from the WHO Vector Control Advisory Group (VCAG-WHO), the PAHO Technical Advisory Group on Public Health Entomology (TAG-PHE), and national TAG-PHEs. All interventions (chemical, community, environmental, etc.) should be evaluated. Evaluating the impact of control interventions is an important part of a vector control program |
|            | 3. Include a comprehensive plan for systematic evaluation of processes and impacts in national vector control programs                                                                            | X X X       | PAHO, Ministry of Health, IMS-Arbovirus coordinator, international and national GT-Arbovirus, PAHO/WHO collaborating centers, and academia | This activity is linked to the Regional Training Plan on Public Health Entomology and Vector Control that PAHO is preparing. Workshops (theory and practice)                                                                 |
| Activities | Tasks | Time frame* | Responsible institution / person | Observations |
|------------|-------|-------------|---------------------------------|--------------|
| R1A2       | Adjust transmission prevention and vector control strategies to new epidemiological and methodological scenarios in order to implement integrated, targeted, effective, and timely interventions | 7. Support the development of methodologies and/or tools that promote the empowerment of communities, families, and individuals in order to work together to improve transmission prevention and vector control | PAHO, health ministries, Dept. of Health Promotion and Communication, international and national GT-Arbovirus, PAHO/WHO collaborating centers, and academia | Health Promotion and Communication |

*Time frame: S=short-term (1 year), M=medium-term (2-4 years), L=long-term (5+ years)

### 4.7 Environment component

The transmission of arboviral diseases depends on the presence of various social and environmental determinants. Prevention, control, and modification of these determinants is dependent not only on vector prevention and control programs within the health sector, but also on IMS-arbovirus and the WHO Global Strategy for 2012-2020, which emphasize an interprogrammatic, intersectoral, and interinstitutional approach for proper implementation within the framework of development agendas. It is also very important to create a legal framework to help reduce the most common breeding sites, which are created by construction, improper disposal of tires, barrels, water storage tanks, and other containers.

Several initiatives in the Region have led to laws that favor the elimination of breeding sites in countries such as Brazil, Costa Rica, El Salvador, Panama, and Paraguay. However, climate change, lack of proper solid waste collection, constant shortages that force people to store water, and uncontrolled urban development are some areas that require political attention at the highest level, as well as participation by all stakeholders, especially international cooperation.

With respect to eliminating breeding sites in homes, achieving behavioral change in families is an action that should not be postponed. This should be done within the framework of environmental sanitation activities carried out by local governments and it will require the participation of multidisciplinary teams that can investigate how to achieve the desired changes, taking into account the culture and special features of each place.

Interprogrammatic management means joint action by at least the following programs within the health sector: vector prevention and control, environmental health, risk management, and health promotion.
A plan means a set of actions that interprogrammatic management should implement in at least the following areas (see Figure 4-1):

1. Setting environmental targets associated with arboviral diseases (standards);
2. Analyzing the health risks associated with environmental determinants;
3. Including the health component in environmental impact assessments associated with infrastructure improvement projects;
4. Conducting research on the relationship between health and environment to support decision-making;
5. Developing capacities to strengthen human resources for health;
6. Using communication tools to achieve community commitment, for example, communication for behavioral impact (COMBI); these can be adapted by countries;
7. Forging partnerships with other relevant sectors to implement these actions.

These plans should promote people-centered local actions and they should be context-specific, comprehensive, multisectoral, focused on disease prevention and health promotion, and within a framework of protection and empowerment.

Figure 4-1. Areas of the interprogrammatic action plan
Table 4-16. Results, indicators, sources, assumptions, and risks: environment component

| Results                                                                 | Indicators                                                                 | Verification sources                                                                 | Assumptions/Risks                                                                 |
|------------------------------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| R1                                                                     | 100% of countries have officially formed interprogrammatic management working groups by 2019 | Country reports (participating entities, management and compliance agreements)       | Permanent political commitment at the highest level                               |
|                                                                        | 100% of countries are implementing interprogrammatic plans by 2020         | Interprogrammatic plans                                                              | Actors that can influence environmental management and help reduce transmission risks participate actively in the working groups |
|                                                                        |                                                                           | Monitoring and supervisory visits                                                    | A legal framework for the environment and health is in implementation, as well as management agreements with stakeholder institutions |

Table 4-17. Results and activities: environment component

| Results                                                                 | Activities                                                                 |
|------------------------------------------------------------------------|----------------------------------------------------------------------------|
| R1                                                                     | R1A1 Form interprogrammatic groups at the national and subnational level  |
|                                                                        | R1A2 Develop and evaluate interprogrammatic plans that support environmental management in order to reduce the vector population and prevent arboviral diseases |
|                                                                        | R1A3 Develop a regional project to demonstrate participatory research at the country level aimed at addressing the environmental determinants of arboviral diseases through strengthened community resilience |
|                                                                        | R1A4 Facilitate the integration of transectoral groups made up of public- and private-sector actors involved in environmental management at the national and subnational level, according to the priorities in each country |
| Activities | Tasks                                                                 | Time frame* | Responsible institution / person | Observations                                                                 |
|------------|------------------------------------------------------------------------|-------------|----------------------------------|-------------------------------------------------------------------------------|
| R1A1       | Form interprogrammatic groups at the national and subnational level 1 | X           | Ministry of Health                |                                                                               |
|            | 1. Build the profile of group members                                 | X           | X                                |                                                                               |
|            | 2. Identify actors in health sector programs based on the defined     |             |                                  |                                                                               |
|            |   profile, and establish the corresponding responsibilities for      | X           |                                  |                                                                               |
|            |   implementation in the respective spheres of activity                | X           |                                  |                                                                               |
| R1A1       | Form interprogrammatic groups at the national and subnational level  | X           | Ministry of Health                |                                                                               |
|            | 3. Institutionalize national and subnational interprogrammatic groups  | X           |                                  |                                                                               |
|            | 4. Conduct training on implementation of actions by the groups formed  | X           |                                  |                                                                               |
| R1A2       | Develop and evaluate interprogrammatic plans that support environmental | X           | Ministry of Health                | Training would focus on environmental health risk assessment, management, and |
|            | management in order to reduce the vector population and prevent       |             |                                  | communication                                                                 |
|            |   arboviral diseases                                                   | X           |                                  |                                                                               |
|            | 1. Plan and implement interprogrammatic activities                    | X           |                                  |                                                                               |
|            | 2. Monitor and evaluate implementation of the plans                   | X           |                                  |                                                                               |
|            | 3. Evaluate the impact of the plans                                   | X           |                                  |                                                                               |
| R1A3       | Develop a regional project to demonstrate participatory research at   | X           | Ministry of Health                |                                                                               |
|            |   the country level aimed at addressing the environmental              |             |                                  |                                                                               |
|            |   determinants of                                                     | X           |                                  |                                                                               |
|            | 1. Identify the country and the public institution leading the project | X           |                                  |                                                                               |
|            | 2. Identify other actors who will participate in project               | X           |                                  |                                                                               |
|            |   implementation                                                      | X           |                                  |                                                                               |
|            | 3. Design, implement, monitor, and evaluate the project               | X           | X                                | Ministry of Health                |                                                                               |

1 The interprogrammatic group should consist of stakeholders in environmental issues, municipal programs, actors responsible for environmental management, and members of the IMS-Arbovirus steering group (epidemiology, patient care, IVM, and environment).
| Activities | Tasks | Time frame | Responsible institution / person | Observations |
|------------|-------|------------|----------------------------------|--------------|
| Arboviral diseases through strengthened community resilience | 4. Disseminate the lessons learned in order to establish a regional process to strengthen community resiliency | X | Ministry of Health | |
| R1A4 Facilitate the integration of transectoral groups made up of public- and private-sector actors involved in environmental management at the national and subnational level, according to the priorities in each country | 1. Identify social actors and establish responsibilities for implementation in the respective areas of each country | X | Ministry of Health and Ministry of Environment | |
| | 2. Determine whether or not there is an institution that coordinates environmental control measures | X | Ministry of Health and Ministry of Environment | |

*Time frame: S=short-term (1 year), M=medium-term (2-4 years), L=long-term (5+ years)*

### 4.8 Operations research and communication for behavioral impact

IMS-arbovirus includes a section devoted to operations research, an essential source of scientific evidence aimed at improving the quality of disease control and health programs and learning from them as they are scaled up. Many definitions of operations research have been proposed, but a pragmatic definition from the perspective of a health program would be: the search for knowledge about interventions, strategies, and tools that can improve a program’s quality, effectiveness, and coverage.

Operations research provides those responsible for decision-making with information they can use to improve the performance of health programs. It also helps identify solutions to problems that limit a program’s quality, efficiency, and effectiveness, and can help determine which alternative strategy for service delivery would yield the best results.

Operations research questions tend to focus on understanding the access barriers to a health program. Social and economic trials and studies can provide input on how to overcome these barriers and suggest effective interventions. The first step in operations research is to identify an adequate research question that can improve the operation of a health program.
Table 4-19. Main approaches: management component

| Operations research question                                                                 | Observations                                                                 | Next steps                                                                 |
|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Establish evidence-based permanent improvement processes:                                   |                                                                              |                                                                            |
| • Define the lines of operations research based on an initial diagnosis according to the IMS-arbovirus component and the country |                                                                              | Coordinate regional level with countries and corresponding collaborating centers (committee) |
| • Establish the guidelines for the call for operations research projects                    |                                                                              |                                                                            |
| • Prepare generic operations research protocols for the different components, taking into account bioethical aspects |                                                                              |                                                                            |
| • Select research proposals                                                                  |                                                                              |                                                                            |

Table 4-20. Main approaches: epidemiology component

| Operations research question                                                                                                                                                                                                 | Observations                                                                 | Next steps                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Effectiveness of the epidemiological surveillance systems in regard to the quantitative and qualitative attributes of the new system                                                                                             | Clarify: Operations research vs routine monitoring                           | Monitoring: regional and country level                                      |
|                                                                                                                                                                                                                              | Depends on the existence of an “integrated” system = medium term            | Locate funds                                                              |
|                                                                                                                                                                                                                              | Evaluate system: determine criteria (adherence, flexibility, sensitivity)   |                                                                            |
|                                                                                                                                                                                                                              | (CDC, 2001)                                                                  |                                                                            |
|                                                                                                                                                                                                                              | Regional/country system                                                     |                                                                            |
|                                                                                                                                                                                                                              | Consider Mexico: lessons learned; results of advocacy (pilot)              |                                                                            |

| Operations research question                                                                                                                                                                                                 | Observations                                                                 | Next steps                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Clinical characterization of confirmed cases of Zika virus disease, dengue, and chikungunya, and impact on case definition in the Region                                                                                          |                                                                              |                                                                            |
| Adherence to the new surveillance protocols for health workers at the different levels                                                                                                                                         |                                                                              |                                                                            |
The patient care component requires the development of lines of research to improve policies, interventions, and clinical care strategies for patients with suspected dengue, chikungunya, Zika, and other arboviral diseases.

**Table 4-21. Main approaches: patient care component**

| Operations research question | Observations | Next steps |
|------------------------------|--------------|------------|
| **Clinical characterization of patients** with dengue, chikungunya, Zika, and other arboviral diseases, based on reliable laboratory evidence that supports differential diagnosis | Priority: clinical standards  
Prospective and/or retrospective study  
Retrospective (severe cases, biases)  
Consider number of patients (type of health center that identifies patients)  
Where: active circulation of three arboviruses (Brazil, Colombia, El Salvador-multicentric, Paraguay) (principal investigators)  
Brazil prospective study (different geographical areas)  
Accessible laboratory confirmation (*gold standard*)  
Consider coinfection | Retrospective/prospective study |
| **NEW**  
Characterization of the causes of mortality and risk factors for dengue/ chikungunya/ Zika | Retrospective study (to evaluate the possibility of real autopsy and verbal autopsy)  
Diagnostic quality: confirmed cases (PCR, histopathological)  
Countries: Brazil, Colombia, Cuba, Paraguay | Priority: locate financing and interested countries |

The laboratory component requires establishing priority lines of operations research in order to strengthen both the diagnosis and surveillance of arboviral diseases.
Table 4-22. Main approaches: laboratory component

| Operations research question                                      | Observations                                                                                           | Next steps                                                                                       |
|-----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| Multicenter evaluations of commercial kits (including rapid tests) | Multicenter evaluation, geographical representation, institutions Build sub-regional panel Origin of samples (representation) Test selection criteria (e.g. trivalent) New tests to consider (Zika, dengue) Sequential methodology In second phase: - intra-country evaluation - need to build regional panels (phase 2) | Retrospective/prospective                                                                         |
| Evaluation of the usefulness of the different biological samples and viral kinetics, prognostic markers | Important to monitor by laboratory group PAHO/WHO national laboratories (reference or designated by the national authorities for arboviral diagnosis and surveillance) |                                                                                                   |
| PAHO/WHO national laboratories (reference or designated by the national authorities for arboviral diagnosis and surveillance) | High priority Medium/long term PAHO/WHO collaborating centers, RELDA                                           |                                                                                                   |
| Evaluation of viral detection in mosquitoes as an entomo-virologic indicator within comprehensive surveillance | IVM + Laboratory + Epidemiology Case studies: Brazil (Espíritu Santo), Cuba, Mexico PAHO/ RELDA/ RELEV/PAHO/ WHO, collaborating centers, national laboratories (reference or designated by the national authorities for arboviral diagnosis and surveillance) |                                                                                                   |
| Implementation of strategies for genomic arbovirus surveillance | Important: basic sciences PAHO/WHO, collaborating centers, national laboratories (reference or designated by the national authorities for arboviral diagnosis and surveillance) |                                                                                                   |

The integrated vector management component includes participation in operations research that guides decision-making on control interventions and new technologies for vector control.
Table 4-23. Integrated vector management component

| Operations research question                                                                 | Observations                                                                                                                                                                                                 | Next steps                                                                                           |
|--------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| Is it possible to improve/find entomological indicators to predict entomological risk with greater certainty? | This has been needed for many years and it is a complicated problem. It is not expected that a single indicator can predict a risk situation; need to involve the biology chairs of universities | Regional monitoring with PAHO/WHO collaborating centers and countries                                |
| What control measures are most cost-effective?                                                 | Important:                                                                                                                                            | Identifies partners in the research process                                                          |
|                                                                                              | - Use already existing data (need for systematic review)                                                                                         |                                                                                                      |
|                                                                                              | - Begin with selection of one or two of the most commonly used techniques; e.g.: breeding site elimination, treating breeding sites and fumigation |                                                                                                      |

Table 4-24. Environment component

| Operations research question                                                                 | Observations                                                                                                                                                                                                 | Next steps                                                                                           |
|--------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| Develop regional project to demonstrate participatory research at the country level in order to address the environmental determinants of arboviral diseases by strengthening community resiliency | Define community resiliency                                                                                                                                                                               | Provides guidance for the research process                                                             |
|                                                                                              | Here, they are considered social determinants (not environmental determinants)                                                                                                                               |                                                                                                      |
|                                                                                              | Need to:                                                                                                                                                                                                     |                                                                                                      |
|                                                                                              | - reformulate and focus more on environment                                                                                                                                                                 |                                                                                                      |
|                                                                                              | - identify indicators                                                                                                                                                                                         |                                                                                                      |
|                                                                                              | - explain how results relate to IMS-arbovirus                                                                                                                                                                |                                                                                                      |
|                                                                                              | - consider a situation analysis in which communities propose interventions                                                                     |                                                                                                      |

Communication for behavioral impact (COMBI) seeks, through communication, to change peoples’ behavior with respect to arboviral disease prevention and alerts. Behavior change is a process in which people go through several stages of learning: information, growing awareness, and implementation of the proposed measures. It will be necessary to tailor each message (and how it is transmitted) to the context of the desired behavioral change.

