



Regional plan of action 2019–2023 for implementation of the *Global vector control response 2017–2030*

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Contents

ACKNOWLEDGEMENTS	5
EXECUTIVE SUMMARY	7
1. BACKGROUND	9
1.1 Introduction.....	9
1.2 Global vector control response 2017–2030.....	9
1.3 Regional status of vector-borne diseases	13
1.4 Regional status of vector surveillance and control	14
2. OBJECTIVE	24
3. PRIORITY ACTIVITIES AND TARGETS.....	25
4. IMPLEMENTATION COST	27
5. PROGRESS INDICATORS.....	28
6. REFERENCES.....	31

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EXECUTIVE SUMMARY

Vector-borne diseases continue to represent a significant health problem and burden to countries of the WHO Eastern Mediterranean Region. Of these diseases, malaria, with 4.4 million estimated cases and 8300 estimated deaths in 2017, followed by leishmaniasis and schistosomiasis, present the highest reported burden in the Region, while diseases such as onchocerciasis and lymphatic filariasis are disproportionately distributed and limited to only a few countries. In recent years, the Region has also witnessed outbreaks of emerging and re-emerging vector-borne diseases such as dengue and chikungunya, affecting the health and well-being of hundreds of thousands of people and imposing a significant burden on the health systems of affected countries. In addition, Crimean-Congo haemorrhagic fever, a tick-borne viral disease that is widespread in the Region, constitutes a major threat to public health services because of its epidemic potential and its high case–fatality rate. Ongoing conflict, insecurity and severe humanitarian crises in several countries of the Region limit people’s access to health services and have significantly increased the risk of outbreaks and undermined efforts to achieve the regional targets for control and elimination of vector-borne diseases.

However, most vector-borne diseases can be prevented through vector control, if interventions are well planned and implemented, and are sustained. A comprehensive and integrated approach to vector control can accelerate achievement of disease-specific national and regional targets, advance human and economic development, and contribute to attainment of the Sustainable Development Goals (SDGs).

The *Global vector control response 2017–2030* (GVCR) has been developed by WHO to provide strategic guidance to countries and development partners to strengthen vector control worldwide through increased capacity, improved surveillance, better coordination and integrated action across sectors and diseases. The GVCR builds on the principles of integrated vector management (IVM) and calls for improved vector surveillance and control capacity and capability (human, infrastructural and institutional), a well-defined national research agenda, improved inter- and intrasectoral collaboration, community engagement and mobilization, and novel tools and interventions with proven effectiveness. In 2017, the Seventieth World Health Assembly adopted resolution WHA70.16 on Global vector control response: an integrated approach for the control of vector-borne diseases, welcoming the goals, milestones, targets and priority activities contained in the GVCR, with the aim of preventing the emergence of disease and responding to outbreaks.

This regional plan of action intends to support countries of the Eastern Mediterranean Region in the implementation of resolution WHA70.16 and relevant resolutions of the WHO Regional Committee for the Eastern Mediterranean. It has been developed to assist the countries of the Region in strengthening their capacity and capability for effective, locally-adaptive and sustainable vector control interventions for vector-borne disease control, including response to outbreaks, epidemics and humanitarian crises,

with the aim of reducing the burden and threat of such diseases in the Region. The plan targets not only countries endemic for vector-borne diseases, but non-endemic countries as well. Capacity-building in vector surveillance and control, especially at points of entry, for the rapid detection and curtailment of vector-borne disease outbreaks is high priority for non-endemic countries as it is required under the International Health Regulations (2005).

The proposed priority activities contained in the plan of action are based on a situation analysis of the capacity of countries and are presented following the GVCR framework. Targets and progress indicators are also provided. A vector control needs assessment should be carried out by all countries in the Region to guide programmes in establishing or strengthening their capacity and capability for vector surveillance and control. Establishment and/or revision of national policy and strategy for vector control based on WHO guidelines and recommendations is of the utmost importance. Establishment of a well-functioning multisectoral inter-ministerial task force to oversee, coordinate and strengthen vector control activities and to mobilize national resources is also of high priority. Other proposed priority activities to strengthen vector control address the workforce, training and education, research, community engagement and mobilization, surveillance, and public health pesticide management.

