GLOBAL VECTOR CONTROL RESPONSE
Progress in planning and implementation
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The Joint Action Group for the Global Vector Control Response wishes to thank the Government of China for their support in facilitating activities at country level.
During almost 3 years of activity, all three levels of the Organization joined in addressing the ambitious, long-term strategy of the Global Vector Control Response (GVCR). This document reports on one of the first scheduled milestones towards the progress report for the Seventy-fifth World Health Assembly in 2022, providing an overview of the progress achieved and what remains to be done.

In the two years that followed the World Health Assembly resolution establishing the GVCR, the Response was welcomed in all regions; five of six regions approved their own strategic action plans in line with GVCR, according to regional priorities. After this initial acceptance, establishment of central coordination and raising and allocating resources for GVCR activities, the pace of progress must be increased.

Vector control needs assessments have been conducted in 10 countries, and meetings and training courses to build capacity have been held in all six regions. These included enhancing vector surveillance (including introduction of District Health Information Software (DHIS2) modules), integrated vector management, monitoring and management of resistance to insecticides, pesticide management and preparation of normative and training material. Large regional workshops were held in Bangladesh (35 participants), Croatia (24 participants), Cuba (150 participants), Fiji (25 participants), Morocco (19 participants), Nepal (18 participants), Singapore (> 50 participants from four WHO regions) and Yemen (27 participants). A 6-week intensive course in entomology and vector surveillance was held for 15 participants in Honduras.

Regions and countries have identified several priorities for the biennium 2020–2021, which include assessments in additional countries, building national
capacity for vector control and entomology, strengthening pesticide management, strengthening national research and establishing inter-ministerial task forces for multi-sectoral action. Other priorities in regional plans are advocacy for resource mobilization, promotion of cross-border collaboration and integration of surveillance systems; however, many of these priorities remain unfunded.

The priorities for WHO headquarters include maintaining coordinated support for regions and countries, providing technical support as required and financial support when possible and monitoring progress in GVCR implementation. WHO plans to improve the collection and integration of data from regions and countries to facilitate monitoring and evaluation of progress in GVCR and to analyse the impact of activities.

Increased funding is required to support national activities and dedicated human resources at all levels.
1. Background

The Global Vector Control Response (GVCR), adopted in May 2017 in resolution WHA70.16 of the World Health Assembly, sets out a strategic approach to reducing vector-borne diseases by reinforcing vector surveillance and control. National capacity for vector surveillance and control is generally insufficient for an integrated response, particularly for diseases other than malaria. The Response is built on the concept of integrated vector management (IVM), to reduce the disease burden by more effective, locally adapted, sustainable surveillance and control. This includes technical solutions such as routine vector surveillance, demographic and health information systems, creation of national data repositories, capacity strengthening, alignment of vector control programmes and resources with the concept of GVCR, involvement of partners and community engagement. The Response includes goals, milestones and targets to reduce the incidence and mortality of vector-borne diseases.

GVCR framework

The four pillars of action are:

- Strengthening of inter- and intra-sectoral action and collaboration.
- Engage and mobilize communities.
- Enhance vector surveillance and monitoring, and evaluation of interventions.
- Scale up and integrate tools and approaches.

Enabling factors of the Response are country leadership, advocacy, resource mobilization and partner coordination; and regulatory, policy and normative support.

The foundations of the Response are enhanced vector control capacity and capability and increased basic and applied research and innovation.
Mid-2020, in the third year of the Response, is time to examine what worked and what could be improved or adapted to ensure that the GVCR meets its intended goals. WHO actively supports implementation of the Response at global, regional and national levels. In 2017, WHO committed itself to allocate resources for implementation of the GVCR.
2. Progress in implementation

2.1 Progress at WHO headquarters

Activities at WHO headquarters include central coordination, advocacy and resource mobilization, networking, normative guidance, technical support and support for research, regulations and policy development.

Central coordination

In 2018, the Assistant Director-General for Universal Health Coverage and Communicable and Noncommunicable Diseases, set up the Joint Action Group for GVCR to define needs and opportunities for global, regional and national activities and to review the support for advocacy, guidelines, training and research. The Group comprises representatives from several WHO departments. Core members are from the departments of Neglected Tropical Diseases (NTD), the Global Malaria Programme (GMP) and the Special Programme for Research and Training in Tropical Diseases (TDR). Additional members from within WHO include:

- Environment, Climate Change and Health;
- Infectious Hazard Management department, WHO Health Emergencies;
- Vector Control Products assessment unit within the Regulation and Prequalification department (RPQ);
- Health, Ethics and Governance, Office of Chief Scientist; and
- representatives from all six regional offices.
The Joint Action Group has met by teleconference eight times, and the minutes circulated. The meetings included regional focal points, who reported on new documents and activities and discussed issues related to GVCR in the regions. It was noted that the participation of some technical units in the calls has decreased with time. The Group has assisted regional offices in preparing regional action plans. A concept note is being developed in consultation with regional focal points to develop an advisory group to support GVCR implementation.

A webpage created to report on activities ([https://www.who.int/vector-control/en/](https://www.who.int/vector-control/en/)) was viewed 34 267 times between 1 January and 31 December 2019. The most views were in Germany, India, Italy, the United States of America and Viet Nam, accounting for 44% of all browsers.

**Advocacy and resource mobilization**

The Joint Action Group advocates for the GVCR and identifies sources of funding and is seeking to improve the visibility of vector control in the WHO programme budget for 2020–2021. The Group is pursuing the documentation of case studies as examples of the impact of GVCR in countries. Examples that have been published include sharing of human and technical resources for vector control among disease-specific programmes. A new operational model for targeting arboviruses, to be pilot-tested in the Americas, could provide another case study. A position paper on vector control at points of entry was prepared for updating the International Health Regulations (2005).