4.9 Facilitating factors

The IMS-dengue operational model identified certain ‘facilitating factors’ as key elements for implementing the strategy. As the strategy was adapted, these elements were included, strongly impacting the progress made in each country. Based on these positive results, it was considered vitally important to include these factors in the IMS-arbovirus operational model. The facilitating factors are: advocacy, resource mobilization, partnerships, capacity building, and monitoring and evaluation.
A. **Advocacy:** This includes communication, dissemination, and persuasion at all levels to achieve the implementation of IMS-arbovirus. The advocacy process should involve the decision-making and management levels of the health sector and should reach beyond the health sector to include governmental, nongovernmental, national, and local levels, including the private sector.

B. **Resource mobilization:** It is essential to identify stakeholders (public and private, national and international) and raise their awareness through advocacy supported by timely, high-quality information. This will help obtain the resources needed to strengthen national capacity, prevent the appearance of arboviral diseases, and above all, respond to outbreaks and epidemics. One of the biggest problems facing these strategies is limited resources, which in most cases are insufficient to address the complex determinants of transmission. This means that adequate planning of resources (human, financial, and material) is required to address the complexity of IMS-arbovirus and ensure its sustainable implementation through time and space.

C. **Forging partnerships:** The technical complexity of the efforts required to combat arboviral diseases is so great that the health sector cannot by itself provide a timely, quality response. For an integrated response that involves all components of the strategy, strong partnerships are needed to guarantee the prevention and control of these arboviral diseases. Schools, workplaces, ministries, churches, and the general public should be firmly allied and committed to implementing the activities necessary for a collective response to the problem of arboviral diseases.

D. **Capacity building:** The IMS-arbovirus model requires that personnel be proactive in training human resources for each component in each country. This involves not only technical aspects, but also their interaction with the other components, while adopting scientific thinking to improve the response to these diseases and achieve a greater impact. Capacity building should be an ongoing activity that involves a planned effort to achieve the proposed objectives.

E. **Monitoring and evaluation:** Based on the evaluations of IMS-dengue, it was considered problematic to work with vector control impact indicators (e.g., infestation index). These indicators were not considered very rigorous, given the dynamics of disease transmission and the wide range of environmental and social determinants that influence transmission. As a result, in IMS-arbovirus, greater priority will be given to evaluating process indicators and monitoring the quality of technical work to achieve the goal and purpose of the strategy. This is vitally important for sound decision-making in the implementation of IMS-arbovirus.
5. Directives for the implementation of the IMS-arbovirus

In 2003, the Integrated Management Strategy for Dengue Prevention and Control (IMS-dengue) was presented in Resolution CD44.R9. In response to this resolution, the countries of the Region initiated the process of adopting a new working model for dengue prevention and control. Since then, 26 countries prepared, implemented, and evaluated their own national IMS-dengue, based on the regional IMS-dengue.

Recognizing that the current epidemiological context (endemic circulation of multiple arboviruses) requires a strategy that comprehensively addresses arboviral diseases, a new resolution was adopted by the PAHO Directing Council in September 2016. Resolution CD55.R6 urges Member States to adopt the strategy for arboviral disease prevention and control in the context of the specific conditions in each country.

In this framework of action, IMS-arbovirus seeks to strengthen regional and national technical capacities for: clinical diagnosis and care of patients with suspected arboviral diseases and their complications; integrated epidemiological surveillance of dengue [DENV], chikungunya [CHIKV], Zika [ZIKV], and other arboviral diseases with an impact on public health; integrated vector management; environment; and laboratory diagnosis, using a single, comprehensive surveillance system.

The activities can be implemented in accordance with the situation in each country, where scenarios may vary from countries that have not yet prepared an IMS, countries with a national IMS-dengue, and those which, during the PHEIC due to ZIKV, adapted their national IMS-dengue to include plans and strategies for dengue/chikungunya/Zika.

The following timetable was developed to guide the implementation of IMS-arbovirus in the Member States.
| ACTIVITIES                                                                 | 2018 (Year 1) |       |       |       |       |       |       |       |       |       |
|---------------------------------------------------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Technical consultation (expert workshop) to update IMS-arbovirus 2016    |               | X     |       |       |       |       |       |       |       |       |
| Publication of draft document for IMS-arbovirus 2018                     |               | X     |       |       |       |       |       |       |       |       |
| Dissemination of IMS-arbovirus 2018 to countries and territories (document sent to national authorities and international GT-Arbovirus) |               | X     |       |       |       |       |       |       |       |       |
| Restructure/reactivate National GT-Arbovirus (formation or consolidation) |               |       |       |       |       |       |       |       | X     |       |
| National workshop to prepare IMS-arbovirus or adjust existing national dengue/arbovirus plans or strategies, based on IMS-arbovirus 2018 |               |       |       |       |       |       |       |       | X     |       |
| Dissemination of adjusted national IMS-arbovirus to national health councils or their equivalents in each country, subnational and local governments, national intersectoral commission (if applicable), scientific societies, academia, trade unions, and other social actors |               |       |       |       |       |       |       |       | X     | X     |
| Arrangements made (with national and local governments, financial agencies, and international cooperation agencies) for financial resources to promote implementation of IMS-arbovirus 2018 |               | X     | X     | X     | X     | X     | X     | X     | X     |       |
| Implementation of the Plan of the national IMS-arbovirus                 |               | X     | X     | X     | X     | X     | X     | X     | X     | X     |
| Development and implementation of a continuous training plan for GT-Arbovirus and local managers |               |       |       |       |       |       |       |       | X     | X     | X     |
| Monitoring of components of the national IMS-arbovirus                   |               |       |       |       |       |       |       |       | X     | X     |
| Self-evaluation of the adjusted national IMS-arbovirus                   |               |       |       |       |       |       |       |       | X     |       |
| External evaluation of the national IMS-arbovirus*                       |               |       |       |       |       |       |       |       | X     |       |
| Establish evidence-based improvement processes (operations research based on a needs diagnosis for each component of IMS-arbovirus, as indicated in the self-evaluations) |               |       |       |       |       |       |       |       | X     |       |

*Every 3 years
6. Monitoring and evaluation

The implementation and operation of IMS-arbovirus must be complemented with evaluation and monitoring activities that identify progress and limitations in order to align and focus resources on achieving results in every country of the Region.

Lines of action were identified for monitoring and evaluation, with their corresponding process indicators, implementation periods, and verification sources. In addition, an evaluation manual will be prepared and made available to the countries. When it becomes available at the end of 2019, it will serve as the policy document that governs regional and national evaluation processes.

Table 6-1. Lines of action, indicators, implementation periods, and verification sources for IMS-arbovirus monitoring and evaluation processes

| Line of action                                                                 | Indicator                                                                 | Implementation period       | Verification sources                      | Observations                                                                 |
|--------------------------------------------------------------------------------|---------------------------------------------------------------------------|----------------------------|-------------------------------------------|----------------------------------------------------------------------------|
| Situation assessment of the country’s approach to arboviral diseases           | Number of countries with a situation assessment of the approach to arboviral diseases/ Total number of countries in the Region | Short-term (6 months)      | Country SWOT document                     | This would be the starting point for monitoring and evaluation              |
| IMS-arbovirus adapted in each country                                         | Number of countries with adapted IMS-arbovirus/ Total number of countries in the Region | Short-term (Deadline: end 2018) | National IMS-arbovirus document           | A resolution of the PAHO Directing Council, signed by the ministers of health of each country, recognizes that the countries have adopted IMS-arbovirus |
| Form, establish, and begin operations of GT-Arbovirus and of the steering group of the national IMS-arbovirus | Number of countries that have a national GT-Arbovirus/ Total number of countries in the Region | Short-, medium-, and long-term (Deadline for forming the groups: end 2018) | Official document appointing the group; minutes of meetings | National GT-Arbovirus would represent these areas: epidemiology, IVM, virology laboratory, communications, environmental health, patient care/health services |
|                                                                                  | Number of countries that have a steering group/ Total number of countries in the Region |                                |                                            | IMS-arbovirus steering group would consist of: directors of key areas such as epidemiology, health services, laboratory, health promotion, environment, and planning |
| Lines of action                                                                 | Indicators                                                                                                                                                                                                 | Implementation time             | Verification sources                                                                 | Observations                                                                                                                                 |
|--------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Results from monitoring of national IMS-arbovirus components sent to coordinator of IMS-arbovirus steering group | Number of countries that monitor the components of IMS-arbovirus/ Total number of countries in the Region                                                                                       | Short-, medium-, long-term (semiannually) | Technical reports on the components of IMS-arbovirus                                   | Each component will refer to its own indicators, established in the adjusted IMS-arbovirus, with reports to the steering group            |
| Self-evaluations of IMS-arbovirus operations                                      | Number of countries that conduct self-evaluation of IMS-arbovirus operations/ Total number of countries that adopted IMS-arbovirus                                                                      | Medium- and long-term (biennial) | Evaluation report                                                                    | PAHO will prepare a standardized self-evaluation instrument                                                                                |
| External evaluations carried out                                                 | Number of countries that have been evaluated externally/ Total number of countries that adopted the strategy                                                                                  | Medium-term (every three years)  | Evaluation report issued by the evaluating entity                                      | International GT-Arbovirus and PAHO should participate; creation of a standardized evaluation document to be used in all countries         |
| Meetings to share lessons learned within the framework of IMS-arbovirus implementation | Number of meetings held                                                                                                                         | Medium/long-term (biennial)      | Meeting report                                                                      | On-site or virtual meetings; meetings should begin after external evaluation                                                                |
References

1. Brathwaite Dick O, San Martin JL, Montoya RH, del Diego J, Zambrano B, Dayan GH. The History of Dengue Outbreaks in the Americas [Internet]. The American Journal of Tropical Medicine and Hygiene 2012; 87(4):584-93. [Accessed on 25 April 2016]. Available at: http://www.ajtmh.org/content/87/4/584.full.

2. Colombia, Instituto Nacional de Salud. Enfermedades transmitidas por vectores. Boletín Epidemiológico Semanal [Internet]. Semana epidemiológica número 50 de 2015 (13-19 December):23-37. Zika; p. 34-37. [Accessed on 12 August 2016]. Available at: http://www.ins.gov.co/boletin epidemiologico/Boletin%20Epidemiologico/2015%20Boletin%20epidemiologico%20semana%2050.pdf.

3. Khasnis AA, Nettelman MD. Global Warming and Infectious Disease [Internet]. Archives of Medical Research 2005;36(6):689-96. [Accessed on 12 August 2016]. Available at: http://www.arcmedres.com/article/S0188-7326(05)00151-7/abstract.

4. Kraemer MUG, Sinka ME, Duda KA, Mylne AQN, Shearer FM, Barker CM, et al. The global distribution of the Arbovirus vectors Aedes aegypti and Ae. Albopictus [Internet]. elife 2015: 4:e08347. [Accessed on 12 August 2016]. Available at: http://elifesciences.org/content/4/e08347v3.

5. Pan American Health Organization. Progress Reports on Technical Matters [Internet]. Document CSP28/INF/3-E, Current dengue situation. 28th Pan American Sanitary Conference, 64th Session of the Regional Committee of WHO for the Americas; 17-21 September 2012; Washington, DC. Washington, DC: PAHO; 2012. [Accessed on 12 August 2016]. Available at: https://www.paho.org/hq/index.php?option=com_docman&task=doc_download&gid=18400&Itemid=270&lang=en.

6. Pan American Health Organization. Dengue Incidence Rate [Internet]. Washington, DC:1980-2014. [Accessed on 12 August 2016]. Available at: https://www.paho.org/data/index.php/en/mnu-topics/indicadores-dengue-en/dengue-nacional-en/254-dengue-incidencia-en.html.

7. Pan American Health Organization. Severe dengue cases and deaths. [Internet]. Washington, DC: PAHO; 1980-2014. [Accessed on 12 August 2016]. Available at: https://www.paho.org/data/index.php/en/mnu-topics/indicadores-dengue-en/dengue-nacional-en/257-dengue-casos-muertes-pais-ano-en.html.

8. Pan American Health Organization. Dengue Prevention and Control in the Americas [Internet]. 54th Directing Council of PAHO, 67th Session of the Regional Committee of WHO for the Americas; 28 September to 2 October 2015; Washington, DC. Washington, DC: PAHO; 2015. Document CDS4/INF/5-D. [Accessed on 2 December 2015]. Available at: https://www.paho.org/hq/index.php?option=com_docman&task=doc_download&gid=23805&Itemid=270&lang=en.