1. BACKGROUND

1.1 Introduction

Vector-borne diseases account for an estimated 17% of the global burden of communicable diseases, with more than 80% of the world's population at risk of one or more. They claim more than 700 000 lives each year, and many who survive are left permanently disabled or disfigured. World Health Organization (WHO) estimates of the burden of disease in 2015 assign 2.6% of the global burden of major vector-borne diseases to the Eastern Mediterranean Region (1). The true burden, however, is most likely underreported due to the limited surveillance and poor reporting systems in some countries, notably those experiencing humanitarian emergencies. Malaria, leishmaniasis and schistosomiasis contribute the highest reported burden of vector-borne diseases in the Region. In recent years, the Region has faced outbreaks of emerging and re-emerging vector-borne diseases such as dengue and chikungunya, imposing a significant burden on the health systems of affected countries. Moreover, Crimean-Congo haemorrhagic fever, a tick-borne viral disease that is widespread in the Region, constitutes a major threat to public health services because of its epidemic potential and its high case–fatality rate.

War and political conflict, migration, unplanned urbanization, lack of reliable piped water supply and inadequate solid waste management in some countries, as well as increased global travel and trade, natural events (such as climate change, drought and floods) and lack of appropriate vector control policies, strategies and capacity to plan, implement and monitor interventions have significantly increased the risk of vector-borne disease outbreaks and undermined efforts to achieve regional targets for their control or elimination.

When interventions are well planned and implemented, and are sustained, vector control plays a critical role in the prevention of most vector-borne diseases. An integrated and comprehensive approach to vector control can accelerate the achievement of disease-specific national and regional targets and contribute to attainment of the Sustainable Development Goals (SDGs). Strengthening vector surveillance and control using the principles of integrated vector management (IVM) is in line with the targets of the Thirteenth General Programme of Work 2019–2023 (GPW13), including achieving universal coverage of vector control interventions for all at-risk populations, addressing vector-borne diseases during health emergencies and promoting healthier populations by accelerating eradication/elimination of major vector-borne diseases (2).

1.2 Global vector control response 2017–2030

The Global vector control response 2017–2030 (GVCR) was developed by WHO to provide strategic guidance to countries and development partners for the urgent strengthening of vector control as a fundamental approach to preventing vector-borne diseases and responding to outbreaks (3). It was developed through an extensive consultation process with numerous experts and WHO partners worldwide, as a joint

activity of the WHO Global Malaria Programme, Department of Control of Neglected Tropical Diseases, and the Special Programme for Research and Training in Tropical Diseases. The GVCR calls for increased basic and applied research and innovation, enhanced vector capacity and capability, strengthened inter- and intrasectoral collaboration, greater community engagement and mobilization, enhanced vector surveillance and monitoring and evaluation of interventions, and the scaling up and integration of tools and approaches (see Fig. 1). The objective is to establish effective, locally-adapted and sustainable vector control with the goal of reducing the burden and threat of vector-borne diseases in humans.

The GVCR builds on the principles of IVM, defined as a rational decision-making process for the optimal use of resources for vector control. IVM transforms the conventional system of vector control by making it more evidence-based, integrated and participative with the aim of improving efficacy, cost-effectiveness, ecological soundness and sustainability (4). The GVCR aims to reposition vector control as a key approach to the prevention and elimination of vector-borne diseases.

The Seventieth World Health Assembly, acutely aware of the burden and threat of vector-borne diseases and deeply concerned by the current limited capacity and capability for vector control, welcomed the goals, milestones, targets and priority activities contained in the GVCR and adopted resolution WHA70.16, with the aim of preventing the emergence of vector-borne diseases and responding to outbreaks (see Box 1) (3).

To support implementation of the GVCR, the WHO *Framework for a national vector control needs assessment* provides the standards for baseline assessment and tracking progress in line with its goals, targets and priority activities (5).