The Assistant Director-General for Universal Health Coverage and Communicable and Noncommunicable Diseases allocated US$ 450 000 to the department of NTD for GVCR in 2019–2021 from a grant by the Chinese Government. In line with the World Health Assembly resolution, however, WHO should also allocate sufficient funds. The Assistant Director-General has proposed that an expert advisory group for GVCR be established to identify priorities for implementation of GVCR.

**Networking**

A “post-list” on vector control for WHO staff and external partners has become functional, and 16 bulletins have been distributed.

Under the umbrella of GVCR, WHO is working in collaboration with the Worldwide Insecticide Resistance Network to coordinate inclusion of non-malaria vectors in the database for global insecticide resistance. The Global Malaria

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1. The Joint Action Group met on 11 May, 8 June, 4 July and 8 August 2018 and on 4 March, 1 July, 9 September and 6 November 2019.
Programme maintains a separate database for malaria vectors and an online platform, “Malaria Threats Map”, to display data reported to WHO. In 2019, the Malaria Threats Map was extended to invasive anopheline vectors prompted by the invasion and spread of *Anopheles stephensi* in the Horn of Africa. Further evolution of the Malaria Threats Map into a tool to assist decision-making for malaria vector control is ongoing; a map to guide decisions about deployment of nets impregnated with a pyrethroid and piperonyl butoxide was launched in early 2020.

WHO collaborated with Wageningen University to organize a global GVCR conference in Wageningen, The Netherlands, on 11–13 June 2019, to bring together policy-makers and scientists to discuss innovative strategies for vector control and progress in the GVCR. The discussions included IVM strategies, organization and financing of IVM initiatives, effective use of insecticides, innovative strategies and community mobilization.

A network was established for the prevention of emerging vector-borne diseases in West Africa. A needs assessment has been performed for the region, and the results are awaited.

**Capacity strengthening**

Technical support has been provided to the regional offices to strengthen capacity in vector control. In 2019, courses for training trainers in indoor residual spraying were organized in Morocco and Nepal, with participants from 16 countries endemic for leishmaniasis and malaria.

WHO is assisting selected countries in analysing their situations and implementing public health pesticide management. WHO and the Food and Agriculture Organization of the United Nations (FAO) recently completed a global survey of pesticide management in agriculture and public health and published a report. A joint workshop with WHO, FAO and the United Nations Environment Programme was held on sound management and disposal of obsolete insecticides on 25–29 August 2019 in Bangladesh. The departments of NTD and RPQ organized a workshop on study design and procedures compliant with good laboratory practice for testing the efficacy of long-lasting insecticidal nets and indoor residual spray products on 4–13 December 2019 in the United Republic of Tanzania.

Generic District Health Information Software (DHIS)2 modules have been developed for countries to use in collecting, analysing and interpreting entomological data on malaria vectors and are being introduced in Gambia, Madagascar and Mozambique. An additional 15 countries requested technical support in this area during the first part of 2020. National data repositories have been established, and regional and global platforms have been aligned with
the DHIS2 modules to facilitate data reporting, collation and analysis, including ongoing work on automated progress reports on insecticide resistance generated with the Malaria Threats Map.

Support for basic and applied research

WHO TDR is funding research and providing support for the evaluation of new vector control technologies.

Two research projects are being conducted in Asia on control of *Aedes* spp., one on a combination of sterile insect technique and *Wolbachia*, in Thailand, and another in Cambodia which focuses on community engagement, particularly in schools, to enhance vector control capacity.

TDR and the International Atomic Energy Agency (IAEA) have established collaboration on testing the sterile insect technique through a memorandum of understanding, and guidance on testing the technique has been prepared by TDR, NTD and IAEA. The guidance was published in April 2020 (https://www.who.int/tdr/publications/year/2020/guidance-framework-for-testing-SIT/en/). Meetings to prepare the document were held in February 2019 in Tapachula, Mexico, and in October 2019 in Vienna, Austria.

IAEA is working with several countries in Africa and Asia and is mobilizing resources to extend testing of the sterile insect technique for *Aedes*. In August 2019, IAEA and the WHO unit of Vector Ecology and Management conducted a feasibility mission in Bangladesh on the use of the technique against *Aedes* spp. TDR also launched a feasibility study on this technique in the Caribbean.

In late 2019, TDR issued a funding call for consortiums of institutions, vector control agencies and public health stakeholders to submit proposals for funding to test the sterile insect technology, with epidemiological evaluation of the outcomes. Three proposals will be funded under the collaborative agreement with IAEA (https://www.who.int/tdr/grants.calls/sit-to-control-vbds/en/). The results of the call are due to be announced in mid-2020. Successful projects will be funded for 2 years, and researchers will participate in a series of workshops for development and implementation of the projects.

*Urban health*: Literature reviews on urban health, vector-borne diseases and other infectious diseases of poverty were published by TDR in a special issue of the *Journal of Infectious Diseases of Poverty*.

*Environmental prevention and control of vector-borne diseases in South-East Asia*: A meeting was convened by TDR in November 2019 in Thailand to present projects on sustainable community-centred adaptation strategies. The results demonstrated effectiveness in reducing larval sources.
**Preparedness for outbreaks**: The High-threat Pathogens unit of the WHO Health Emergencies department is exploring new methods and approaches to vector surveillance to improve countries’ preparedness for vector-borne disease outbreaks and to address the lack of resources available for emergency response.