9. Pan American Health Organization. Epidemiological Alert. Chikungunya Fever; 9 December 2013 [Internet]. Washington, DC: PAHO; 2013. [Accessed on 12 August 2016]. Available at: https://www.paho.org/hq/index.php?option=com_docman&task=doc_download&gid=23805&lang=en.

10. Pan American Health Organization. Report on Chikungunya Virus Transmission and its Impact in the Region of the Americas [Internet]. 54th Directing Council of PAHO, 67th Session of the Regional Committee of WHO for the Americas; 28 September to 2 October 2015. Document CDS4/INF/3. Washington, DC. Washington, DC: PAHO; 2015. [Accessed on 12 August 2016]. Available at: https://www.paho.org/hq/dmdocuments/2015/CDS4-INF-3-e.pdf.

11. Pan American Health Organization. Number of Reported Cases of Chikungunya Fever in the Americas, by Country or Territory 2015 (to week noted) Cumulative cases [Internet]. Epidemiological Week/EW 52 (updated to 13 May 2016); 2015. Washington, DC: PAHO; 2015. [Accessed on 12 August 2016]. Available at: http://www.paho.org/hq/index.php?option=com_docman&task=doc_download&Itemid=270&gid=33091&lang=en.

12. Pan American Health Organization; Centers for Disease Control and Prevention. Preparedness and Response for Chikungunya Virus: Introduction in the Americas [Internet]. Washington, DC: PAHO; 2011. Available at:
http://iris.paho.org/xmlui/bitstream/handle/123456789/4009/Chikungunya%20Virus.pdf?sequence=1&isAllowed=y.

13. Pan American Health Organization. Epidemiological Alert. Zika virus infection; 7 May 2015. [Internet]. Washington, DC: PAHO; 2015. [Accessed on 12 August 2016]. Available at: https://www.paho.org/hq/index.php?option=com_docman&task=doc_download&gid=30075&lang=en.

14. Pan American Health Organization. Epidemiological Alert. Zika virus infection; 16 October 2015 [Internet]. Washington, DC: PAHO; 2015. [Accessed on 12 August 2016]. Available at: https://www.paho.org/hq/dmdocuments/2016/2015-oct-16-cha-actualizacion-epi-virus-zika.pdf.

15. Pan American Health Organization. Preparing the Region of the Americas to Achieve the Sustainable Development Goal on Health [Internet]. Washington, DC: PAHO; 2015. Available at: http://iris.paho.org/xmlui/bitstream/handle/123456789/10016/9789275118634_eng.pdf.

16. Pan American Health Organization. Integrated Management Strategy for Dengue Prevention and Control in the Region of the Americas [Internet]. Washington, DC: PAHO; 2017. [Accessed on 20 August 2018]. Available at: http://iris.paho.org/xmlui/bitstream/handle/123456789/34860.

17. Pan American Health Organization. State of the Art in the Prevention and Control of Dengue in the Americas. Meeting report [Internet]. Meeting: State of the Art in the Prevention and Control of Dengue in the Americas; 28-29 May 2014, Washington, DC, United States. Washington, DC: PAHO; 2014 [Accessed on 20 August 2018]. Available at: http://iris.paho.org/xmlui/bitstream/handle/123456789/31171/DengueReport2014-eng.pdf?sequence=1&isAllowed=y.

18. Pan American Health Organization. Number of reported cases of chikungunya fever in the Americas 2016 [Internet]. Washington, DC: PAHO; 2016. [Accessed on 12 August 2016]. Available at: https://www.paho.org/hq/index.php?option=com_docman&task=doc_download&gid=37867&Itemid=270&lang=en.

19. Pan American Health Organization. Strategy for Arboviral Disease Prevention and Control [Internet]. Document CD55/16. 55th Directing Council, 68th Session of the Regional Committee; 26-30 September 2016; Washington, DC, United States. Washington, DC: PAHO; 2016. [Accessed on 20 August 2018]. Available at: http://iris.paho.org/xmlui/bitstream/handle/123456789/31430/CD55-16s.pdf?sequence=4&isAllowed=y.

20. Pan American Health Organization. Taller regional para la revisión y ajuste de la “Estrategia para la prevención y el control de las enfermedades arboviraless” en las Américas. Informe del taller [Internet]. Taller regional para la revisión y ajuste de la “Estrategia para la prevención y el control de las enfermedades arboviraless” en las Américas; del 17 al 20 de abril de 2018, Ciudad de Guatemala, Guatemala. Washington, DC: OPS; 2018. Available in Spanish at: https://www.paho.org/hq/index.php?option=com_docman&task=doc_download&gid=44903&Itemid=270&lang=es.

21. Pan American Health Organization. Zika - Epidemiological Update. Situation Summary in the Americas; 25 August 2017 [Internet]. Washington, DC: PAHO; 2017. [Accessed on 25 August 2017]. Available at: https://www.paho.org/hq/index.php?option=com_docman&task=doc_download&gid=41705&lang=en.

22. Pan American Health Organization. Epidemiological Update. Yellow Fever; 26 July 2016 [Internet]. Washington, DC: PAHO; 2016. [Accessed on 11 August 2016]. Available at: https://www.paho.org/hq/index.php?option=com_docman&task=doc_download&gid=35502&lang=en.

23. Pan American Health Organization. Zika – Epidemiological Update. Situation Summary in the Americas; 25 August 2016 [Internet]. Washington, DC: PAHO; 2016. (Accessed on 11 August 2018). Available at: https://www.paho.org/hq/index.php?option=com_docman&task=doc_download&gid=35929&lang=en.

24. Pan American Health Organization. Strategy for Arboviral Disease Prevention and Control [Internet]. 158th Session of the Executive Committee; 20-24 June 2016; Washington, DC. (Resolution CE158.R3). Washington, DC: PAHO; 2016. [Accessed on 8 August 2016]. Available at: https://www.paho.org/hq/index.php?option=com_docman&task=doc_download&gid=35152&Itemid=270&lang=en.

25. Pan American Health Organization. Continental Aedes Aegypti eradication [Internet]. 1st Directing Council of PAHO; 24 September to 2 October 1947; Washington, DC. Washington, DC: PAHO; 1947. Resolution CD1.R1. [Accessed on 11 August 2016]. Available at:
http://iris.paho.org/xmlui/handle/123456789/1733?show=full.

26. Pan American Health Organization. New, Emerging, and Re-emerging Infectious Diseases [Internet]. 38th Directing Council of PAHO, 47th Session of the Regional Committee; 25-30 September 1995; Washington, DC. Washington, DC: PAHO; 1995. Resolution CD38.R12. [Accessed on 10 August 2016]. Available at: http://iris.paho.org/xmlui/bitstream/handle/123456789/1605/CD38.R12en.pdf?sequence=1&isAllowed=y.

27. Pan American Health Organization. Aedes aegypti. 39th Directing Council of PAHO, 48th Session of the Regional Committee; 23-27 September 1996; Washington, DC. [Internet]. Washington, DC: PAHO; 1996. (Resolution CD39.R11). [Accessed on 10 August 2016]. Available at: http://iris.paho.org/xmlui/bitstream/handle/123456789/1614/CD39.R11en.pdf?sequence=1&isAllowed=y.

28. Pan American Health Organization. Dengue and Dengue Hemorrhagic Fever [Internet]. 43rd Directing Council of PAHO, 53rd Session of the Regional Committee of WHO for the Americas; 24-28 September 2001; Washington, DC. Washington, DC: PAHO; 2001. Resolution CD43.R4. [Accessed on 8 August 2016]. Available at: https://www.paho.org/english/GOV/CD/CD43.r4-e.pdf?ua=1.

29. Pan American Health Organization. Dengue. 44th Directing Council of PAHO, 55th Session of the Regional Committee of WHO for the Americas; 22-26 September 2003; Washington, DC. Washington, DC: PAHO; 2003. Resolution CD44.R9. [Accessed on 10 August 2016]. Available at: https://www.paho.org/english/GOV/CD/CD44-r9-e.pdf?ua=1.

30. Pan American Health Organization. Dengue Prevention and Control in the Americas [Internet]. 27th Pan American Sanitary Conference, 59th Session of the Regional Committee of WHO for the Americas; 1-5 October 2007; Washington, DC. Washington, DC: PAHO; 2007. Resolution CSP27.R15. [Accessed on 8 August 2016]. Available at: https://www.paho.org/english/gov/csp/csp27.r15-e.pdf?ua=1=.

31. Pan American Health Organization. Epidemiological Update. Neurological syndrome, congenital malformations, and Zika virus infection [Internet]; 17 January 2016. Washington, DC: PAHO. [Accessed on 12 August 2016]. Available at: https://www.paho.org/hq/index.php?option=com_docman&task=doc_download&gid=32878&lang=en.

32. Pan American Health Organization. Zika - Epidemiological Update (Corrigendum) 23 June 2016 [Internet]. Washington, DC: PAHO; 2016. [Accessed on 12 August 2016]. Available at: https://www.paho.org/hq/index.php?option=com_docman&task=doc_download&gid=35117&lang=en.

33. Pan American Health Organization. Zika Cumulative Cases. [Accessed on 11 August 2016]. Available at: http://ais.paho.org/php/viz/ed_Zika_cases.asp.

34. Pan American Health Organization. Reported increase of congenital microcephaly and other central nervous system symptoms - 10 February 2016 [Internet]. Washington, DC: PAHO; 2016. [Updated 17 February 2016; Accessed on 25 April 2016]. Available at: https://www.paho.org/hq/index.php?option=com_content&view=article&id=11675:reported-increase-of-congenital-microcephaly-and-other-central-nervous-system-symptoms-10-february-2016&Itemid=41711&lang=en.

35. Pan American Health Organization. Integrated Vector Management: A Comprehensive Response to Vector-borne Diseases. 48th Directing Council of PAHO, 60th Session of the Regional Committee of WHO for the Americas; 29 September to 3 October 2008; Washington, DC. Document CD48/13. Washington, DC: PAHO; 2008. [Accessed on 12 August 2016]. Available at: http://www.paho.org/spanish/gov/cd/cd48-13-s.pdf.

36. Pan American Health Organization. 1st Ad-hoc Meeting of the Technical Advisory Group on Vaccine-preventable Diseases [Internet]. Ad-hoc virtual TAG meeting 2016; 13 May 2016. Washington, DC. Washington, DC: PAHO; 2016. [Accessed on 12 August 2018]. Available at: https://www.paho.org/hq/dmdocuments/2017/vaccine-preventable-diseases-tag-adhoc1-2016-FinalReport-Spa.pdf.

37. Parks W, Lloyd L. Planning social mobilization and communication for dengue fever prevention and control: a step-by-step guide [Internet]. Geneva: World Health Organization Mediterranean Center for Vulnerability Reduction (WMC); 2004. [Accessed on 25 April 2016]. Published in collaboration with the Pan American Health Organization and the Special Programme for Research and Training in Tropical Diseases (TDR). Available at: http://www.who.int/immunization/hpv/communicate/planning_social_mobilization_and_communication_for_dengue_fever_prevention_and_control_who_cds_wmc_2004.pdf.
38. Patz JA, Epstein PR, Burke TA, Balbus JM. Global Climate Change and Emerging Infectious Diseases [Internet]. JAMA, 1996;275(3):217-23. [Accessed on 12 August 2016]. Available at: http://jama.jamanetwork.com/article.aspx?articleid=394508.

39. ReliefWeb. Cumulative Zika confirmed and suspected cases reported by countries and territories in the Americas, 2015-2016 - Updated as of 25 February 2016, with data received by 24 February 2016 [Internet]. [Accessed on 12 August 2016]. Available at: http://reliefweb.int/report/world/cumulative-Zika-confirmed-and-suspected-casesreported-countries-and-territories-1.

40. United Nations General Assembly. Resolution adopted by the General Assembly on 25 September 2015 [Internet]. A/RES/70/1. Transforming our world: the 2030 Agenda for Sustainable Development. United Nations: 2015. Available at: https://undocs.org/A/RES/70/1.

41. Van Den Berg H, Mutero CM, Ichimori K. Guidance on policy-making for Integrated Vector Management. Geneva: WHO; 2012. [Accessed on 12 August 2016]. Available at: http://apps.who.int/iris/bitstream/10665/44766/1/9789241502795_eng.pdf.

42. Weaver SC, Reisen WK. Present and future arboviral threats. Antiviral Research 2010;85(2):328-45. [Accessed on 2 December 2015]. Available at: http://www.sciencedirect.com/science/article/pii/S0166354209004951.

43. World Health Organization. Handbook for Integrated Vector Management [Internet]. Geneva: WHO; 2012 [Accessed on 12 August 2016]. Available at: http://apps.who.int/iris/bitstream/10665/44768/1/9789241502801_eng.pdf.

44. World Health Organization. International Health Regulations (2005) [Internet]. Second edition. Geneva: WHO; 2008. [Accessed on 12 August 2016]. Available at: http://apps.who.int/iris/bitstream/10665/246107/1/9789241580496-eng.pdf?ua=1.

45. World Health Organization. WHO statement on the first meeting of the International Health Regulations (2005) (IHR 2005) Emergency Committee on Zika virus and observed increase in neurological disorders and neonatal malformations; 1 February 2016 [Internet]. Geneva: WHO; 2016. [Accessed on 11 August 2016]. Available at: https://www.who.int/news-room/detail/01-02-2016-who-statement-on-the-first-meeting-of-the-international-health-regulations-(2005)-(ihr-2005)-emergency-committee-on-zika-virus-and-observed-increase-in-neurological-disorders-and-neonatal-malformations-emergency-committee-Zika/es/.
Annex A. SWOT analysis, by component

SWOT analysis (analysis of Strengths, Weaknesses, Opportunities, and Threats) is a methodological tool used in the study of an existing situation. This tool enables us to proactively and systematically search for and analyze strategic variables to fully inform decision-making. SWOT analysis also looks at the internal characteristics of the situation (strengths and weaknesses), as well as the external environment (threats and opportunities), to generate a matrix that can be interpreted both horizontally and vertically. This matrix can be used to develop the necessary strategies for meeting the proposed objectives.