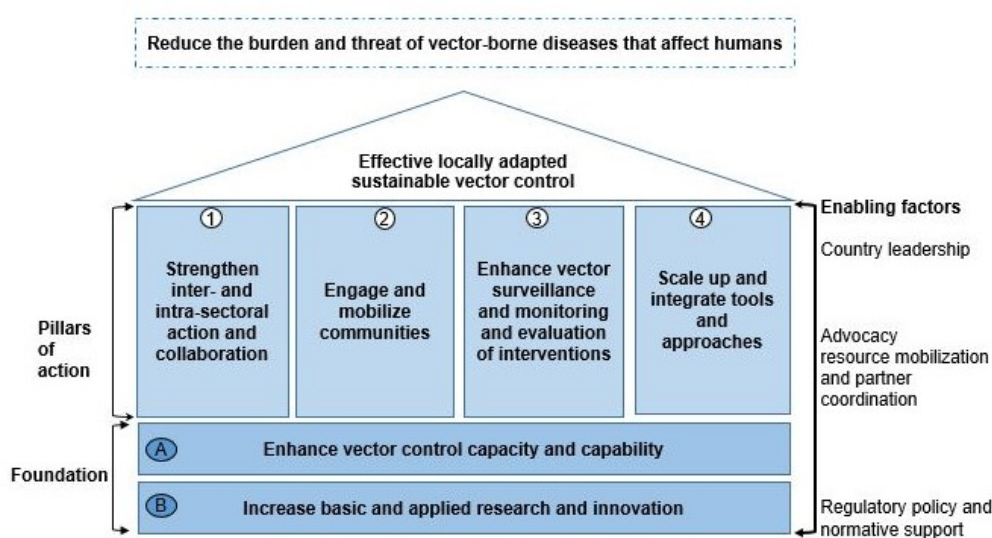


Fig. 1. Global vector control response framework (3)

Box 1. Seventieth World Health Assembly resolution WHA70.16 on Global vector control response: an integrated approach for the control of vector-borne diseases

URGES Member States:¹

- (1) to develop or adapt, as appropriate, existing national vector control strategies and operational plans to align them to the strategic approach for integrated global vector control and response, as summarized in the report,² and consistent with the International Health Regulations (2005);
- (2) to build and sustain, as appropriate, adequate human-resource (especially public health entomology), infrastructural and institutional capacity and capability at all levels of government and across all relevant sectors, based on a vector control needs assessment;
- (3) to promote basic research on vectors and their transmission of pathogens, and applied research on vector control tools, including biological tools, technologies and approaches to evaluate their impact on disease, socioeconomic development, human populations and the environment; and to assess how to integrate them with vaccines, medicines and other interventions;
- (4) to promote collaboration in line with the “One Health” approach and the integrated vector and communicable disease approach, as appropriate, across all levels and sectors of government, including municipality and local administrative structures, and with the engagement and mobilization of communities through organized stakeholder groups;
- (5) to strengthen national and subnational capacity, as appropriate, for vector surveillance, forecasting and intervention monitoring, including for vector pesticide resistance, and the impact of pesticides on environmental and human health, and to integrate them with public health surveillance systems;
- (6) to strengthen and engage in cross-border and regional collaboration by means that include networks in line with the International Health Regulations (2005) in order to build adequate capacity for prevention, surveillance, control and response for vector-borne diseases;
- (7) to collaborate, as appropriate, with international, regional, national and local institutions and non-State actors from relevant sectors to support and contribute to the implementation of WHO’s strategic approach for integrated global vector control and response;

REQUESTS the Director-General:

- (1) to continue to develop and disseminate normative guidance, policy advice and implementation guidance that provides support to Member States¹ to reduce the burden and threat of vector-borne diseases, including to strengthen human-resource capacity and capability for effective locally adapted sustainable and ethically sensitive vector control;
- (2) to continue to promote research on vector-borne disease systems and development of innovative products, methods, tools, technologies and approaches, and to support the generation of evidence-based knowledge on their safety, efficacy and impact on disease, socioeconomic development, human populations and the natural environment;
- (3) to review and provide technical guidance on the ethical aspects and issues associated with the implementation of new vector control approaches in order to develop mitigating strategies and solutions;
- (4) to undertake a review of the ethical aspects and related issues associated with vector control implementation that will include social determinants of health, in order to develop mitigating strategies and solutions to tackle health inequities;
- (5) to disseminate widely, and update as appropriate, technical guidance on integrated vector control for all relevant vector-borne diseases, especially as new evidence-based knowledge becomes available for improved and novel products, tools, technologies and approaches;
- (6) to strengthen the capacities and capabilities of the Secretariat at the global, regional and country levels and ensure that all relevant parts of the Organization across all three levels are actively engaged to lead a coordinated global effort that includes collaboration with other bodies of the United Nations system and other intergovernmental agencies for better implementation of vector control;
- (7) to develop, in consultation with Member States and through regional committees, as appropriate, regional action plans aligned with WHO’s technical guidance on vector control, including the priority activities as described in the report;¹

(8) to provide support to countries to develop and/or update national vector control and vector-borne disease control strategies aligned to the strategic approach for integrated global vector control and response and, as appropriate, to other ongoing communicable disease control strategies and emergency responses to outbreaks;

(9) to monitor the implementation of the strategic approach for integrated global vector control and response, and report back on its impact and the progress made towards the milestones and targets at the Seventy-fifth, Eightieth and Eighty-fifth World Health Assemblies.

