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F. PLAN OF ACTION ON ENTOMOLOGY AND VECTOR CONTROL 2018-2023: MIDTERM REVIEW

Background

1. The World Health Organization (WHO) has noted that vector-borne diseases, such as dengue, yellow fever, and others caused by viruses transmitted by *Aedes* mosquitos, malaria, schistosomiasis, leishmaniasis, Chagas disease, and plague account for around 17% of infectious diseases worldwide and each year are responsible for more than 700,000 deaths (1). Since 2010, major outbreaks of these diseases have disproportionately affected populations, claiming lives and putting enormous pressure on the Region of the America's health systems. The Plan of Action on Entomology and Vector Control 2018-2023 (Document CD56/11) (2), approved by Resolution CD56.R2 of the 56th Directing Council of the Pan American Health Organization (PAHO) in September 2018 (3), provides the strategic and practical framework for technical cooperation and action by the countries and other partners to reduce the burden and threat of vector-borne diseases in the Region through sustainable vector control and best practices, including integrated vector management (4). This plan, moreover, is aligned with the WHO *Global Vector Control Response 2017-2030* and other PAHO mandates (1, 5-7). The purpose of this document is therefore to report to the Governing Bodies of the PAHO on progress toward achieving the objectives of this plan of action.

Analysis of Progress Achieved

2. To varying degrees, progress was made in meeting the indicators of the five strategic lines established in the plan of action. The main sources of information for this midterm report were the documents and reports that countries send to PAHO and WHO, reports on technical cooperation visits, and reports of the regional or subregional meetings on the issue, in addition to a consultation with 19 selected countries through a structured questionnaire that 13 countries completed. A summary of progress on each strategic line of action is presented below, along with the respective evaluation of the indicators, following the criteria¹ presented in Document CD58/9, Add. I, Annex B of the report on the end-of-biennium assessment of the PAHO Program and Budget 2018-2019 (8).

¹ Criteria for assessing immediate and intermediate outcome indicators at the regional level. (Document CD58/5, Add. I).

Strategic line of action 1: Multilevel Integration Dimension – Strengthen inter-programmatic, intra-sectoral, and intersectoral action and collaboration in vector prevention and control

3. To promote and facilitate the use of multisectoral integrated approaches in the routine of national vector control programs, the Pan American Sanitary Bureau (PASB or the Bureau), in collaboration with the Member States, prepared the *Handbook for Integrated Vector Management in the Americas (9)*, which spells out the key elements for that integration. The handbook is also supported by a situation analysis on the use of sanitation and environmental vector control data, the product of which is a generic document to guide the preparation of national vector control plans (10). A concrete result of this effort was the creation of new inter-ministerial task forces in seven countries and completion of the review or adaptation of five national vector control plans; in addition, 12 countries were motivated to adopt the use and analysis of data from different sources to support strategic decision-making for vector control (preparation of a disaster response, prioritization of areas for intervention, or the adoption of measures for managing mosquito breeding sites, etc.).

Objective 1.1: Inter-ministerial task force for multisectoral engagement in vector control established and functioning	
Indicator, baseline, and target	Status
<p>1.1.1 Number of countries and territories that have established a task force for multisectoral engagement in vector control (including vector control during emergencies/outbreaks) that has convened in the past 12 months and developed a national vector control work plan</p> <p>Baseline (2017): 3 Target (2020): 10 Target (2023): 20</p>	<p>Met. To date, 10 countries have created a task force for multisectoral collaboration in vector control.</p> <p>Country progress to date shows that the indicators of this line of action are on the way to achievement at the end of 2023.</p>
Objective 1.2: Vector control programs using data and information from multiple sources for integrated decision-making	
Indicator, baseline, and target	Status
<p>1.2.1 Number of countries and territories with vector control programs using data and information (e.g., temperature, rainfall, climate, environment, potable water, sanitation and waste management, infrastructure and housing) from various sources for integrated decision-making within the vector control programs</p> <p>Baseline (2017): 3 Target (2020): 10 Target (2023): 20</p>	<p>Exceeded. Fifteen countries have reported using data and information from a variety of sources, at different levels of analytical complexity, for integrated decision-making in their vector control programs.</p> <p>Significant progress has been made in this line of action, and the target is expected to be met in 2023.</p>

Strategic line of action 2: Government and Community – Engage and mobilize regional and local governments and communities, including local health services, for sustainable commitments to entomology and vector prevention and control