It is extremely important to use the SWOT matrix when developing strategies with the logical framework approach. Once the goal and purpose are established, each of the components will eliminate its weaknesses by turning them into expected outcomes aimed at meeting the proposed goal and by turning strengths into special capabilities that will foster the implementation of activities and tasks. In the logical framework matrix, threats (i.e., situations that hinder achievement of the goal) become the assumptions/risks that need to be taken into account to ensure the success of the planned activities.
Annex A-1. SWOT Analysis: management component

| STRENGTHS | WEAKNESSES |
|-----------|------------|
| • Political support from the countries, through PAHO Resolution CD55.R6, which resolves to adopt IMS-arbovirus  
• An agreement among the countries to develop their capacity to detect, evaluate, and report public health events within the IHR framework  
• Experience in the Region of the Americas with the implementation and evaluation of IMS-dengue  
• An international technical group (GTI-Dengue) and a regional group, as well as operational teams engaged in technical work | • The integration and development of epidemiological surveillance in health care practice is uneven  
• Poor coordination of the different components of IMS-arbovirus at the intra- and extra-sectoral levels  
• Some health authorities express limited political commitment to the sustainable allocation of resources to implement IMS-arbovirus  
• Poor development of operations research to provide evidence for decision-making within the framework of IMS-dengue  
• Lack of regular, sustainable activities for surveillance and prevention of arboviral diseases  
• Heterogeneity in the appointment and performance of national and subnational managers, resulting in different levels of hierarchy and competency to lobby health authorities and to viably implement IMS-arbovirus  
• Low impact of public communication strategies to induce changes in attitudes and behaviors regarding arboviral diseases  
• Health teams are not sufficiently trained in the diagnosis and clinical management of arboviral diseases  
• Lack of financial and logistic resources to tackle PHEICs caused by ZIKV |}

| OPPORTUNITIES | THREATS |
|---------------|---------|
| • Implementation of IMS-arbovirus was facilitated by the public impact of the disability and deaths caused by arboviral diseases  
• Due to the emergence of new arboviral diseases and their impact on national economies, other sectors and political and economic groups have become interested in participation and financing  
• Incorporating new technologies can improve entomological surveillance, health promotion, risk communication, and disease prevention and control  
• Availability of PAHO funds to train health workers in clinical management and surveillance of arboviral diseases  
• Availability of resources to support operations research | • Globalization facilitates rapid introduction and dispersion of new pathogens  
• Political changes can affect the continuity of IMS-arbovirus  
• Climate change favors the persistence and dispersion of arboviral diseases  
• Social inequity and greater poverty increases the vulnerability of populations to arboviral diseases  
• Disorderly urban growth creates enabling environments for the development of arboviral diseases  
• New technologies can become barriers to achieving and sustaining changes in people’s attitudes |
### Annex A-2. SWOT Analysis: epidemiology component

| STRENGTHS | WEAKNESSES |
|-----------|------------|
| • IMS-dengue has been developed, implemented, and evaluated in the countries of the Region of the Americas since 2003 | • Need to strengthen the process of integrating arboviral diseases into epidemiological surveillance |
| • A system for weekly reporting of arboviral disease cases in the countries of the Americas | • Laboratory monitoring in serology has been debilitated by cross-reactions between arboviral diseases |
| • Epidemiological surveillance of arboviral diseases, with interventions in response | • Need to strengthen health workers’ knowledge about diagnostic protocols and patient care |
| • Capacity to diagnose arboviral diseases | • Health workers need permanent training in epidemiological surveillance |
| • Health workers with knowledge in epidemiological and laboratory surveillance | • Poor understanding of the synergies among the three arboviral diseases and others through space and time |
| • Multidisciplinary groups tackle outbreaks and epidemics | • Insufficient human resources trained in epidemiological and laboratory surveillance and clinical management |
| • Adequate integration of epidemiological and laboratory surveillance | • Insufficient coordination between epidemiological and entomological surveillance |
| • Adequate coordination between laboratory, epidemiology, vector personnel, and health promotion | • Poorly integrated surveillance system for febrile illness with skin rashes |
| | • Lack of a model to address arboviral diseases |
| | • There is no established network for research, support, and joint efforts among countries for the prevention and control of arboviral diseases |
| | • Surveillance system is weak with respect to arbovirus-associated events and mother-to-child and sexual transmission |

| OPPORTUNITIES | THREATS |
|---------------|---------|
| • New technologies (multiplex/trioplex) will improve the diagnosis of arboviral diseases | • Population is susceptible to new arboviral diseases and cross-reactions |
| • Countries and agencies have the political will to cooperate, given the reintroduction and introduction of new arboviral diseases | • The structural determinants affecting the presence of diseases remain the same: sanitation, water, and risk management |
| • Rapidly update standards to combat different pathologies | • Perception of low risk and little community participation |
| • Adapt IMS-dengue to epidemiological surveillance of arboviral diseases | • Insufficient private sector participation |
| • New technologies available for use of information sources that support epidemiological surveillance | • In epidemic outbreaks, basic competency criteria for staff recruitment are not applied |
| | • Climate change and global warming favor vector proliferation and adaptation |
| | • Population is susceptible to the new arboviruses |
| | • High migration flows favor the spread of pathogens |
| | • Expansion of agriculture affects integrated vector management |
| | • Changes in government structures undermine the sustainability of any strategy, especially IMS-arbovirus |

### Annex A-3. SWOT Analysis: patient care component

| STRENGTHS | WEAKNESSES |
|-----------|------------|
| | • Need to strengthen the process of integrating arboviral diseases into epidemiological surveillance |
| | • Laboratory monitoring in serology has been debilitated by cross-reactions between arboviral diseases |
| | • Need to strengthen health workers’ knowledge about diagnostic protocols and patient care |
| | • Health workers need permanent training in epidemiological surveillance |
| | • Poor understanding of the synergies among the three arboviral diseases and others through space and time |
| | • Insufficient human resources trained in epidemiological and laboratory surveillance and clinical management |
| | • Insufficient coordination between epidemiological and entomological surveillance |
| | • Poorly integrated surveillance system for febrile illness with skin rashes |
| | • Lack of a model to address arboviral diseases |
| | • There is no established network for research, support, and joint efforts among countries for the prevention and control of arboviral diseases |
| | • Surveillance system is weak with respect to arbovirus-associated events and mother-to-child and sexual transmission |

| OPPORTUNITIES | THREATS |
|---------------|---------|
| • New technologies (multiplex/trioplex) will improve the diagnosis of arboviral diseases | • Population is susceptible to new arboviral diseases and cross-reactions |
| • Countries and agencies have the political will to cooperate, given the reintroduction and introduction of new arboviral diseases | • The structural determinants affecting the presence of diseases remain the same: sanitation, water, and risk management |
| • Rapidly update standards to combat different pathologies | • Perception of low risk and little community participation |
| • Adapt IMS-dengue to epidemiological surveillance of arboviral diseases | • Insufficient private sector participation |
| • New technologies available for use of information sources that support epidemiological surveillance | • In epidemic outbreaks, basic competency criteria for staff recruitment are not applied |
| | • Climate change and global warming favor vector proliferation and adaptation |
| | • Population is susceptible to the new arboviruses |
| | • High migration flows favor the spread of pathogens |
| | • Expansion of agriculture affects integrated vector management |
| | • Changes in government structures undermine the sustainability of any strategy, especially IMS-arbovirus |
| OPPORTUNITIES | THREATS |
|--------------|---------|
| • Existence of and access to regional protocols for case management of patients with suspected arboviral disease, available in electronic and print format | • Difficulties in the practical implementation of case management protocols for patients with suspected arboviral disease |
| • Growing number of health professionals in the Region | • Health professionals do not know the protocols for case management |
| • Professionals with expertise in the management of arboviral diseases in the Region. | • Professionals fail to comply with existing case management protocols for patients with suspected arboviral disease |
| • Multidisciplinary groups are participating in research in the Region | • High turnover of health workers responsible for patients with suspected arboviral disease |
| • Systems for mandatory reporting of cases of arboviral disease in the countries | • Not enough health professionals are trained in case management of patients with suspected arboviral disease |
| • Epidemiological information at the regional level is better, more reliable, and available in real time | • Lack of monitoring or follow-up on the commitment of multipliers to conduct national trainings |
| • Coordinated regional operations research strategies | • Poor distribution of health professionals at all levels of care |
| • Integrated approach to clinical care, vector control, and social communication | • Little knowledge of high-level scientific evidence for case management of patients with suspected arboviral disease |
|                   | • Lack of clinical characterization based on reliable laboratory evidence supporting differential diagnosis in cases of suspected arboviral disease |
|                   | • Lack of a specific antiviral treatment for arboviral diseases |
|                   | • Poor records of signs and symptoms in clinical case files for suspected arboviral disease |

| • Published IHR is not in line with regional criteria for classification of arboviral diseases | • Prognostic criteria of severity have not been defined nor standardized for some arboviral diseases (not including dengue) |
| • Health professionals do not recognize the shock phase in the initial stage of the disease | • Health professionals do not perform differential clinical diagnosis among arboviral diseases |
| • Mild forms of yellow fever are not recognized for timely clinical diagnosis | • Difficult or no access to health services |
| • Difficiencies at the primary care level in terms of case management of suspected arboviral disease | • Lack of clinical laboratory support for adequate management of severe cases (excluding laboratory diagnosis) |
| • Lack of clinical laboratory support for adequate management of severe cases (excluding laboratory diagnosis) | • Difficulty with imaging studies of pregnant women with suspected Zika |
| • Poor availability of resources for the implementation of new technologies | • Lack of contingency plans at the local level for outbreaks and epidemics |
| • Use of new technologies for the development of mobile applications that permit field implementation of protocols |
| • Use of health professionals already trained in case management of suspected arboviral disease |
| • Quality of case management can be improved by properly training health professionals |
| • Financial support is available for operations research |
| • Promotion of clinical research |
| • Strengthening health care at all levels to guarantee clinical assessment of quality |
| • Introduction of new arboviral diseases or other viruses with great dissemination capacity |
| • High turnover among health workers in charge of patients with suspected arboviral disease |
| • A large accumulation of susceptible individuals facilitates new outbreaks/epidemics |
| • Increased migratory movements |
| • Changes or mutations in the serotypes of circulating arboviruses |
| • Economic crises |
| • Sustainability of the contingency plans for outbreaks and epidemics |
### Annex A-4. SWOT Analysis: laboratory component

| **STRENGTHS** | **WEAKNESSES** |
|----------------|----------------|
| Regional RELDA established | Insufficient implementation of quality management systems and insufficient financial resources to maintain them |
| Implementation of harmonized protocols for the Region | Insufficient availability of reagents, despite progress |
| Countries with established internal networks | Difficulties in mobilizing biological material (customs restrictions and problems with courier services) |
| Staff trained in laboratory diagnosis of arboviruses | Difficulties in preserving samples for transportation (traceability/cold chain) |
| Technological platforms established to facilitate rapid and sustained communication | Need to strengthen biocontainment, biosafety, and good laboratory practices |
| 16 level-3 biosafety laboratories (BSL3) | Lack of specific methodologies for serology (differential diagnosis) |
| 85-90% of countries with molecular methods for diagnosis | Not enough trained staff |
| Four WHO collaborating centers near laboratories | Deficiencies in the validation of serological cases (operations research) |
| Availability of EQA | Limited capacity for detection of new pathogens (emerging arboviruses) |

| **OPPORTUNITIES** | **THREATS** |
|-------------------|-------------|
| Development of new methodologies and more efficient diagnostic systems | Instability of the workforce (high turnover, temporary contracts) |
| Development of new knowledge through research, including multicenter studies | Budget limitations |
| Optimization of procurement processes (tenders) for commercial kits, taking advantage of the knowledge generated in RELDA | Emergence of other arboviruses |
| Integration of the different components of surveillance, management, and control within the framework of IMS-arbovirus | Sustainable supply of reagents |
| Technology transfer for the production of nonmarket reagents | Commercial kits tendered/procured based on price and not on technical characteristics or the specifications of the laboratory of reference |
| Implementation of genomic sequencing in surveillance processes | Decision-making on use of reagents/methodologies not coordinated with laboratories |
| Decentralization of surveillance processes in national networks | Laboratories not included in decision-making on surveillance, prevention, and control |
| More laboratories in the Region take part in rounds of EQA | |
### SWOT Analysis: integrated vector management component

#### STRENGTHS

| | |
|---|---|
| • Countries’ experience with IMS-dengue, in different degrees of implementation | • Insufficient human resources to ensure quality coverage in terms of training and competition |
| • PAHO Technical Advisory Group on Public Health Entomology (TAG PHE) | • Loss of human resources due to worker turnover |
| • Regulations or technical guidelines are in place for vector control in the countries of the Region | • Insufficient continuous training programs |
| • Regional resolutions on integrated vector management are in place | • Poor integration of entomological and epidemiological surveillance systems and other systems for decision-making |
| • Organizational structure for vector control in the countries | • Entomological indicators not used for integrated situation analysis |
| • Incipient insecticide monitoring network in several countries | • Integrated vector management strategies conceptualized but not implemented |
| • Operations research on new technologies in the countries | • Countries need technical support to implement IVM |

#### WEAKNESSES

| | |
|---|---|
| • Insufficient human resources to ensure quality coverage in terms of training and competition | • Countries need to update entomological surveillance systems and adapt to the IVM approach |
| • Loss of human resources due to worker turnover | • Lack of coordination among the different components of IMS-arbovirus |
| • Insufficient continuous training programs | • Insufficient collaboration among countries to control arboviral diseases |
| • Poor integration of entomological and epidemiological surveillance systems and other systems for decision-making | • Inadequate management and coordination of national and subnational vector prevention and control programs |
| • Entomological indicators not used for integrated situation analysis | • Incorrect implementation of decentralization in some countries’ programs |
| • Integrated vector management strategies conceptualized but not implemented | • Structural weakness of vector control programs |
| • Countries need technical support to implement IVM | • Insufficient operations research in countries to enable evidence-based decision-making |
| • Regulations or technical guidelines are in place for vector control in the countries of the Region | |
| • Regional resolutions on integrated vector management are in place | |
| • Organizational structure for vector control in the countries | |
| • Incipient insecticide monitoring network in several countries | |
| • Operations research on new technologies in the countries | |