**Insecticide resistance in Aedes and Anopheles**: Information on vector resistance status serves as a basic requirement for determining the susceptibility of target species to insecticides and for insecticide resistance management. Discriminating concentrations have been established for pyrethroid insecticides against several anopheline species, but few are available for aedine mosquitoes, which limits appropriate monitoring and management of insecticide resistance in arbovirus vectors. The NTD unit of Veterinary Public Health, Vector Control and Environment (NTD/VVE) is coordinating an international multicentre study to determine the discriminating concentrations of 18 insecticides for both anopheline and aedine mosquitoes, which is likely to be concluded in mid-2020. The results will be reviewed in an expert meeting to finalize WHO recommendations on discriminating concentrations for the two mosquito genera.

**Vector Control Advisory Group**: The WHO Vector Control Advisory Group is managed jointly by NTD, the GMP and RPQ. The Advisory Group meets bi-annually, with the latest meeting on 11–13 November 2019. It is responsible for reviewing evidence submitted by applicants on new vector control tools and approaches. These interventions and tools are evaluated for their epidemiological impact in reducing and/or preventing infection and disease in humans, and the Group provides guidance on developing the evidence base. The public health value of 16 intervention classes submitted to the Group is currently being reviewed. Reports of the meetings are available at https://www.who.int/vector-control/vcag/meeting-reports/en/.

**Regulatory and policy support**

The WHO unit for Prequalification of Vector Control Products (PQT/VCP) works with national regulatory agencies and partner organizations to ensure the availability of high-quality vector control products. This is achieved through evaluation and inspection and by building national capacity for sustainable manufacture and monitoring of good-quality vector control products. PQT/VCP prequalify vector control products and public health pesticidal active ingredients that are effective and safe and that meet stringent quality and manufacturing standards. It does so by assessing product dossiers, inspecting manufacturing sites, setting specifications and supporting quality-control testing of products. Products that meet prequalification requirements are added to the WHO list of prequalified vector control products.
About 30 new products are expected to be submitted to WHO for prequalification in the near future. As of March 2020, 77 vector control products had been prequalified. These comprise 72 for single use (20 indoor residual sprays, 2 kits for treating insecticide-treated nets, 20 long-lasting insecticidal nets, 10 space sprays and 20 larvicides) and 5 for dual use (four kits for indoor residual spraying and insecticide-treated nets and one for indoor residual spraying and larviciding).

The WHO Prequalification of Vector Control Products unit also assists procurers, regulators, manufacturers and the network of testing institutions and donors in achieving their public health objectives by listing prequalified products, assessments, ongoing inspections, technical assistance, information and capacity-building activities.

**Normative support**

A number of guidelines have been published in the past 3 years on vector control, testing of vector control products and policy on vector control (see Annex 1). Others that are being prepared or revised are:

- a manual on vector surveillance and control for leishmaniasis;
- a revised manual on vector control at points of entry (after a consultation held on 3–6 July 2018);
- a manual on training in vector control at points of entry;
- methods and procedures for aircraft disinsection;
- a revised manual on indoor residual spraying;
- identification of key vector control indicators;
- pesticide management guidelines;
- guidance on multisectoral approaches;
- a comprehensive update of the practical manual on entomology in malaria published in 1975;
- revised procedures for testing insecticide resistance in malaria vectors;
- guidance on prioritization of national resources for malaria;
- revision of the WHO position statement on use of DDT; and
- a WHO position statement on the evaluation of genetically modified mosquitoes.

A document on ethics in vector control, including in research and surveillance, is being prepared after a consultation on 23–25 July 2019. Ethics are particularly relevant in the evaluation of innovative vector control tools such as genetically modified mosquitoes and CRISPR/Cas9.
The Joint Action Group is identifying gaps in normative support for vector control among the departments and programmes at WHO headquarters and the regional offices. Vector control needs assessments (VCNAs) will provide relevant information for identifying what is required.

2.2 Regional and national progress

All six WHO regions have welcomed the GVCR initiative, and the WHO regional offices have facilitated the development and, in some regions, adoption of policy resolutions or strategic action plans for implementation of GVCR, taking into account regional priorities. Regional policy is considered important for accelerating implementation at country level. An overview of the available regional action plan documents on the GVCR is given below.

<table>
<thead>
<tr>
<th>Regional office</th>
<th>Policy document</th>
<th>Year</th>
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<tbody>
<tr>
<td></td>
<td>Roadmap to support the implementation of the Global Vector Control Response in the WHO African Region, 2019</td>
<td>2019</td>
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<tr>
<td>Americas</td>
<td>Regional Resolution and Plan of action on entomology and vector control 2018–2023. 56th Directing Council, 70th Session of the Regional Committee of WHO for the Americas</td>
<td>2018</td>
</tr>
<tr>
<td>Eastern Mediterranean</td>
<td>Regional plan of action 2019–2023 for the implementation of the Global Vector Control Response 2017–2030</td>
<td>2018</td>
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<tr>
<td>European</td>
<td>Implementation of the Regional framework for surveillance and control of invasive mosquito vectors and re-emerging vector-borne diseases 2014–2020: 63rd session of the WHO Regional Committee for Europe (resolution no. European Region/RC63/R6).</td>
<td>2018</td>
</tr>
<tr>
<td>South-East Asia</td>
<td>Regional Resolution: Vector Control. 70th session of the Regional Committee</td>
<td>2017</td>
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<tr>
<td></td>
<td>Regional Resolution: Malaria and dengue, from declaration to action, and intensifying dengue vector control. 71st session of the Regional Committee</td>
<td>2018</td>
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<tr>
<td>Western Pacific</td>
<td>Meeting on the Global Vector Control Response, 1–2 August 2018, Nadi, Fiji. Conclusions and recommendations (not formal policy)</td>
<td>2018</td>
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* Endorsed by the 69th Regional Committee in August 2019.