4. In strategic line of action 2, the Bureau has been supporting the action taken by Member States to promote partnerships with communities and with community and business leaders to develop and implement sustainable vector surveillance and control activities. A good example of the progress in this area is Mosquito Awareness Week (11), launched in 2016 as an initiative for community, household, and intersectoral action and mobilization; it has been held five times and was carried out in 2019 with the participation of 27 countries (12). Activities to promote capacity building in communication and social mobilization among vector control program managers were also important; as a result, 65 professionals received training to strengthen country capacities in risk communication and in the preparation and structuring of national mobilization plans. As a result, nine countries have prepared their plans or agreements for effective community participation, collaboration, and mobilization, following the Bureau’s guidance and recommendations.

Objective 2.1: Engage and mobilize regional and local government and communities, including local health services, to increase sustainable commitments to and action in vector control	
Indicator, baseline, and target	Status
<p>2.1.1 Number of countries and territories in which national or territorial health authorities have developed plans or agreements for effective community participation, engagement, and mobilization at the national, regional, and local level (including local health services) with sustainable commitments in vector control</p> <p>Baseline (2017): 3 Target (2020): 10 Target (2023): 15</p>	<p>Exceeded. To date, 12 countries have prepared plans or agreements for effective community participation, collaboration, and mobilization in vector control.</p> <p>Considering the positive results and the priority that the governments have given to this issue, the countries are expected to meet 100% of the target for this indicator in 2023.</p>

Strategic line of action 3: Vector Control Programs and Systems – Enhance entomological surveillance and vector control monitoring and evaluation, including insecticide resistance monitoring and management.

5. The Bureau’s cooperation activities with the Member States in this strategic line were primarily based on the preparation or updating of technical documents and guidance, establishment of regional networks, training of country technical teams in specific areas of entomological surveillance and vector control, and strengthening of work with institutions and reference centers in the Region, among them: the Centers for Disease Control and Prevention (CDC), United States of America; the Oswaldo Cruz Foundation (Fiocruz), Brazil; the Center for Research on Pests and Insecticides (CIPEIN), Argentina; the National Institute of Health, Colombia; the National Institute of Health, Mexico; Emory University, United States of America; the Autonomous University of Yucatán, Mexico; and the

Uniformed Services University, United States of America. As a result, two regional networks were established, one for the surveillance and management of insecticide resistance, with the participation of 19 countries. Technology for the production of insecticide-impregnated paper has been transferred to two laboratories in the Region (CIPEIN and Fiocruz), thus facilitating access to and availability of that critical supply; support was also provided to three institutions in the Americas (Fiocruz, CIPEIN, and the Autonomous University of Yucatán) for certification of compliance with the principles of good laboratory practices for pesticide evaluation. Fiocruz, and the Autonomous University of Yucatán have finalized their certification processes, and CIPEIN is expected to do so by the end of 2021 (13). In addition, three new technical guides were published (14-16). This effort enabled 14 countries to strengthen their databases and entomological surveillance system; 16 to effectively increase their capacity for monitoring and managing vector resistance to insecticides used in public health; and six to complete their vector control needs assessments.

Objective 3.1: Entomological surveillance systems established or strengthened and integrated with health information to guide vector control programs and activities	
Indicator, baseline, and target	Status
<p>3.1.1 Number of countries and territories that have established or strengthened their entomological surveillance system and database in accordance with PAHO/WHO guidelines and/or recommendations</p> <p>Baseline (2017): 2 Target (2020): 15 Target (2023): 22</p>	<p><i>Exceeded.</i> Sixteen countries reported that they have established or strengthened their databases and entomological surveillance systems in accordance with PAHO/WHO guidelines or recommendations.</p> <p>Significant progress has been made on this line of action, and the target is expected to be met in 2023.</p>
<p>3.1.2 Number of countries and territories that have established or strengthened a system for the monitoring and management of vector resistance to insecticides used in public health, in accordance with PAHO/WHO guidelines and/or recommendations</p> <p>Baseline (2017): 3 Target (2020): 10 Target (2023): 22</p>	<p><i>Exceeded.</i> To date, 19 countries have established a system for the monitoring and management of resistance to insecticides used in public health, in accordance with PAHO/WHO guidelines or recommendations. Significant progress has been made in this line of action, and the target is expected to be met at the end of 2023.</p>