#### OPPORTUNITIES

| | |
|---|---|
| • Countries of the Region are sensitized to the need to implement IVM | • Permanent changes in the political priorities of governments |
| • The effects of the PHEIC due to Zika, as well as other emerging and reemerging arboviral diseases, create a favorable situation for restructuring and strengthening IVM programs | • Vector resistance to insecticides used in public health |
| • Advances in new technologies for vector control | • Risk perception in the population, who believe that insecticide application is what controls vectors |
| • Installed capacities in universities and research centers | • Control of vector-borne diseases is not at the top of the political agenda |
| • PAHO/WHO and other international agencies are ready to help strengthen programs in the countries. | • Adverse climate events |

#### THREATS

| | |
|---|---|
| | • Socioeconomic vulnerability in countries affects the response capacity of vector control programs |
| | • Vector control personnel asked to carry out unrelated tasks in emergencies, hindering performance of their regular duties |
| | • Community perception that vector control is exclusively a responsibility of the government |
## Annex A-6 SWOT Analysis: environment component

| STRENGTHS                                                                 | WEAKNESSES                                                                                                                                                                                                 |
|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| • Regulations enforced to reduce the proliferation of breeding sites (tires, flowerpots, etc.) in several countries of the Region | • Lack of participation by key actors working on social determinants (water, sanitation, garbage collection, migration, etc.) in relation to outbreak prevention and response |
| • Legal sanctions in some countries for the creation of breeding sites during construction in urban areas | • Few public policies to protect the environment and prevent breeding sites                                                                                                                                 |
| • Municipal regulations in several countries include penalties for generating breeding sites | • Little participation of families and communities in physical control of the vector breeding sites within their scope of action |
| • Organized private sector participation                                      | • Sector has no regulatory entity with a role in environmental health issues and in the institutions in charge of addressing them (local government and others).                               |
| • Mobilization of all stakeholders (health sector and other sectors), although only during epidemics or PHEICs | • Little or no perception of risk on the part of the population                                                                                                                                            |
| • Environmental issues addressed by several actors (health, environment, housing, local government) | • Widespread use of insecticides for vector elimination not supported by environmentalist groups                                                                                                                                 |
| • Existence of budgets for environmental public health interventions          | • Lack of sustainable budgets to maintain a healthy environment                                                                                                                                              |
| |                                                                            | • Environmental health issues not on the agenda of the environment sector                                                                                                                                  |
|                                                                            | • Funds allocated for environmental public health interventions used for other programs                                                                                                                                 |

| OPPORTUNITIES                                                                 | THREATS                                                                                                                                                                                                 |
|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| • Territorial management to strengthen stewardship in environmental health issues, through a defined agenda that establishes roles and responsibilities for each actor | • In health ministries, the structure of environmental health has weakened over time. Currently, it is poorly developed and focused on vector surveillance and control, and management of safe water and solid waste, where it does not have a stewardship role |
| • International Health Regulations (IHR 2005) is a binding document that requires countries to prevent the international spread of diseases and includes measures related to vector-born diseases | • Lack of agreements on joint efforts between the health sector and other involved sectors                                                                                                                                 |
| • Human resources trained but limited by high turnover                        | • Weak health sector advocacy on issues related to improving environmental health                                                                                                                                 |
| • Health situation analysis (used by countries as a planning tool) is not strongly developed in environmental indicators | • Poorly defined environmental health priorities within research priorities                                                                                                                                 |
| • Recognition of the financial impact of these diseases at the country level, due to the high cost of intervention and spread that can interfere in trade | • Need to raise stakeholders’ awareness of the importance of interventions in environmental health                                                                                                                                 |
|                                                                            | • Lack of information on available environmental indicators; and, where they exist, they are underutilized                                                                                                             |
|                                                                            | • Health promotion related to territorial management does not take a comprehensive approach to health and does not consider the need for multisectoral intervention                                                                 |
|                                                                            | • Existing prevention and control plans are only within the health sector; multisectoral plans have not been implemented.                                                                                          |
|                                                                            | • Weak national programs and strategies to address environmental health issues                                                                                                                                 |


Annex B. Guides and documents

Annex B-1. Guides and technical documents, by component

Management component
Pan American Health Organization. 55th Directing Council, 68th Session of the Regional Committee of WHO for the Americas. Washington, DC: PAHO; 2016. Available at: http://www.paho.org/hq/index.php?option=com_content&view=article&id=12276%3A2016-55th-directing-councildocuments&catid=8811%3Adc-documents&Itemid=42078&lang=en

Pan American Health Organization. Integrated Management Strategy for Dengue Prevention and Control in the Region of the Americas. Washington, DC: PAHO; 2017. Available at: https://iris.paho.org/bitstream/handle/10665.2/34860/PAHOCHA17039_eng.pdf?sequence=5&isAllowed=y.

Pan American Health Organization. Field Guide for Developing a Risk Communication Strategy: From theory to action [Internet]. Washington, DC: PAHO; 2011. Available at: https://www.paho.org/hq/index.php?option=com_docman&view=download&alias=27449-field-guide-for-developing-a-risk-communication-strategy-2011-449&category_slug=communication-materials-7129&Itemid=270&lang=en

Pan American Health Organization. Resolution of the 27th Pan American Sanitary Conference. Dengue Prevention and Control in the Americas, CSP27.R15 [Internet]. Washington, DC: PAHO; 2007. Available at: https://www.paho.org/english/gov/csp/csp27.r15-e.pdf?ua=1.

Parks W, Lloyd LS. Planning social mobilization and communication for dengue fever prevention and control: a step-by-step guide [Internet]. Geneva: WHO; 2004. Available at: http://www.who.int/immunization/hpv/communicate/planning_social_mobilization_and_communication_for_dengue_fever_prevention_and_control_who_cds_wmc_2004.pdf.

World Health Organization. Communication for behavioural impact: field workbook for COMBI planning steps in outbreak response [Internet]. Geneva: WHO; 2012. Available at: http://www.who.int/ihr/publications/combi_toolkit_fieldwkbk_outbreaks/en/

World Health Organization. Global Strategy for Dengue Prevention and Control 2012-2020 [Internet]. Geneva: WHO; 2012. Available at: http://apps.who.int/iris/bitstream/10665/75303/1/9789241504034_eng.pdf.

Epidemiology component
Pan American Health Organization. Guidelines for Surveillance of Zika Virus Disease and Its Complications. [Internet]. Washington, DC: PAHO; 2016. Available at: https://iris.paho.org/handle/10665.2/28405.

World Health Organization. International Health Regulations (2005). Available at: https://www.who.int/ihr/publications/9789241580496/en/.

Patient care component
Pan American Health Organization. Dengue: guías para la atención de enfermos en la Región de las Américas [Internet]. 2.ª ed. Washington, DC: PAHO; 2016. Available (in Spanish only) at: http://iris.paho.org/xmlui/handle/123456789/28232.
Pan American Health Organization. Instrumento para el diagnóstico y la atención a pacientes con sospecha de arbovirus [Internet]. Washington, DC: PAHO; 2015. Available (in Spanish only) at: http://iris.paho.org/xmlui/handle/123456789/31448.

World Health Organization. Guidelines on Clinical Management of Chikungunya Fever [Internet]. New Delhi: WHO; 2008. Available at: http://www.wpro.who.int/mvp/topics/ntd/ Clinical_Mgmt_Chikungunya_WHO_SEARO.pdf.

**Laboratory component**

Instituto de Medicina Tropical “Pedro Kouri” Ministerio de Salud Pública. Técnicas de laboratorio para el diagnóstico y la caracterización de los virus del dengue [Internet]. Havana, Cuba; 2009. Available at: http://new.paho.org/hq/dmdocuments/2011/Protocolos_Dengue_IPK_2009_I.pdf.

Pan American Health Organization. Zika virus (ZIKV) Surveillance in the Americas: Recommendations for laboratory detection and diagnosis [Internet]. Washington, DC: PAHO; 2016; Available at: https://www.paho.org/hq/index.php?option=com_docman&task=doc_download&gid=30176&Itemid=270&lang=en.

Pan American Health Organization. Health Information Platform: PLISA. Distribution of dengue serotypes in the Americas. Available at: http://www.paho.org/hq/index.php?option=com_docman&task=doc_download&Itemid=270&gdid=29143&lang=en.

Pan American Health Organization. Laboratory diagnosis of yellow fever virus. September 2018. Available at: https://www.paho.org/hq/index.php?option=com_docman&view=download&category_slug=guidelines-5053&alias=46877-laboratory-diagnosis-of-yellow-fever-virus-infection&Itemid=270&lang=en

Pan American Health Organization. RELDA annual meeting report. 2017. Washington, DC (publication pending).

PAHO/WHO/CDC. VIGENDA protocol: sequencing dengue virus. 2016 (publication pending).

PAHO/WHO. Report on workshop on detection of viruses in mosquitoes. 2017 (publication pending).

World Health Organization. Laboratory Biosafety Manual - Third Edition [Internet]. Geneva: WHO; 2005. Available at: https://www.who.int/csr/resources/publications/biosafety/Biosafety7.pdf?ua=1.

WHO. Laboratory quality management system (LQMS) handbook. Geneva: WHO; 2016. Available at: https://www.who.int/ihr/publications/lqms_en.pdf.

**Integrated vector management component**

Achee NL, Gould F, Perkins TA, Reiner RC Jr., Morrison AC, Ritchie SA, et al. A Critical Assessment of Vector Control for Dengue Prevention. PLoS Neglected Tropical Diseases 9(5): e0003655. doi:10.1371/journal.pntd.0003655. Available at: http://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0003655.

Abad-Franch F, Zamora-Perea E, Ferraz G, Padilla-Torres SD, Luz SLB. Mosquito-Disseminated Pyriproxyfen Yields High Breeding-Site Coverage and Boosts Juvenile Mosquito Mortality at the Neighborhood Scale. PLoS Neglected Tropical Diseases 9(4): e0003702. doi:10.1371/journal.pntd.0003702. Available at: http://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0003702.

Bhatt, S. et al. The global distribution and burden of dengue. Nature, 2013. 496(7446):p. 504-507. Available at: https://www.nature.com/articles/nature12060.

Bowman LR, Donegan S, McCall PJ. Is Dengue Vector Control Deficient in Effectiveness or Evidence?: Systematic Review and Meta-analysis. PLoS Neglected Tropical Diseases 10(3): e0004551. doi:10.1371/journal.pntd.0004551 Available at: https://www.ncbi.nlm.nih.gov/pubmed/26986468.
Centers for Disease Control and Prevention. Guideline for Evaluating Insecticide Resistance in Vectors Using the CDC Bottle Bioassay [Internet]. Atlanta, Georgia: CDC; 2012. Available at: http://www.cdc.gov/malaria/resources/pdf/fsp/ir_manual/ir_cdc_bioassay_en.pdf.

Focks, DA. A review of entomological sampling methods and indicators for dengue vectors [Internet]. TDR/WHO; 2003. Available at: http://apps.who.int/iris/bitstream/10665/68575/1/TDR_IDE_DEN_03.1.pdf.

Ministry of Health of Brazil. Levantamiento rápido de índices para Aedes aegypti -LIRAa- para vigilancia entomológica de Aedes aegypti en Brasil: metodología para evaluación de los índices de Breteau y de vivienda y tipo de recipientes [Internet]. Secretaria de Health Surveillance, Department of Communicable Disease Surveillance, Brasilia, 2015. Available (in Spanish) at: http://bvsms.saude.gov.br/bvs/publicacoes/levantamiento_rapido_indices_aedes_aegypti_liraa.pdf.

Ministry of Health of Brazil. Levantamento rápido de índices para Aedes aegypti – LIRAa para vigilância entomológica do Aedes aegypti no Brasil: metodologia para avaliação dos índices de Breteau e Predial e tipo de recipientes [Internet]. Secretaria de Vigilância em Saúde, Departamento de Vigilância das Doenças Transmissíveis, Brasília; 2013. Available (in Portuguese) at: http://bvsms.saude.gov.br/bvs/publicacoes/manual_liraa_2013.pdf.

Pan American Health Organization. Technical Note on Transgenic Mosquitoes Engineered for Aedes aegypti Control [Internet]. Washington, DC: PAHO; 2014. Available at: https://www.paho.org/hq/index.php?option=com_docman&view=download&category_slug=dengue-2&alias=28197-technical-note-on-transgenic-mosquitoes-engineered-for-aedes-aegypti-control-197&Itemid=270&lang=en.

Pan American Health Organization. CD48.R8. Resolution of the 48th Directing Council of PAHO. Integrated Vector Management: A Comprehensive Response to Vector-borne Diseases; PAHO; 2008. Available at: https://www.paho.org/english/gov/cd/cd48.r8-e.pdf?ua=1.

Van den Berg H, Mutero CM, Ichimori K. Guidance on policy-making for Integrated Vector Management [Internet]. Geneva: WHO; 2012. Available at: http://apps.who.int/iris/bitstream/10665/44766/1/9789241502795_eng.pdf.

Weaver SC, Lecuit M. Chikungunya virus and the Global Spread of a Mosquito-Borne Disease. The New England Journal of Medicine, 2015. 372(13): p. 1231-1239. Available at: http://www.nejm.org/doi/pdf/10.1056/NEJMra1406035.

World Health Organization. Handbook on Integrated Vector Management. Geneva: WHO; 2012. Available at: https://apps.who.int/iris/bitstream/handle/10665/102816/9789241502801_eng.pdf?sequence=1.

World Health Organization. Global strategy for dengue prevention and control 2012-2020. Geneva: WHO; 2012. Available at: https://www.who.int/denguecontrol/9789241504034/en/.

World Health Organization. Handbook for integrated vector management [Internet]. Geneva: WHO; 2012. Available at: https://apps.who.int/iris/bitstream/handle/10665/44768/9789241502801_eng.pdf?sequence=1.

World Health Organization. Test procedures for insecticide resistance monitoring in malaria vector mosquitoes [Internet]. Second edition. Geneva: WHO; 2013. Available at: http://apps.who.int/iris/bitstream/handle/10665/250677/9789241511575-eng.pdf?sequence=1.