Several regional workshops have been conducted on vector surveillance, including insecticide resistance monitoring and pesticide management. VCNAs have been conducted in 10 countries (Iraq, the Islamic Republic of Iran, Morocco, Sudan and Yemen in the Eastern Mediterranean Region; and Cambodia, the Lao People’s Democratic Republic, Myanmar, Thailand and Viet Nam in the Greater Mekong Sub-region). Other regions will include countries in 2020 (see section 2.3).
2.3 Progress by region

African Region

The Region has finalized a regional framework, the *Framework for the implementation of the Global Vector Control Response in the WHO African Region*, which was endorsed by the Regional Committee on 22 August 2019. The Regional Office has also prepared a costed *Roadmap to support the implementation of the Global Vector Control Response in the WHO African Region 2019: Curbing the threats of mosquito behaviour change and insecticide resistance in the WHO African Region* in collaboration with member institutions of the Africa Network for Vector Resistance.

Activities and achievements in countries are listed below.

- National strategic plans are being prepared or revised. Using resources from the AFRO II Project to recruit experts, national strategic plans for IVM and management of insecticide resistance have been revised in Angola, Botswana, Namibia, and Uganda, and are under development in Burundi, Eswatini, Liberia, and South Africa.

- Burundi, Congo, Cabo Verde, Ethiopia, Nigeria, and the United Republic of Tanzania have received support for disease outbreak response.

- Technical support was provided to Cabo Verde to carry out arbovirus vector surveillance as part of strengthening comprehensive vector surveillance and control systems. The Secretariat of the Elimination 8 (E8; a consortium of malaria-burdened countries) was given support to prepare a harmonized training manual for indoor residual spraying in 2019. Requests for technical support were received from Comoros, Congo, Ethiopia, Gabon, and Madagascar.

- Training was provided in 2019 on surveillance and control of vectors of arboviruses in Senegal, with 14 regional experts, and on indoor residual spraying for participants from all E8 countries.

Upcoming activities include a malaria surveillance training for Central and West Africa, and the High Burden to High Impact (HBHI) meeting, both held in Mauritania. The regional office has accelerated the uptake of GVCR using the HBHI platforms in Cameroon and Nigeria and the AFRO II Project in Botswana, Eswatini, Mozambique, Zambia, and Zimbabwe. Similar forums and the Regional Framework will be used to increase the uptake.
Region of the Americas

The Resolution and plan of action on entomology and vector control 2018–2023 was aligned with the GVCR road map and reviewed by the Executive Committee at its 162nd session in June 2018. The plan builds onto the 2016 Strategy for arboviral disease prevention and control, which was discussed with countries in subregional teleconferences. The plan was approved by the 56th Directing Council and the 70th session of the Regional Committee in September 2018.

Work in the regional insecticide resistance management network, established in August 2018 and coordinated by the Regional Office, was reviewed in October 2018. Eleven countries in the Region have completed their national plans for monitoring and insecticide resistance management, and seven countries also monitored insecticide resistance in Anopheles spp. and two in Aedes spp., with supplies provided by the Regional Office.

The Regional Office and WHO headquarters provided technical support to improve regional capacity for surveillance and management of insecticide resistance and evaluation of pesticides. Two reference laboratories in the Region (CIEPIN, Argentina, and FIOCRUZ, Brazil) received technology transfer and training in the production of insecticide-impregnated paper for use of WHO methodology for evaluating resistance. Three reference laboratories in the Region (CIEPIN, Argentina; FIOCRUZ, Brazil; UADY, Mexico) are achieving certification of good laboratory practice in pesticide evaluation.

A meeting of the External Evaluator Group of New Technologies for the control of Aedes spp., created to provide independent support and advice to the Regional Office and Member States in evaluating new and complementary tools for vector control, met in December 2017. The group reviewed new Aedes control technologies used in the Americas, reviewed methods for evaluating pilot studies of new technologies and created an expert group to provide technical support on new technologies. In September 2018, a meeting was held to discuss the pilot tests for the new operating model of control for Aedes spp. In 2019, technical workshops were held on vector control in Anguilla, Brazil and Dominica. The Regional Office plans to develop new guidelines on vector surveillance for prevention of yellow fever.

A technical mission was conducted in Medellín, Colombia, on 2–6 September 2019, to perform an independent evaluation of the operations and results of use of Wolbachia by the World Mosquito Program. The aim of the mission was to evaluate the degree to which the programme has achieved the operational

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objectives of pilot implementation, identify experience that will improve the programme, ensure that it can be used in other settings, and propose a framework for measuring and communicating public health outcomes.

The Regional Office has provided technical documents on up-to-date entomological surveillance and vector control for all Member States in the Region. This technical contribution responds to demand generated by health professionals as well as many sectors related to health. The objective has been to support entomology and vector control programmes in taking strategic action for the prevention, control and elimination of vector-borne diseases prioritized by countries (November 2019). The resources include:

- a manual on indoor residual spraying in urban areas for Aedes aegypti control; available in English, French, Portuguese and Spanish;
- a technical document for interventions based on generic operational scenarios for Aedes aegypti control; available in English, Portuguese and Spanish;
- Evaluation of innovative strategies for Aedes aegypti control: challenges for their introduction and impact assessment; available in English, Portuguese and Spanish;
- Guidelines for the structure of public health entomology laboratories; available in French, Portuguese and Spanish;
- infographic: Approach to environmental health determinants in surveillance and vector control strategies: guidelines to promote key interventions; available in Spanish; and

A 6-week course on entomological surveillance and IVM was concluded in November 2019, with 20 participants. It was prepared in partnership with the Secretariat of Health Honduras, the Zika AIRS Project of the United States Agency for International Development and the Catholic University of Honduras.