Objective 3.2: Vector control needs assessment conducted and/or updated	
Indicator, baseline, and target	Status
<p>3.2.1 Number of countries and territories that have completed or updated their existing vector control needs assessment (workforce, entomology, and vector control capacity and structure) through a consultative process within the past 24 months, in accordance with PAHO/WHO guidelines and/or recommendations</p> <p>Baseline (2017): 5 Target (2020): 15 Target (2023): 35</p>	<p>Partially met. Eleven countries have completed or updated their assessment of existing vector control needs.</p> <p>Although the target was not met, bearing in mind the countries' commitment and activities planned for the next years of the period 2021-2023, it is expected to be met at the end of 2023.</p>

Strategic line of action 4: Tools and Interventions – Test, document, and integrate proven and/or novel tools and approaches, and scale them up when possible or needed

6. Given the growth in the supply of novel vector control tools available to the countries, including new insecticide molecules, personal protective equipment, and manipulated (irradiated, genetically modified, and *Wolbachia*-infected) mosquitos, an appropriate operational assessment is essential before adding new interventions to the routine tools of vector control programs. To support the countries, in addition to publishing and disseminating the technical guide *Evaluation of Innovative Strategies for Aedes aegypti Control: Challenges for their Introduction and Impact Assessment (17)*, the Bureau also promoted the work of the External Evaluation Group on New Technologies for vector control (18) through independent evaluations of current projects in the Region. Specifically, two evaluations of projects involving the use of the *Wolbachia* bacterium for *Aedes* mosquito control were conducted at the request of Brazil (municipality of Niteroi) and Colombia (Medellín). As a consequence of this line of action, nine countries have moved forward with standardized processes for the assessment and documentation of vector control tools or measures to improve vector control; three new vector control tools (insecticide spreaders, lethal traps, and new insecticide molecules) are also being evaluated. Furthermore, one country has reported progress in scaling up integration with water and sanitation services, in housing improvements, and in urban planning to support vector control operations. The progress in this indicator is modest; however, it should be recognized that this type of intervention is highly effective, though generally expensive, and financing is needed to improve housing and basic sanitation infrastructure in communities.

Objective 4.1: Ministries of health have tested and documented selected novel vector control tools, as recommended by PAHO/WHO, in operations or pilot studies	
Indicator, baseline, and target	Status
<p>4.1.1 Number of ministries of health that have tested and documented vector control tools or measures to improve control of priority vector-borne diseases (VBD)</p> <p>Baseline (2017): 1 Target (2020): 10 Target (2023): 15</p>	<p>Met. Ten countries reported having tested and documented vector control tools or measures to improve control of priority VBD.</p> <p>The target for this indicator is expected to be met at the end of 2023.</p>
<p>4.1.2 Number of novel tools for vector control scaled up using standard methodologies, and independent evaluation initiated in selected countries and territories</p> <p>Baseline (2017): 3 Target (2020): 5 Target (2023): 8</p>	<p>Exceeded. Six new tools are in different phases of evaluation, following the evaluation protocols established by the countries.</p> <p>The target for this indicator is expected to be met at the end of the 2023.</p>
Objective 4.2: Countries and territories have scaled up and/or integrated water and sanitation improvements, housing improvements, and/or urban planning in vector control operations	
Indicator, baseline, and target	Status
<p>4.2.1 Number of countries and territories that have national or territorial plans or programs for water and sanitation improvement, housing improvement, and/or urban planning that include entomological risk as a factor for prioritizing actions and conducting assessments and studies</p> <p>Baseline (2017): 1 Target (2020): 4 Target (2023): 8</p>	<p>Partially met. To date, three countries have reported having national or territorial plans or programs to improve housing or urban planning that consider entomological risks a priority factor.</p> <p>Significant progress with this indicator has not been reported. Considering the current COVID-19 pandemic and the fact that most of the available financial resources are being channeled to the pandemic response, 50% of the target is expected to be met.</p>

Strategic line of action 5: Workforce and Training – Create and expand opportunities for entomologists, entomology technicians, and public health workers to receive regular training, continuing education, and career development