World Health Organization. Use of malathion for vector control. Report of a WHO meeting [Internet]. Geneva: WHO; 2016. Available at:
World Health Organization. Zika virus outbreak global response. Interim report. May. Geneva: WHO; 2016. Available at: http://apps.who.int/iris/bitstream/handle/10665/207474/WHO_ZIKV_SRF_16.2_eng.pdf?sequence=1.

Environment component

United Nations. 2030 Agenda and the Sustainable Development Goals. An opportunity for Latin America and the Caribbean. Available at: https://repositorio.cepal.org/bitstream/handle/11362/40156/S1801140_en.pdf?sequence=25.

United Nations Office for Disaster Risk Reduction. Sendai Framework for Disaster Risk Reduction (2015–2030) [Internet]. Available at: https://www.preventionweb.net/files/43291_sendaiframeworkfordrren.pdf.

Social communication and community participation

Lloyd LS. Best Practices for Dengue Prevention and Control in the Americas [Internet]. Washington, DC: Environmental Health Project (EHP); 2003. Available at: http://www.ehproject.org/PDF/Strategic_papers/SR7-BestPractice.pdf.

Pan American Health Organization. Field Guide for Developing a Risk Communication Strategy: From theory to action [Internet]. Washington, DC: PAHO; 2011. Available at: https://www.paho.org/hq/index.php?option=com_docman&view=download&alias=27449-field-guide-for-developing-a-risk-communication-strategy-2011-449&category_slug=communication-materials-7129&Itemid=270&lang=en.

Parks W, Lloyd LS. Planning social mobilization and communication for dengue fever prevention and control: a step-by-step guide [Internet]. Geneva: WHO; 2004. Available at: http://www.who.int/immunization/hpv/communicate/planning_social_mobilization_and_communication_for_dengue_fever_prevention_and_control_who_cds_wmc_2004.pdf.

World Health Organization. Communication for behavioural impact: field workbook for COMBI planning steps in outbreak response [Internet]. Geneva: WHO; 2012. Available at: http://www.who.int/ihr/publications/combi_toolkit_fieldwkbk_outbreaks/en/.

Annex B-2. Complementary guides and technical documents

Lloyd LS. Best Practices for Dengue Prevention and Control in the Americas [Internet]. Washington, DC: Environmental Health Project (EHP); 2003. Available at: http://www.ehproject.org/PDF/Strategic_papers/SR7-BestPractice.pdf.

Ledrans M, Quatresous I, Renault P, Pierre V. Outbreak of chikungunya in the French Territories, 2006: lessons learned [Internet]. Eurosurveillance, 2007;12(36):pii=3262. Available at: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=3262.

Pan American Health Organization; Centers for Disease Control and Prevention. Preparedness and Response for Chikungunya Virus: Introduction in the Americas [Internet]. Washington, DC: PAHO; 2011. Available at: http://www1.paho.org/hq/dmdocuments/CHIKV_English.pdf.

Pan American Health Organization; Agencia Mexicana de Cooperación Internacional para el Desarrollo. Plan Maestro Mesoamericano de Gestión Integrada para la Prevención y Control del Dengue y Chikungunya [Internet]. Washington, DC: PAHO; 2015. Available (in Spanish) at: http://www.proyectomesoamerica.org/joomla/images/Documents/Proyectos/Salud/Plan%20maestro%20dengue.pdf.

Pan American Health Organization. State of the Art in the Prevention and Control of Dengue in the Americas [Internet]. Washington, DC: PAHO; 2014. Available at:
Pan American Health Organization. Control of Yellow Fever: Field Guide [Internet]. Washington, DC: PAHO; 2005. Available at: http://www.paho.org/immunization/toolkit/resources/paho-publication/field-guides/Control-of-Yellow-Fever.pdf?ua=1

Pan American Health Organization. Tool for the diagnosis and care of patients with suspected arboviral diseases [Internet]. Washington, DC: PAHO; 2015. Available at: https://iris.paho.org/bitstream/handle/10665.2/33895/9789275119365_eng.pdf?sequence=1&isAllowed=y

World Health Organization. Guidelines for Prevention & Control of Chikungunya Fever [Internet]. New Delhi: WHO; 2008. Available at: http://www.wpro.who.int/mvp/topics/ntd/Chikungunya_WHO_SEARO.pdf
**Annex C. Technical consultation agenda**

*Technical consultation on the strategy for arboviral disease prevention and control in the Americas. Bucaramanga, Colombia, 9-12 August 2016.*

**Tuesday, 9 August 2016**

| Time       | Activity                                                                 | Responsible institution / person                                                                                                                                 |
|------------|--------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8:00 - 8:30| Registration of participants                                             |                                                                                                                                   |
| 8:30 - 9:00| Welcoming remarks                                                        | Dr. Luis Villar – Universidad Industrial de Santander – RED Aedes<br>Dr. Gina Watson, PWR Colombia<br>Dr. Enrique Pérez, IHR Unit Chief |
| 9:00 - 9:20| Introduction of participants and review of the workshop agenda/General remarks | Dr. José Luis San Martín – Regional Advisor on Dengue                                                                             |
| 9:20 - 9:50| The new challenges of chikungunya and Zika virus fever for the Americas  | Dr. Enrique Pérez, IHR Unit Chief                                                                                                  |
| 9:50 - 10:20| IMS-dengue: Current platform as the foundation for work (strengths and weaknesses) | Dr. José Luis San Martín, Regional Advisor on Dengue                                                                                   |
| 10:20 - 10:40| Coffee break                                                            |                                                                                                                                   |

**Plenary: Preparation of the SWOT analysis on arboviral disease prevention and control**

**Dr. Linda Lloyd**

| Time       | Activity                                                                 | Responsible institution / person                                                                                                                                 |
|------------|--------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10:40 - 11:10| Presentation of methodology for participatory construction, groups and stages of work, objectives at the end of the workshop, basic documents. Doubts and initial clarifications | Dr. José Luis San Martin, Regional Advisor on Dengue                                                                                                        |
| 11:10 - 11:40| Formation of working groups, by component: Guidance for preparation of the SWOT (Strengths, Weaknesses, Opportunities, and Threats) matrix for implementing IMS-arbovirus in the Americas | Facilitators                                                                                                                                                |
| 11:40 - 12:30| Group work, by component: Preparation of the SWOT matrix analysis for arbovirus control in the countries and territories of the Americas, based on the strategy’s facilitating factors | Facilitators                                                                                                                                                |
| 12:30 - 14:00| Lunch                                                                    |                                                                                                                                   |
Formation of working groups by component*. Guidance for group work. Working groups: Management, Epidemiological Surveillance, Laboratory Diagnosis, Integrated Vector Management, Patient Care

| Time            | Activity                                                                 | Responsible institution / person                                                                 |
|-----------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| 14:00 - 14:15   | Formation of working groups by component*. Guidance for group work.       | Facilitators                                                                                     |
| 14:15 - 16:00   | Beginning of group work                                                  |                                                                                                  |
| 16:00 - 16:20   | Coffee break                                                             |                                                                                                  |
| 16:20 - 17:40   | Continuation of group work, by component                                 |                                                                                                  |
| 17:40 - 17:50   | Closure/conclusions                                                      | Dr. José Luis San Martín, Regional Advisor on Dengue                                             |
| 17:50 - 18:00   | Meeting of Select Committee of the Coordinating Group                    | Dr. José Luis San Martín, Regional Advisor on Dengue                                             |

* Each group will have a coordinator. Social communication and operations research will be part of each working group.

**Wednesday, 10 August 2016**

| Time            | Activity                                           | Responsible institution / person                                                                 |
|-----------------|----------------------------------------------------|--------------------------------------------------------------------------------------------------|
| 8:30 - 10:00    | Continuation of group work by component            | Group coordinators                                                                               |
| 10:00 - 10:30   | Coffee break                                       |                                                                                                  |
| 10:30 - 12:30   | Continuation of group work by component            | Group coordinators                                                                               |
| 12:30 - 14:00   | Lunch                                              |                                                                                                  |
| 14:00 - 15:30   | Continuation of group work by component            | Group coordinators                                                                               |
| 15:30 - 15:50   | Coffee break                                       |                                                                                                  |
| 15:50 - 17:30   | Continuation of group work by component            | Group coordinators                                                                               |
| 17:30 - 17:40   | Closure/ conclusions                               | Dr. José Luis San Martin, Regional Advisor on Dengue                                             |
| 17:40 - 18:00   | Meeting of Select Committee of the Coordinating Group | Dr. José Luis San Martin, Regional Advisor on Dengue                                             |

**Thursday, 11 August 2016**

| Time            | Activity                                           | Responsible institution / person                                                                 |
|-----------------|----------------------------------------------------|--------------------------------------------------------------------------------------------------|
| 8:30 - 10:00    | Continuation of group work by component            | Group coordinators                                                                               |
| 10:00 - 10:30   | Coffee break                                       |                                                                                                  |
| 10:30 - 12:30   | Continuation of group work by component            | Group coordinators                                                                               |
| 12:30 - 14:00   | Lunch                                              |                                                                                                  |
| 14:00 - 15:30   | Continuation of group work by component            | Group coordinators                                                                               |
| 15:30 - 15:50   | Coffee break                                       |                                                                                                  |
| 15:50 - 17:30   | Continuation of group work by component            | Group coordinators                                                                               |
| 17:30 - 17:40   | Closure/ conclusions                               | Dr. José Luis San Martin, Regional Advisor on Dengue                                             |
| 17:40 - 18:00   | Meeting of Select Committee of the Coordinating Group | Dr. José Luis San Martin, Regional Advisor on Dengue                                             |
| Time             | Activity                                                                                     | Responsible institution / person                          |
|------------------|---------------------------------------------------------------------------------------------|----------------------------------------------------------|
| 8:30 – 9:30      | Presentation of multidisciplinary working groups                                              | Group coordinators                                       |
| 9:30 – 10:00     | Discussion of the presentations of the multidisciplinary groups                               |                                                          |
| 10:00 – 10:30    | Coffee break                                                                                |                                                          |
| 10:30 – 12:30    | Changes to IMS-arbovirus based on the discussions of the multidisciplinary groups and definition of next steps | Group coordinators                                       |
| 12:30 – 14:00    | Lunch                                                                                       |                                                          |
| 14:00 – 15:30    | Continuation of changes to IMS-arbovirus                                                    | Group coordinators                                       |
| 15:30 – 15:50    | Coffee break                                                                                |                                                          |
| 15:50 – 17:30    | Presentation of the preliminary IMS-arbovirus document                                        | Group coordinators                                       |
| 17:30 – 18:00    | Close of workshop                                                                           | Dr. José Luis San Martín, Regional Advisor on Dengue     |

**Friday, 12 August 2016**

| Time             | Activity                                                                                     | Responsible institution / person                          |
|------------------|---------------------------------------------------------------------------------------------|----------------------------------------------------------|
| 8:30 – 10:30     | Plenary session, presentations of the working groups: management, epidemiology, laboratory, integrated vector management, patient care | Group coordinators                                       |
|                  | 10-minute group presentations, 5 minutes of questions from the plenary per presentation, and 30 minutes of plenary discussion |                                                          |
| 10:30 – 11:00    | Coffee break                                                                                |                                                          |
| 11:00 – 12:30    | Continuation of the group work, by component: inclusion of final changes                     | Group coordinators                                       |
| 12:30 – 14:00    | Lunch                                                                                       |                                                          |
| 14:00 – 15:30    | Multidisciplinary working groups are formed and begin work: IMS-arbovirus, contingency plan, monitoring and evaluation, annexes | Group coordinators                                       |
| 15:30 – 15:50    | Coffee break                                                                                |                                                          |
| 15:50 – 17:30    | Continuation of multidisciplinary group work                                                 | Group coordinators                                       |
| 17:30 – 17:40    | Closure/conclusions                                                                         | Dr. José Luis San Martín, Regional Advisor on Dengue     |
Annex D. List of participants in the technical consultation

Technical consultation on the strategy for arboviral disease prevention and control in the Americas. Bucaramanga, Colombia, 9-12 August 2016.

Brasil
João Bosco Sequeira
GT-Dengue
Universidade de Goiás
Tel. 5562999131349
siqueirajb@gmail.com

George S. Dimech
Secretaria Estadual de Saúde – Pernambuco
Tel. 5581992026757
gsdimech@gmail.com

Kleber Luz
Prof. Associado II - Departamento de Infectologia
Universidade Federal de Rio Grande do Norte
Hospital Giselda Trigueiro
Rua Conego Monte, 110 - Quintas
CEP 59040-430 NATAL – RN – BRAZIL
Tel. +55 (84) 9982-4374
klebergluz@gmail.com

Claudenice Pontes
Secretaria Estadual de Saúde – Pernambuco
Tel. 81999659974
pontesandrade@yahoo.com.br

Marcelo Resende
Universidad Federal de Minas Gerais
Tel. (31)999798645
marcelo.resende60@gmail.com

Livia Vinhal
Ministerio de Salud
Tel. 61982598451
lvivia.vinhal@saude.gov.br

Colombia
Jaime E. Castellanos
Universidad del Bosque
Tel. 571-6489066; Cel. 3102425944
castellanosjaime@unbosque.edu.co

Pablo Enrique Chaparro Narváez
Instituto Nacional de Salud
Tel. 3125869292
pchaparro@ins.gov.co

Olga Patricia Fuya Oviedo
Instituto Nacional de Salud
Cel. 3108832415
pfuya@ins.gov.co

Jasblehidy Lizarazo Bejarano
Ministerio de Salud y Protección Social
Tel. 3138590401
jlizarazo@minsalud.gov.co

Fredy Eberto Lizarazo L.
Ministerio de Salud y Protección Social
Tel. 3007857340
flizarazo@minsalud.gov.co

María Isabel Ospina
Ministerio de Salud y Protección Social
Tel. 3105797248
mospinap@minsalud.gov.co

Julio César Padilla Rodríguez
Coordinador Programa Enfermedades por Aedes Aegypti
Ministerio Salud y Protección Social (1)
Tel. 330-5000 Ext .1459 - 3202939498
jpadilla@minsalud.gov.co

Lissethe Carolina Pardo Herrera
Instituto Nacional de Salud
Tel. 2207700 ext. 1426/Cel. 3002324032
lpardo@ins.gov.co