The Regional Office provided extensive support to contain the impact of Hurricane Dorian, including inspection of mosquito breeding sites, entomological surveys, source reduction, bed net distribution, training in pesticide application and pesticide safety and mosquito control. The United States Public Broadcasting Service filmed control and surveillance by the Regional Office and the United States Department of Environmental Health Services in Abaco, Bahamas, for 3 days for a documentary entitled Disaster 360, to be aired in summer 2020.

No information was available from the regional office on progress in conducting VCNAs.
Eastern Mediterranean Region

The Regional plan of action 2019–2023 for the implementation of the Global Vector Control Response 2017–2030 was drafted in 2018. The plan was circulated for comments to Member States and experts, discussed in a consultation between the former WHO Department for Communicable Diseases and the WHO Health Emergencies programme and officially presented at the 65th session of the Regional Committee in Sudan in October 2018.

The plan was published on the web in 2019 and sent by the Regional Director to Member States.

A regional workshop for strengthening insecticide resistance management was conducted in Tunisia in June 2018 with support from WHO headquarters and attended by 19 participants from 12 countries. The regional status of insecticide resistance was discussed, and the plan for monitoring and management of resistance was revised. The meeting agreed to set up a regional network for vector surveillance and control, to be coordinated by the Regional Office.

In June 2018, a regional working group reviewed the VCNAs of selected countries and used the results to prepare a regional plan of action for implementing the GVCR for the period 2019–2023. In July 2018, a workshop was held in Iraq to prepare a national IVM strategy in line with GVCR, for the same period. Morocco has updated its national IVM strategy 2019–2025 in line with the GVCR roadmap.

Capacity-building activities conducted in the Region include:

- a regional workshop to train trainers in indoor residual spraying to control leishmaniasis and malaria in Morocco in October 2019, with support from WHO headquarters, attended by 19 participants from eight countries endemic for malaria and/or leishmaniasis;
- training in vector surveillance for dengue and malaria for containment of the frequent outbreaks of dengue and chikungunya in Yemen, was conducted in April 2019, for 27 participants from 12 governorates;
- a pilot study on vector surveillance and control at points of entry in Oman in August 2019, with support from WHO headquarters; and
- a second workshop on capacity-building in tropical disease implementation research in Bahrain in October 2019, coordinated by Innovation, Information, Evidence and Research at the regional Office, targeting the recipients of small grants from TDR in seven countries.

Studies on *A. stephensi* conducted in Eastern Mediterranean Region countries are being reviewed by a group of researchers in the Islamic Republic of Iran.
Two workshops to build capacity in dengue vector surveillance and control were held in Singapore in 2018–2019 attended by a total of 42 participants from 18 countries. The travel costs of the participants were paid for by their countries.

There has been good progress in conducting VCNAs in the Region. Qatar completed a VCNA in 2017; Iraq, the Islamic Republic of Iran, Morocco and Yemen completed VCNAs in 2018, and Sudan completed a VCNA in 2019.

A toolkit for IVM in the Region is being adapted from the toolkit for IVM in sub-Saharan Africa.

**European Region**

The Region is implementing the *Regional framework for surveillance and control of invasive mosquito vectors and re-emerging vector-borne diseases in the WHO European Region, 2014–2020*. The GVCR is being implemented using this framework.

A technical consultation was held to identify challenges in vector surveillance and control in Greece in June 2018. A position document on lessons learnt from implementing the regional framework was prepared and discussed at the 68th session of the Regional Committee in September 2018. Member States expressed concern about the increasing threats from several vector-borne diseases in the Region and proposed that a regional action plan be developed on vector control, in line with the GVCR. The scope of the existing framework will be expanded to cover other vector-borne diseases of concern, i.e. West Nile fever, Lyme borreliosis, Zika virus disease and Crimean–Congo haemorrhagic fever.

The Regional Office organized a number of training workshops in 2016–2019 and provided technical assistance to countries to strengthen their capacity to control invasive mosquitoes and re-emerging vector-borne diseases.

- After *Aedes albopictus* was first detected in Armenia in 2016, the Regional Office, the Ministry of Health and the national Centre for Disease Control conducted a 5-day training course on identification of larvae and adult mosquitoes in Yerevan for 12 entomologists.
- A training curriculum on invasive mosquitoes and (re-)emerging vector-borne diseases in the WHO European Region was developed and published in 2016. The curriculum aims to provide non-specialists with an understanding of the key issues related to invasive mosquitoes and (re-)emerging vector-borne diseases, and with the analytical skills to improve strategic planning and implementation of activities in their country context. Based on the published training curriculum, the Regional office conducted a training workshop in
April 2017 in Croatia for 24 specialists from Albania, Armenia, Bosnia and Herzegovina, Croatia, Montenegro, Romania and Slovenia.

- Between August and October 2017, the Secretariat supported an audit of the species composition of invasive *Aedes* mosquitoes in nine districts of Tajikistan, representing various landscapes and ecological zones. The Regional Office also supported a study of the resistance of mosquitoes to pesticides in Tajikistan.

- WHO supported a “stop breeding mosquitoes” campaign in Croatia between June and October 2017, which included educating the public on measures to reduce the number of mosquitoes, raising public awareness about mosquito-borne diseases and influencing individual and community decisions on health. The campaign was particularly important in the Dubrovnik region, in which the influx of tourists in the summer coincides with the mosquito breeding season.