7. On this strategic line of action, the countries are seeking to reduce gaps in entomology applied to public health, especially those related to the lack of trained professionals (public health entomologists or vector biologists, for example). If this gap is covered, it should have a direct positive effect on the capacity of the vector programs responsible for implementing and properly assessing the epidemiological and entomological impact of the interventions. A 2018 study supported by the Bureau on regional capacity in training technical and operational personnel in vector control (19),

revealed the existence of 107 training options (specialization, diploma, and post-graduate courses). Most of these (70%) are concentrated in seven countries, demonstrating the need to expand other countries' access to these opportunities for training human talent. In addition, five training videos were produced on biosafety and the use of insecticide application equipment (in Spanish and English) for vector control workers; the Spanish version of these videos has already been viewed 66,000 times (20). Thus, as a result of ongoing efforts by the Member States to strengthen national programs with technical staff trained in program management, it can be reported that seven countries have personnel with training in entomology, vector control, and integrated vector management, and eight will upgrade their national workforce with training supported by national or regional institutions or networks that are established and functioning.

Objective 5.1: National public health entomology workforce strengthened and maintained to meet identified needs; and national and/or regional institutions or networks to support training and education in entomology and vector control established and functioning	
Indicator, baseline, and target	Status
<p>5.1.1 Number of countries and territories with staff from national health authorities and/or their supporting institutions trained in entomology, vector control, and IVM, in alignment with the national vector control needs assessment</p> <p>Baseline (2017): 9 Target (2020): 20 Target (2023): 35</p>	<p>Met. To date, 16 countries have reported having staff in the national health system or supporting institutions with training in entomology, vector control, and integrated vector management.</p> <p>Although the target was not met, considering that the target for 2023 is 35 countries and that this midterm evaluation found that 16 (50%) had met it, and bearing in mind the countries' commitment and the activities planned for the next years of the period 2021-2023—for example, virtual training—the target is expected to be met at the end of 2023.</p>
<p>5.1.2 Number of countries and territories that have used a national or regional institution or network to conduct a training or education program (degree/diploma/certificate) that included entomology, vector control, and IVM in the past 24 months</p> <p>Baseline (2017): 3 Target (2020): 12 Target (2023): 35</p>	<p>Partially met. Eleven countries have used a national or regional institution or network to conduct a training or education program (degree, diploma, or certificate) that includes entomology, vector control, and integrated vector management.</p> <p>The target for this indicator is expected to be met at the end of 2023.</p>

Lessons learned

8. Implementing the plan of action has provided Member States with a tool that facilitates progress in aspects that are key to the implementation of integrated vector management in their territories. Another important aspect is that the plan made possible the engagement of new actors, since vector prevention and control activities are not exclusively the health sector's responsibility but should involve other government sectors, ministries, academia, the private sector, communities, and families, thus guaranteeing an integrated response to the socioenvironmental determinants involved in the maintenance of vector populations. It is important to point out that working with different partners facilitated and strengthened the implementation of strategic activities such as the creation of the surveillance network and the management of insecticide resistance to support decision-making by the national programs (21, 22). Another important lesson is the adaptation of technical cooperation with the countries due to the COVID-19 pandemic, which required the use of virtual tools to provide good quality, safe, and timely technical cooperation. Finally, it should be noted that the activities of the plan of action were implemented more intensely in the period prior to the COVID-19 pandemic, enabling the targets of several indicators to be met. However, it is still impossible to estimate the impact of the pandemic during the next implementation period.

Actions Necessary to Improve the Situation

9. Among the measures that would help to improve the situation, consideration of the following is suggested:

- a) Consolidate achievements (provide sustainability) and make progress in implementing the plan of action as a strategic and practical tool for vector prevention and control.
- b) Guarantee political support and the financial and human resources needed for sustainable implementation and monitoring of the Plan of Action on Entomology and Vector Control 2018-2023.
- c) Continue promoting and encouraging the development and implementation of intersectoral public policies that address the social and environmental determinants associated with the spread of vector-borne diseases.
- d) Continue strengthening the technical capacity of professionals responsible for conducting entomological surveillance and vector control interventions through continuing education involving multiple training strategies (in-person and remote) based on the principles and characteristics of integrated vector management.
- e) Promote strategic partnerships with national and international partners and stakeholders to advance toward meeting the targets of the Plan of Action on Entomology and Vector Control 2018-2023.
- f) Despite the current COVID-19 pandemic, it is essential that health programs in each country provide continuity for essential vector control measures to protect populations affected by vector-borne diseases, while always respecting the safety

measures adopted by the health authorities to control the COVID-19 pandemic, and with the participation of households and individuals.

Action by the Directing Council

10. The Directing Council is invited to take note of this report and provide any comments it deems pertinent.

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