Doris Salgado
GT-Dengue
Tel. 3174386847
dpanqueba@gmail.com
Erica Natalia Tolosa Pérez  Instituto Nacional de Salud  etolosa@ins.gov.co  Tel. 314-4685776

Mauricio Javier Vera  Ministerio de Salud y Protección Social  (571) 3305000 ext. 1468/3153970376  mvera@minsalud.gov.co

Cuba  
María Guadalupe Guzmán  GT-Dengue  Instituto de Medicina Tropical Pedro Kourí  Tel. 72553556  lupe@ipk.sld.cu

Francisco Alberto Durán García  Ministerio de Salud  Tel. 52869658  duran@infomed.sld.cu

Eric Martínez  GT-Dengue  Instituto de Medicina Tropical Pedro Kourí  Tel. (537) 8325863  ericm@ipk.sld

Osvaldo Castro  GT-Dengue  Instituto de Medicina Tropical Pedro Kourí  Tel. 5352782744  osvaldo@ipk.sld.cu

México  
José Cruz Rodríguez Martínez  Secretaría de Salud  Tel. 015553371732  ciJose@dgepi.salud.gob.mx

Gustavo Sánchez  Secretaría de Salud  Tel. 2291685171  gsancheztejada@gmail.com

Venezuela  
Milena Mazzarri  GT-Dengue  Cel. 584121420668  milena.mazzarri@gmail.com

Jaime Torres  Universidad Central de Venezuela  Tel. 584166233041  torresj@post.com

WHO  
Martha Quiñones  Entomology and Vector Control  Tel. 2216062  quinonesm@who.int  WHO Geneva

PAHO/WHO Temporary advisors  
Linda Lloyd  GT-Dengue  lindalloyd01@gmail.com  USA

Mónica Prado  GT-Dengue  opsmonicag@hotmail.com  USA

PAHO/WHO  
Gina Watson  PAHO/WHO Representative, Colombia  Tel. 3144141 ext. 41102  watsong@paho.org  PAHO/WHO Colombia

Giovanini Coelho  National Consultant  Tel. 541131818979  coelho@paho.org  PAHO/WHO Argentina

Héctor Coto  PAHO/WHO Consultant  Tel. 49611661  hectorcoto@live.com

Pablo Durán  Regional Advisor on Perinatal Health  Tel. 202974  duranpa@paho.org  PAHO/WHO Washington DC

Leticia Franco  Regional Program on Dengue  Tel. 2127882 f  rancole@paho.org  PAHO/WHO Panama
Guillermo González  
Punto Focal Epidemiología  
Tel. 50588103919  
gonzalezg@paho.org  
PAHO/WHO Nicaragua

Gamaliel Gutiérrez  
Regional Program on Dengue  
Tel. 202 9743716  
gutierrezg@paho.org  
PAHO/WHO Washington DC

Wilmer Marquiño  
PAHO/WHO Focal Point, Colombia  
Tel. 3144141 ext. 41102  
marquinw@paho.org  
PAHO/WHO Colombia

Carlos Melo  
PAHO/WHO Consultant  
Tel. 556182222456/556198222456  
meloc@paho.org  
PAHO/WHO Brazil

Jairo Méndez  
Regional Advisor on Viral Diseases  
Tel. 202 97443040  
jmendez@paho.org  
PAHO/WHO Washington DC

Enrique Pérez  
IHR Unit Chief  
Tel. 2029743879  
pereze@paho.org  
PAHO/WHO Washington DC

Gabriela Rey  
National Consultant  
PAHO/WHO Colombia  
Cel. 3006657797  
reygabri@paho.org  
PAHO/WHO Colombia

José Luis San Martín  
Regional Advisor on Dengue  
Regional Program on Dengue  
Tel. 2029743140  
sanmartinj@paho.org  
PAHO/WHO Washington DC

Marco Fidel Suárez  
PAHO/WHO Consultant  
masuarez61@gmail.com  
PAHO/WHO Washington DC
Annex D-1. Photo of the technical consultation group
Technical consultation on the strategy for arboviral disease prevention and control in the Americas.
Bucaramanga, Colombia. 9-12 August 2016.
Annex E. Agenda of the regional workshop

Regional workshop for the review and adjustment of the strategy for arboviral disease prevention and control. Guatemala, 17–20 April 2018.

Tuesday, 17 April 2018

| Time       | Activity                                                                 | Responsible institution / person                                      |
|------------|--------------------------------------------------------------------------|-----------------------------------------------------------------------|
| 8:00 – 8:30| Registration of participants                                              |                                                                       |
| 8:30 – 9:00| Opening remarks                                                          | Ministry of Health of Guatemala PAHO/WHO Representative Office Guatemala |
| 9:00 – 9:20| Introduction of participants Review of the workshop agenda and methodology| Dr. José Luis San Martín, PAHO/WHO                                    |
| 9:20 – 9:40| Contextualizing IMS-dengue and the process of preparing IMS-arbovirus    | Dr. Romeo Montoya, PAHO/WHO                                           |
| 9:40 – 10:25| Round table: Components of IMS-arbovirus (part one)                       | Facilitator: Dr. José Luis San Martín, PAHO/WHO                     |
|             | Presentations will be 15 minutes each:                                   | Speakers:                                                            |
|             | 1. Management                                                            | 1. Dr. Héctor Coto, PAHO/WHO                                         |
|             | 2. Epidemiology                                                          | 2. Dr. Thais Dos Santos, PAHO/WHO                                     |
|             | 3. Laboratory                                                            | 3. Dr. Jairo Méndez, PAHO/WHO                                         |
| 10:25 – 10:45| Group photo                                                               |                                                                       |
|             | Coffee break                                                            |                                                                       |
| 10:45 – 11:30| Round table: Components of IMS-arbovirus (part two)                      | Dr. Haroldo Bezerra, PAHO/WHO                                        |
|             | Presentations will be 15 minutes each:                                   | 4. Dr. Gamaliel Gutiérrez, PAHO/WHO                                  |
|             | 4. Integrated vector management                                          | 5. Dr. Marcelo Korc, PAHO/WHO                                         |
|             | 5. Patient care                                                          |                                                                       |
|             | 6. Environment                                                           |                                                                       |
| 11:30 – 12:00| Questions and observations                                               |                                                                       |
| 12:00 – 13:00| Lunch                                                                    |                                                                       |

Linchpin

Operations research

| 13:00 – 13:30| Methodology to define priority research topics                          | Dr. Freddy Pérez, PAHO/WHO                                           |

Preparation of SWOT analysis: Arboviral disease prevention and control

| 13:30 – 13:50| Presentation of methodology for the SWOT analysis Questions and initial clarifications | Dr. Linda Lloyd |
| Time          | Activity                                                                 | Responsible institution / person                                      |
|--------------|--------------------------------------------------------------------------|----------------------------------------------------------------------|
| 13:50 – 14:00| Formation of working groups, by component: Guidelines for the preparation of the SWOT matrix (Strengths, Opportunities, Weaknesses and Threats) to implement IMS-arbovirus in the Americas. 1. Management 2. Epidemiology 3. Laboratory 4. Integrated vector management 5. Patient care 6. Environment | Facilitator: Dr. Linda Lloyd  Working group coordinator  1. Dr. Héctor Coto, PAHO/WHO  2. Dr. Carlos Saenz  3. Dr. María Guadalupe Guzmán  4. Dr. Haroldo Bezerra, PAHO/WHO  5. Dr. Ernesto Pleites  6. Dr. Marcelo Korc, PAHO/WHO |
| 14:00 – 15:30| Group work on each component: Preparation of the SWOT analysis matrix for IMS-arbovirus | Facilitator: Dr. Linda Lloyd |
| 15:30 – 16:15| Presentation of SWOT analysis for each component:  1. Management  2. Epidemiology  3. Laboratory  10 minutes per presentation and 5 minutes for questions | Working group coordinators |
| 16:15 – 16:30| Coffee break                                                             |                                                                      |
| 16:30 – 17:15| Presentation of SWOT analysis for each component:  4. Integrated vector management  5. Patient care  6. Environment  10 minutes per presentation and 5 minutes for questions | Working group coordinators |
| 17:15 – 17:45| Adjustments to SWOT analysis, based on comments                          | Working group coordinators |
| 17:45 – 17:55| Turn in developed materials to Integration group                          | Coordinators of working groups Integration group                       |
| 17:55 – 18:00| Closure/conclusions                                                      | Dr. José Luis San Martín, PAHO/WHO                                    |
| 18:00 – 18:30| Meeting of the Coordinating group                                       | Dr. José Luis San Martín, PAHO/WHO                                    |

2 Each group will have a work coordinator. Social communication and operations research will be part of each working group.

**Wednesday, 18 April 2018**

| Time          | Activity                                                   | Responsible institution / person |
|--------------|------------------------------------------------------------|---------------------------------|
| 8:30 – 9:30  | Proposed classification of Zika: consultation              | Dr. Thais Dos Santos, PAHO/WHO  |
| Time          | Activity                                                                                           | Responsible institution / person                                                        |
|--------------|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| 9:30 – 9:45  | Creation of a working group for each component                                                   | Dr. José Luis San Martín, PAHO/WHO                                                      |
|              | Guidance for group work                                                                           | Working group coordinators                                                             |
|              | Working groups                                                                                     | 1. Dr. Héctor Coto, PAHO/WHO                                                           |
|              | 1. Management                                                                                      | 2. Dr. Carlos Saenz                                                                     |
|              | 2. Epidemiology                                                                                     | 3. Dr. Marí Guadalupe Guzmán                                                          |
|              | 3. Laboratory                                                                                      | 4. Dr. Haroldo Bezerra, PAHO/WHO                                                        |
|              | 4. Integrated vector management                                                                       | 5. Dr. Ernesto Pleites                                                                  |
|              | 5. Patient care                                                                                    | 6. Dr. Marcelo Korc, PAHO/WHO                                                           |
|              | 6. Environment                                                                                     |                                                                                        |
| 9:45 – 10:20 | Beginning of group work on each component                                                           | Group coordinators                                                                      |
| 10:20 – 10:40| Coffee break                                                                                       |                                                                                        |
| 10:40 – 12:30| Group work on each component (continued)                                                            | Working group coordinators                                                             |
| 12:30 – 14:00| Lunch                                                                                              |                                                                                        |
| 14:00 – 16:00| Group work on each component (continued)                                                            | Working group coordinators                                                             |
| 16:00 – 16:20| Coffee break                                                                                       |                                                                                        |
| 16:20 – 17:20| Group work on each component (continued)                                                            | Working group coordinators                                                             |
| 17:20 – 17:30| Closure/conclusions                                                                                | Dr. José Luis San Martín, PAHO/WHO                                                      |
| 17:30 – 18:00| Meeting of the Coordinating group                                                                  | Dr. José Luis San Martín, PAHO/WHO                                                      |

**Thursday, 19 April 2018**

| Time          | Activity                                                                                           | Responsible institution / person                                                        |
|--------------|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| 8:30 – 10:30 | Presentations by the working groups for each component:                                           | Working group coordinators                                                             |
|              | 1. Management                                                                                      | 1. Dr. Héctor Coto, PAHO/WHO                                                           |
|              | 2. Epidemiology                                                                                     | 2. Dr. Carlos Saenz                                                                     |
|              | 3. Laboratory                                                                                      | 3. Dr. Marí Guadalupe Guzmán                                                          |
|              | 4. Integrated vector management                                                                       | 4. Dr. Haroldo Bezerra, PAHO/WHO                                                        |
|              | 5. Patient care                                                                                    | 5. Dr. Ernesto Pleites                                                                  |
|              | 6. Environment                                                                                     | 6. Dr. Marcelo Korc, PAHO/WHO                                                           |
|              | 10-minute presentations by each group, plus 5 minutes of plenary questions, per presentation, and 30 minutes of plenary discussion | Facilitator: Dr. Linda Lloyd                                                          |
| 10:30 – 10:50| Coffee break                                                                                       |                                                                                        |
| 10:50 – 12:10| Group work on each component (continued)                                                            | Working group coordinators                                                             |
|              | Changes will be based on the plenary discussion                                                     |                                                                                        |
| 12:10 – 12:30| Turn in changes to the Integration group                                                             | Working group coordinators                                                             |
|              |                                                                                                   | Integration group                                                                      |
| 12:30 – 14:00 | Lunch |
|----------------|-------|
| 14:00 – 16:20 | Multidisciplinary working groups are formed and begin work:  
  1. IMS-arbovirus  
  2. Monitoring, evaluation  
  3. Annexes of the document  
  4. Implementation plan  
  5. Operations research | Working group coordinators  
  1. Dr. Gamaliel Gutiérrez, PAHO/WHO  
  2. Dr. Carlos Saenz  
  3. MSc. Jaime Juárez, PAHO/WHO  
  4. Dr. Leticia Franco, PAHO/WHO  
  5. Dr. Freddy Pérez, PAHO/WHO  
  Facilitator:  
  Dr. Linda Lloyd |

| 16:20 – 16:40 | Coffee break |
|----------------|-------------|
| 16:40 – 17:30 | Multidisciplinary group work (continued) | Working group coordinators |
| 17:30 – 17:40 | Closure/conclusions | Dr. José Luis San Martín, PAHO/WHO |
| 17:40 – 18:00 | Meeting of the Coordinating group | Dr. José Luis San Martín, PAHO/WHO |

**Friday, 20 April 2018**

| Time          | Activity                                                                 | Responsible institution / person                        |
|---------------|--------------------------------------------------------------------------|---------------------------------------------------------|
| 8:30 – 10:15  | Presentations by multidisciplinary working groups:  
  1. IMS-arbovirus  
  2. Monitoring, evaluation  
  3. Annexes of the document  
  4. Implementation plan  
  5. Operations research  
  10-minute presentations by each group, plus 5 minutes of plenary questions, per presentation, and 30 minutes of plenary discussion | Working group coordinators  
  1. Dr. Gamaliel Gutiérrez, PAHO/WHO  
  2. Dr. Carlos Saenz  
  3. MSc. Jaime Juárez, PAHO/WHO  
  4. Dr. Leticia Franco, PAHO/WHO  
  5. Dr. Freddy Pérez, PAHO/WHO |
| 10:15 – 10:40 | Coffee break |
| 10:40 – 12:30 | Changes to IMS-arbovirus based on the presentation of the multidisciplinary groups and plenary discussion | Working group coordinators |
| 12:30 – 14:00 | Lunch |
| 14:00 – 15:50 | Changes to IMS-arbovirus based on the presentation of the multidisciplinary groups and plenary discussion (continued) | Working group coordinators |
| 15:50 – 16:20 | Turn in changes to the Integration group | Working group coordinators Integration group |
| 16:20 – 16:40 | Coffee break |
| 16:40 – 17:30 | Presentation of the preliminary IMS-arbovirus document | Integration group |
| Time       | Event                                    | Presenter                        |
|------------|------------------------------------------|----------------------------------|
| 17:30 – 17:40 | Closure of the workshop                  | Dr. José Luis San Martín, PAHO/WHO |
| 17:40 – 18:00 | Meeting of the Coordinating group        | Dr. José Luis San Martín, PAHO/WHO |
Annex F. List of participants in the regional workshop

Regional workshop for the review and adjustment of the strategy for arboviral disease prevention and control. Guatemala, 17-20 April 2018.