- The geographical distribution of mosquitoes and sand flies was studied in several countries.

- To strengthen the capacity of entomologists in Central Asian countries and in view of the revitalization of work on leishmaniasis in all countries of the sub-region, a training course on the biology, taxonomy and approaches for control of leishmaniasis vectors (sand flies) was conducted in Bishkek, Kyrgyzstan, on 23–25 September 2019. It was attended by 12 specialists from four countries. The programme covered all aspects of sand flies, from their biology, taxonomy and ecology to identification, sample collection, control and personal protection. The course included field work components also.

- In collaboration with WHO, the Worldwide Insecticide Resistance Network hosted 19 participants from 15 countries at the first European workshop on testing procedures for monitoring and managing insecticide resistance in invasive mosquitoes, at the Institute for Research for Development in Montpellier, France. The workshop included plenary lectures and 3 days of laboratory exercises in performing the WHO filter paper assay and larval bioassay and the United States Centers for Disease Control and Prevention bottle assays. After the course, all participants were sent the test kits for both methodologies so that they could establish the assays in their laboratories.

In August 2017, the Regional Office published a guide on *Zika virus and emerging mosquito-borne diseases: the European emergency risk communication challenge* to assist public health authorities in European Member States to communicate effectively in response to outbreaks of Zika virus and other mosquito-borne diseases and to provide lessons learnt from the experiences of other regions on how to communicate about Zika in this context. The guide provides support for strengthening national risk communication preparedness and response to mosquito-borne diseases in general.
In January 2019, the Regional Office published the *Manual on prevention of establishment and control of mosquitoes of public health importance in the WHO European Region (with special reference to invasive mosquitoes)*.

A guide for collecting, identifying, recording and preserving sand flies (Diptera, Psychodidae and Phlebotominae) in Central Asia was published in September 2019 as a practical guide for medical workers and entomologists working in leishmaniasis control to ensure methodological consistency.

A workshop on operational readiness for vector-borne diseases based on lessons learnt from the response to West Nile Virus in the European Region was held in Sofia, Bulgaria, on 15–17 October 2019. More than 70 experts from 18 countries and territories shared their experiences in implementing their contingency plans to strengthen prevention, surveillance, preparedness and control measures.

A meeting on coordination of cross-border collaboration on preventing re-establishment of malaria between bordering countries in the WHO Eastern Mediterranean and European regions was conducted in Tajikistan in November 2019. The meeting heard reports on achievements and experiences in malaria elimination, reviewed practical modalities in malaria elimination and in the prevention of reintroduction, reviewed problems encountered in border areas and agreed on a strategy and implementation mechanisms for greater coordination in border areas.

Activities planned for 2020 are:

- an IAEA–WHO coordination meeting on potential use of the sterile insect technique for integrated control of invasive *Aedes* mosquitoes in Europe, was held on 24–28 February 2020 in Athens, Greece;
- a VCNA is planned for Albania, while efforts are being made to undertake similar assessments in other countries of the Region; and
- in collaboration with the Ministry of Health, Italy, an international workshop on capacity-building in vector-borne disease prevention, surveillance and control, with participants from Albania, Bosnia and Herzegovina, France, Greece, Malta, Montenegro, Russian Federation, Serbia, Slovenia, Spain, and Turkey.

**South-East Asia Region**

A resolution on vector control was adopted at the 70th session of the Regional Committee in September 2017 that called for a comprehensive regional action plan for vector control in line with the GVCR. A strategic action plan for vectors of vector-borne diseases has been prepared and is due to be published shortly. A strategic plan is being prepared for integrated vector management in the
Maldives, and several training workshops have been organized on vector control and vector surveillance. A pictorial identification key for important disease vectors in the Region is also being prepared.

Support has been provided to Bangladesh for development of a national IVM strategy, along with specific guidance on dengue prevention and control.

A training course was held in Nepal in September 2019 on the prevention and control of dengue, with about 100 participants from all Nepalese provinces, including entomologists, biologists, medical officers and inspectors. Similar training was provided for 30 participants in Pokhara, Nepal, on 13 September 2019 and for 50 youth on 14 September 2019 on the prevention and control of dengue.

Sri Lanka issued a national plan on IVM for the prevention of re-introduction of malaria in 2017.

With respect to advocacy, in August 2019, a media conference on the prevention and control of dengue was held in Dhaka, Bangladesh. The session was chaired by the Director-General of Health Services and attended by senior officers of the vector-borne disease control programme and about 100 journalists. Two Nepalese press conferences were held on the prevention and control of dengue, in Kathmandu and Bharatpur districts, in September 2019, attended by 110 journalists.

**Western Pacific Region**

A regional action plan for the GVCR was considered unnecessary, as separate action plans are already available for malaria and dengue. Malaria programme managers from nine countries met in June 2018 in Manila, Philippines, to review progress in malaria vector control within the regional action framework, where the concept of the GVCR was introduced. A meeting on the GVCR was convened in August 2018 in Fiji for senior health staff from 18 countries to raise awareness in ministries of health about the importance of the GVCR. The meeting identified capacity strengthening, insecticide resistance management and control of dengue as priorities.

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Singapore hosted an international workshop on dengue in October 2019, with participants from the Eastern Mediterranean, European, South-East Asia and Western Pacific regions, which included two parallel sessions on vector surveillance and insecticide resistance monitoring. It was attended by 54 participants from 25 countries.

The next steps will be to engage with countries to conduct VCNAs. An informal analysis of malaria vector control conducted in the Greater Mekong Sub-region identified major deficiencies in the capacity for entomological surveillance and vector control.
3. Priority actions

The priority actions of the regional frameworks and strategic plans reflect the main themes of the GVCR. The tables below list the priority actions in the plans and frameworks.