Argentina
María Virginia Introini
Coordinación de Vectores
Dirección Nacional de Epidemiología y Análisis de la Situación de Salud
Ministerio de Salud de la Nación
9 de Julio 356 - 3er piso, Córdova, Argentina
Tel/Fax: 0351-4223540
mvintroini@gmail.com

María Alejandra Morales
Jefe de la División Virología e Inmunología
Laboratorio de Arbovirus, Depto. de Investigación Centro Nacional de Referencia para Diagnóstico de Dengue y Otros Arbovirus
INEVH “Dr. Julio I. Maiztegui” – ANLIS, Monteagudo 2510-(2700) Pergamino
Tel.: 02477-433044/420712 al 714 Int. 218/227
Fax: 02477-433045
morales.mariaalejandra@yahoo.com.ar

Dr. Laura Brandt
Coordinadora de Vectores
Dirección Nacional de Epidemiología y Análisis de la Situación de Salud
Ministerio de Salud de la Nación
Av. 9 de Julio 1925, 9.º Piso
C1073ABA – Ciudad Autónoma de Buenos Aires
Buenos Aires, Argentina
Tel: +54-11-4379-9023
laurabrandt74@gmail.com

Brazíl
Dr. Kleber Luz
Prof. Associado II - Departamento de Infectología
Universidad Federal de Río Grande del Norte
Hospital Giselda Trigueiro
Rua Conego Monte, 110 - Quintas
CEP 59040-430 NATAL – RN – BRAZIL
Cel.: +55 (84) 9982-4374
klebergluz@gmail.com

Dr. Sulamita Brandão Barbiratto
Ministério da Saúde (MS)
Secretaria de Vigilância em Saúde (SVS)
Departamento de Vigilância das Doenças Transmissíveis
Programa Nacional de Controle da Dengue (PNCD)
Vigilância Epidemiológica
SRTVN 701 - Vía W 5 Norte - LoteD Ed. PO 700 - 6.º andar
Brasilia/DF - CEP:70.719-040
Tel.: + 55 (61) 3315.3122
sulamita.barbiratto@saude.gov.br

Colombia
Dr. Julio César Padilla Rodríguez
Coordinador del Programa Promoción, Prevención y Control de Arbovirosis
Ministerio de Salud y Protección Social
Dirección Carrera 13 # 32-76, Piso 14
Bogotá, Colombia
Tel.: (57) 3202939498 | MINSALUD 3305000 ext. 1459-1494
jpadilla@minsalud.gov.co ; jcpadilla59@yahoo.es

Cuba
Dr. María Guadalupe Guzmán
Jefa del Centro de Investigación, Diagnóstico y Referencia
Instituto de Medicina Tropical “Pedro Kourí” (IPK)
Havana, Cuba
Tel.: 72553556/72553503
lupe@ipk.sld.cu | mguadalupe@infomed.sld.cu

Dr. Madeleine Rivera Sánchez
Jefa del Departamento de Vigilancia Entomológica
Ministerio de Salud,
Havana, Cuba
Tel.: 37 838 3332
pmaedes@infomed.sld.cu

El Salvador
Dr. Ernesto Pleités
Subdirector del Instituto Nacional de Salud de El Salvador
Pediatra Infectólogo
Calle Ingeniero Alcaine #66
Colonia Universitaria Norte
Mejicanos, San Salvador, El Salvador
Tel.: (503) 7860 9279
pleitessan@gmail.com

United States
Dr. Linda S. Lloyd
Public Health Consultant
3443 Whittier St. San Diego, CA, 92106
lindalloyd01@gmail.com

Guatemala
Dr. Pedro Marcelino Yax Caxaj
Jefe Coordinador Enfermedades por Arbovirales
Enfermedades Transmitidas por Vectores/ Departamento de Regulación de los Programas de Atención a las Personas (DRPAP/DGRVCS/MSPAS)
5ª avenida 11-40, Zona 11. Colonia El Progreso, Ciudad de Guatemala
Mónica Elisa Barrientos Juárez
Facilitadora de la Sección de Entomología Médica
Programa de Enfermedades Transmitidas por Vectores
5ª avenida 11-40, Zona 11. Colonia El Progreso, Ciudad de Guatemala
vectorescentralmb@gmail.com
Tel.: (502) 4151-7954

Zoraida Anabella Morales Monroy
Coordinadora del Programa de Enfermedades Transmitidas por Vectores
Ministerio de Salud Pública y Asistencia Social (MSPAS)
5ª avenida 11-40, Zona 11. Colonia El Progreso, Ciudad de Guatemala
vectoresguatemala@gmail.com
Tel.: (502) 30835955

Dr. Edgar Roberto Huertas Cordero
Asistente Técnico/Sistema Integrado de Atención a la Salud (SIAS)
Ministerio de Salud Pública y Asistencia Social (MSPAS)
9ª avenida 15-14, Zona 1, Ciudad de Guatemala
erobertohuertas@gmail.com
Tel.: (502) 55023135

Dr. Enrique Eugenio Duarte Sáenz de Tejada
Asesor de Gestión de Riesgo, Unidad de Gestión de Riesgo
Ministerio de Salud Pública y Asistencia Social (MSPAS)
6ª avenida 3-45, Zona 11, Ciudad de Guatemala
tiduarte2@yahoo.com
Tel.: (502) 58051318

Dr. Ingrid Estrada Morales
Responsable de Reglamento Sanitario Internacional
Ministerio de Salud Pública y Asistencia Social (MSPAS)
6ª avenida 3-45, Zona 11, Ciudad de Guatemala
ingridestradam@yahoo.com/iestradaepi@gmail.com
Tel.: (502) 57696674

Ericka Chávez Vásquez
Epidemióloga
Ministerio de Salud Pública y Asistencia Social (MSPAS)
6ª avenida 3-45, Zona 11, Ciudad de Guatemala
ervigilancia@gmail.com
Tel: (502) 54229994

Evelin Carolina Donis De Matta
Laboratorio Nacional de Salud (LNS)
Ministerio de Salud Pública y Asistencia Social (MSPAS)
Km. 22 Carretera al Pacífico, Bárcenas, Villa Nueva

Mauricio Vázquez Pichardo
Jefe del Laboratorio de Arbovirosis y Virus Hemorrágicos
Instituto de Diagnóstico y Referencia Epidemiológicos “Dr. Manuel Martínez Báez”
Francisco de P. Miranda No.177
Col Unidad Lomas de Plateros, Del. Álvaro Obregón Ciudad de México, México
arbored.indre@gmail.com

Nicaragua
Dr. Carlos Sáenz Torres
Secretario General y Director del CNDR
Ministerio de Salud
Costado Oeste Colonia 1.º de Mayo, Complejo de Salud Concepción Palacio
Managua, Nicaragua
Tel.: 89301049
carlossaenz@minsa.gob.ni

Paraguay
Dr. Maria Teresa Barán Wasilchuk
Viceministra de Salud
Coordinadora General del Comité Técnico EGI Vectores
Ministerio de Salud Pública y Bienestar Social
Asunción, Paraguay
secretariagralviceministerio@gmail.com
Dr. Águeda Cabello Sarubbi  
Directora General de Vigilancia de la Salud  
Ministerio de Salud Pública y Bienestar Social  
Asunción, Paraguay  
Tel.: (595) 981454159  
mspdgvs@gmail.com

Dr. Jaime Nombera Cornejo  
Director Ejecutivo de la Dirección de Prevención y Control de las Enfermedades Metaxénicas y Zoonosis  
Ministerio de Salud  
Cel.: 926911515  
jnombera@minsa.gob.pe /md26243@hotmail.com

Dr. Gladys Marina Ramírez Prada  
Directora Ejecutiva Adjunta  
Centro Nacional de Epidemiología, Prevención y Control de Enfermedades CDC-Perú  
Ministerio de Salud de Perú  
Cel.: 989331135  
gramirez@dge.gob.pe /gr3926@gmail.com

Dominican Republic  
Dr. Grey Idalia Benoit Vásquez  
Encargada de Vigilancia Epidemiología  
Centro de Control de Vectores y Zoonosis  
Ministerio de Salud Pública  
Av. Héctor Homero Hernández Vargas esq. Av. Tiradentes  
Ensanche La Fe, Santo Domingo, Rep. Dominicana  
Grey.benoit@ministeriodesalud.gob.do /dra.greybenoit@gmail.com  
Tel.: 18492430550

Suriname  
Dr. Hélène Hiwat  
Coordinator of the Malaria Programme  
Ministry of Health  
Paramaribo, Suriname  
Tel.: 597 7180226  
helenehiwat@gmail.com

Trinidad and Tobago  
Dr. David Okechukwu Ibeleme  
Specialist Medical Officer  
Insect Vector Control Division  
Ministry of Health  
P.O. Box 4378  
St. Ann’s, Port of Spain, Trinidad and Tobago  
Tel.: 1-868-355-5147  
davidibeleme@hotmail.com

PAHO/WHO  
Dr. José Luis San Martín  
Regional Advisor on Arboviral Diseases  
Neglected, Tropical and Vector-borne Diseases  
PAHO/WHO  
525 23rd St. NW Washington DC 20037  
Tel.: +1-202-974-3140  
sanmartj@paho.org

Dr. Haroldo Bezerra  
Regional Advisor, Public Health Entomology  
Neglected, Tropical and Vector-borne Diseases  
PAHO/WHO  
525 23rd St. NW Washington DC, 20037  
Tel.: +1-202-974-3630  
bezerrha@paho.org

Dr. Thais Dos Santos  
Advisor, Surveillance and Control of Arboviral Diseases  
Regional Program on Arboviral Diseases  
Neglected, Tropical and Vector-borne Diseases  
PAHO/WHO  
525 23rd St. NW Washington DC, 20037  
Tel.: +1-202-974-3896  
dossantt@paho.org

Dr. Gamaliel Gutiérrez  
Specialist, Dengue Prevention and Control  
Regional Program on Arboviral Diseases  
Neglected, Tropical and Vector-borne Diseases  
PAHO/WHO  
525 23rd St. NW Washington DC, 20037  
Tel.: +1-202-974-3716  
gutierrezg@paho.org

Dr. Marcelo Korc  
Unit Chief  
Climate Change and Environmental Determinants of Health  
PAHO/WHO  
525 23rd St. NW Washington DC 20037  
Tel.: +1-202-974-3148  
korcmarc@paho.org

Dr. Freddy Pérez  
Advisor, Communicable Diseases Research Communicable Diseases and Environmental Determinants of Health Department  
PAHO/WHO  
525 23rd St. NW Washington DC 20037  
Tel.: +1-202-974-3486 Cel.: +1-202-2576715  
perezf@paho.org

Dr. Jairo Méndez  
Advisor, Viral Diseases  
Infectious Hazard Management  
PAHO/WHO
525 23rd St. NW Washington, DC Tel.: +1 202 9743070 ricoj@paho.org

**Dr. Héctor Coto**
PAHO Consultant
Public Health Entomology
PAHO/WHO – Washington, DC
Lucio V. Mansilla 2856, Piso 8
Buenos Aires, Argentina 1425
Tel.: +54 9341 2011262; 54 1149 611661 hectorcoto@live.com

**Carlos Frederico Campelo de Albuquerque e Melo**
National PAHO Consultant
Diseases Prevention and Control, and Environmental Health
PAHO/WHO Brasilia, Brazil
Tel.: +55 (61) 32519530 meloc@paho.org

**Dr. Leticia Franco**
International PAHO Consultant
Neglected, Tropical and Vector-borne Diseases
PAHO/WHO Panama
Ancón, Ave. Gorgas, Edificio 261. Piso 2°
Panama City, Panama
Tel.: (507) 212 7802 francolet@paho.org

**Dr. Romeo Montoya**
Advisor on Communicable Diseases and Environmental Determinants of Health, CDE-HA
PAHO/WHO Guatemala
Diagonal 6, 10-50, Zona 10. Edificio Interaméricas, Torre Norte, cuarto nivel montoyah@paho.org
Tel.: (502) 23294200 ext. 40471/42570201

**Jaime Juárez**
National Consultant on Vectors
PAHO/WHO Guatemala
Diagonal 6, 10-50, Zona 10. Edificio Interaméricas, Torre Norte, cuarto nivel
Tel: (502) 23294200 ext. 40425 juarezja@paho.org
Annex F-1. Photo of the regional workshop group
Regional workshop for the review and adjustment of the strategy for arboviral disease prevention and control in the Americas. Guatemala City, Guatemala. 17-20 April 2018.
The Integrated Management Strategy for the Prevention and Control of Arboviral Disease in the Americas (IMS-arbovirus) offers a methodology and management model with clearly defined objectives and strategic lines. Based on conditions in the Region, each component of IMS-arbovirus is grounded in best practices. The model is easily applicable to local conditions and is constantly enhanced by operations research and scientific advances, which has made it sustainable over time. This document is mainly for health ministers and managers at the various levels of the health system. It offers detailed information on the performance indicators, expected results, activities, and tasks necessary for strengthening national and local technical capacities for the prevention and control of arboviral disease.