*National VCNA conducted or updated, and resource mobilization planned, including for outbreak response*

Five regions have identified national VCNAs as a priority for planning further activities.

<table>
<thead>
<tr>
<th>African Region</th>
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<th>Western Pacific Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conduct VCNA to guide resource mobilization for implementing the national strategic plan</td>
<td>Complete or update VCNA through consultation in accordance with WHO guidelines and recommendations.</td>
<td>National VCNA to be conducted or updated</td>
<td>No GVCR plan, but VCNA will be conducted in Albania and some other countries in 2020.</td>
<td>Conduct or update national VCNA</td>
<td>Support countries to conduct VCNA</td>
</tr>
</tbody>
</table>

*National entomology and cross-sectoral workforce appraised and enhanced to meet identified requirements for vector control.*

*Relevant staff from health ministries or supporting institutions trained in public health entomology.*
Staff training and education on vector control and public health entomology has been highlighted as a priority in most regions, and human resource management will be based on VNCAs in several countries. Irrespective of VNCAs, human resources for vector control and surveillance are generally insufficient. Particular emphasis was placed on plans for capacity-building for vector surveillance.

<table>
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<tbody>
<tr>
<td>Ensure adequate human resources for vector surveillance and control.</td>
<td>Staff of national health authorities and institutions trained in entomology, vector control and IVM, according to VCNA</td>
<td>Human resource development plan to be aligned with GVCR. Staff trained in public health entomology. Vector control unit with multi-disease mandate established. Staff trained in safe handling, application and disposal of pesticides.</td>
<td>Support capacity development for entomology and vector control in 2020–2021.</td>
<td>Build and sustain human resources, based on VCNA. Integrate with public health surveillance systems. Strengthen capacity for vector surveillance, forecasting, monitoring (including insecticide resistance, environment, health effects).</td>
<td>Support capacity development for entomology and vector control</td>
</tr>
</tbody>
</table>

National and regional institutional networks to support training and/or education in public health entomology and technical support established and functioning.

Three regions indicated that regional and national institutional networks must be established or enhanced for training and education in public health entomology and vector control.
### National agenda for basic and applied research in entomology and vector control established and/or progress reviewed

Three regions planned to develop a national research agenda. Promotion of basic and applied research on vector control was identified as the priority. The agenda should prioritize research needs and align them with funding.

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</thead>
<tbody>
<tr>
<td>Establish regional, national and institutional networks for training and education in public health entomology and vector control.</td>
<td>Establish a national or regional institution or network to conduct training or education, including entomology, vector control and IVM</td>
<td>National programme for training or education that includes vector surveillance, control and programme planning. Establish roster of experts.</td>
<td>Not specified</td>
<td>Not specified</td>
<td></td>
</tr>
</tbody>
</table>

### National inter-ministerial task force for multisectoral engagement in vector control established and functioning

Five regions prioritized establishment of an inter-sectoral task force to engage other ministries in the prevention and control of vector-borne diseases. Collaboration with structures such as the One Health initiative was also mentioned.

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</thead>
<tbody>
<tr>
<td>Set a national research agenda with list of priorities to align research and funding.</td>
<td>Not specified</td>
<td>Establish a national agenda for priorities in research. Establish networking and collaboration with research institutes.</td>
<td>Not specified</td>
<td>Promote basic research on vectors and applied research on tools, including evaluation of impacts and side-effects.</td>
<td>Not specified</td>
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### Priority actions

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Establish a national inter-ministerial vector control task force.</td>
<td>Establish a task force for multisectoral engagement in vector control (including for outbreaks), with a national work plan.</td>
<td>Establish a functional national task force for multisectoral engagement in vector control.</td>
<td>Strengthen inter-sectoral and intra-sectoral action and collaboration.</td>
<td>Promote collaboration in line with “One Health” and communicable disease approaches at all levels and sectors.</td>
<td>Not specified</td>
</tr>
</tbody>
</table>

**National plan for effective community engagement and mobilization in vector control developed.**

Most regions recognized the importance of national plans for community engagement and mobilization to achieve sustained local ownership of vector control interventions. However, successful examples to inform national plans are uncommon and should be developed.

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</thead>
<tbody>
<tr>
<td>Prepare a national plan for community engagement and mobilization in vector control, based on communication strategies; train community members, health workers</td>
<td>Health authorities to develop a plan for community engagement and mobilization with sustainable commitments to vector control</td>
<td>Develop an evidence-based strategy for community mobilization for sustained ownership of vector control interventions</td>
<td>Ensure community engagement and mobilization by working with local residents</td>
<td>Engagement and mobilization of communities through organized stakeholder groups</td>
<td>Not specified</td>
</tr>
</tbody>
</table>

**National vector surveillance systems strengthened and integrated with health information systems to guide vector control**

Four regions prioritized strengthening of vector surveillance systems, including monitoring of insecticide resistance and establishment of databases. One region noted that vector surveillance should be integrated with health information systems.
Strengthen national vector surveillance systems, and integrate them into health information systems by systematic surveillance, establishment of a database and data review.

Strengthen entomological surveillance system and database. Strengthen system for monitoring and management of insecticide resistance.

Strengthen surveillance for all significant vectors, including at points of entry. Establish a national plan for insecticide resistance management and a database. Establish a regional network for vector surveillance and control.

Enhance vector surveillance, and monitor and evaluate interventions.

Not specified

Not specified

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**National targets for protection of at-risk population with appropriate vector control aligned across vector-borne diseases**

Three regions prioritized an integrated approach, with combinations of vector control tools, use of multiple data sources and less reliance on reactive control operations.

Align targets for protecting at-risk populations against various vector-borne diseases. Ensure evidence-based combinations of interventions with community participation; monitor and evaluate impact.

Use various data for integrated decisions on vector control. Test and scale up vector control tools, with independent evaluation in selected countries. Include risk of transmission in urban planning, water and sanitation, housing improvement.

Not specified

Not specified

Not specified

Adopt sustainable integrated vector control to reduce vector density, moving from reactive control. Implement insecticide resistance management. Adopt judicious use of insecticides.
Other priority actions

Other priorities mentioned in the regional plans were national policy, strategies and plans on vector control, and strategies to advocate for resources to implement the GVCR. The South-East Asia Regional Office emphasized the need to strengthen cross-border collaboration and capacity for surveillance, prevention and control of vector-borne diseases, in line with the International Health Regulations (2005). The African Regional Office highlighted strengthening of ethical and research review committees and environmental impact assessment in the evaluation of vector control tools.
4. Conclusions, challenges and the way forward

A Joint Action Group with broad representation from both relevant technical units at headquarters and the regional offices has been coordinating the Response since 2018. Most regions have developed strategic frameworks for the GVCR and conducted various normative and capacity-building activities. Priorities have been identified in each region.

It is difficult to explain the complexity of the GVCR to countries and donors, as the GVCR addresses not a single disease but “systems strengthening” for all vector-borne diseases. It involves not only technical issues but also reorientation and transformation of existing systems and institutional arrangements. Thus far, countries have focused mainly on technical aspects, with less attention to institutional and systems issues, including a multisectoral approach. Such imbalance could obstruct structural progress. For example, much progress has been made in building capacity for monitoring insecticide resistance, particularly in Africa, but limited progress in intra- and inter-sectoral collaboration has hindered effective management of insecticide resistance.

Another limitation is a critical shortage of internal, external and domestic resources for implementation of the GVCR. WHO itself must allocate adequate human and financial resources, in line with the commitments made at the World Health Assembly for the GVCR.
Strategies for advocacy and resource mobilization should be reviewed to identify opportunities in countries and funding streams in the programmes of WHO and other agencies. Case studies should be prepared to document lessons learnt in selected countries on the technical, institutional, systems and policy aspects of the GVCR for the benefit of other countries. Such case studies will be essential for advocacy.

Table 3 of the GVCR strategic framework lists indicators for measuring progress; however, baseline estimates are required. Therefore, surveys should be conducted, at the least in a representative set of “sentinel” countries, and resources for this activity are a priority.

VCNA is the basis for GVCR resource mobilization and implementation at country level; however, very few countries have so far completed a VCNA. The apparent obstacles include lack of resources to support the assessment, and the time-consuming process. WHO should therefore explore time- and resource-saving alternatives, such as a method for “rapid VCNA”, with streamlined assessment of the main indicators. A time limit should be set for completion of such rapid VCNAS by the majority of countries at risk of vector-borne diseases. Results from these (even abridged) VCNAS will identify core areas and the types of support required, for use in advocacy, resource mobilization and action planning.
Annex: Recently published documents related to vector control

**Guidelines for implementation**
- Multisectoral approach for the prevention of vector-borne diseases (2020)
- Guidelines for malaria vector control (2019)
- Managing pesticides in agriculture and public health: an overview of FAO and WHO guidelines and other resources (2019)
- Equipment for vector control specification guidelines (2018)
- Methods and operating procedures for aircraft disinsection (2018)
- Field use of molluscicides in schistosomiasis control programmes: an operational manual for programme managers (2017)
- Achieving and maintaining universal coverage with long-lasting insecticidal nets for malaria control (2017)
- Conditions for deployment of mosquito nets treated with a pyrethroid and piperonyl butoxide (2017)
- Manual on prevention of establishment and control of mosquitoes of public health importance in the WHO European Region (with special reference to invasive mosquitoes)

**Guidelines for testing**
- Guidance framework for testing the sterile insect technique as a vector control tool against Aedes-borne diseases (2020)
- Guidelines for laboratory and field testing of molluscicides for control of schistosomiasis (2019)
Annex 1. Recently published documents related to vector control

- Generic risk assessment model for insecticides used for larviciding and mollusciciding, second edition (2018)
- Efficacy-testing of traps for control of Aedes spp. mosquito vectors (2018)
- How to design vector control efficacy trials (2017)
- Data requirements and protocol for determining non-inferiority of insecticide-treated net and indoor residual spraying products within an established WHO policy class (2018)
- Data requirements and methods to support the evaluation of new vector control products (2017)
- The evaluation process for vector control products (2017)
- Global capacity for vector control and product testing (2017)

Guidelines for policy

- Framework for a national vector control needs assessment (2017)
- Malaria vector control policy recommendations and their applicability to product evaluation (2017).
The **Global vector control response 2017–2030** (GVCR) provides a new strategy to strengthen vector control worldwide through increased capacity, improved surveillance, better coordination and integrated action across sectors and diseases.

In May 2017, the World Health Assembly adopted resolution WHA 70.16, which calls on Member States to develop or adapt national vector control strategies and operational plans to align with this strategy.

**Pillars of action**
- Strengthen inter- and intra-sectoral action and collaboration
- Engage and mobilize communities
- Enhance vector surveillance, and monitoring and evaluation of interventions
- Scale up and integrate tools and approaches

**Foundation**
- Enhance vector control capacity and capability
- Increase basic and applied research, and innovation

Successful implementation of the GVCR will require strong country leadership, advocacy, resource mobilization and partner coordination, along with regulatory, policy and normative support.

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