¹ And, where applicable, regional economic integration organizations.

² Document A70/26 Rev.1.

1.3 Regional status of vector-borne diseases

There have been significant achievements in recent years in the control of major vector-borne diseases in the Region. This includes the certification of malaria elimination in Morocco and the United Arab Emirates, reaching the end stage of malaria elimination in Islamic Republic of Iran and Saudi Arabia, reaching the pre-elimination phase of lymphatic filariasis in Sudan, and achieving the validation of elimination of lymphatic filariasis disease as a public health problem in Yemen, as well as increased coverage of core vector control interventions for malaria.

Despite this, vector-borne diseases continue to represent a significant public health problem and burden to countries of the Region. The risk of outbreaks and setbacks in achieving the regional targets for control and elimination of vector-borne diseases has significantly increased in recent years due to, among other factors, ongoing conflict, insecurity and severe humanitarian crises in several countries, limiting access to health services. It is estimated that 88% of the population in the Region is at risk of at least one major vector-borne disease.

The list of countries in the Region endemic for major human vector-borne diseases is presented in Table 1, and for emerging and re-emerging vector-borne diseases (arboviruses) in Table 2. Malaria, with 4.4 million estimated cases and 8300 estimated deaths in 2017, followed by leishmaniasis and schistosomiasis, contribute the highest reported vector-borne disease burden in the Region. Diseases such as onchocerciasis, lymphatic filariasis and yellow fever also take their toll on human health, but are limited to only a few countries. Sudan is the only country in the yellow fever zone, with the most recent large epidemic of the disease reported in 2012 and 2013. Dengue has emerged as an important public health problem in the Region in recent years. Pakistan, the worst affected country, reported 125 316 cases of dengue with 69 deaths in 2017 (6).

Table 1. List of countries in the Eastern Mediterranean endemic for major human vector-borne diseases

Disease	Endemic countries
Leishmaniasis	Afghanistan, Djibouti, Egypt, Iran (Islamic Republic of), Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, occupied Palestinian territory, Oman, Pakistan, Saudi Arabia, Somalia, Sudan, Syrian Arab Republic, Tunisia, Yemen
Lymphatic filariasis ¹	Sudan, Yemen
Malaria	Afghanistan, Djibouti, Iran (Islamic Republic of), Pakistan, Saudi Arabia, Somalia, Sudan, Yemen
Onchocerciasis ²	Sudan, Yemen
Schistosomiasis ³	Egypt, Somalia, Sudan, Yemen

¹ The regional target is elimination as a public health problem (validation of elimination as a public health problem achieved Yemen).

² The regional target is elimination (interruption of transmission) in Sudan and Yemen.

³ The regional target is elimination as a public health problem in Egypt and Yemen and control of morbidity in Somalia and Sudan.

Table 2. Emerging and re-emerging vector-borne diseases (arboviruses) in the Eastern Mediterranean Region

Disease	Endemic countries	Evidence of circulation (recent or past; includes published data)
Crimean-Congo haemorrhagic fever	Afghanistan, Iran (Islamic Republic of), Iraq, Pakistan	Kuwait, Oman, Saudi Arabia, Sudan, United Arab Emirates
Chikungunya	Sudan, Yemen	Pakistan, Somalia
Dengue	Pakistan, Saudi Arabia, Sudan, Yemen	Djibouti, Egypt, Jordan, Somalia
Yellow fever	Sudan	Djibouti, Somalia

Sporadic human cases and outbreaks of Crimean-Congo haemorrhagic fever have also been reported from Afghanistan, Iran (Islamic Republic of), Iraq, Kuwait, Oman, Pakistan, Saudi Arabia, Sudan and United Arab Emirates, and pose a major threat to public health services. The majority of cases have occurred in people involved in the livestock industry, such as agricultural workers, slaughterhouse workers and veterinarians. Personal protection and elimination/control of tick infestations in animals or in stables and barns are the major interventions for reducing the risk of tick-to-human transmission, requiring close collaboration and coordination between the human and animal health sectors.

1.4 Regional status of vector surveillance and control

The assessment of the status and capacity of vector surveillance and control in countries of the Region presented below is based on a review of: 1) vector control needs assessments carried out during 2017 and 2018 in selected countries; and 2) SWOT (strengths, weaknesses, opportunities and threats) analysis performed by country participants in a workshop on strengthening insecticide resistance management in selected countries of the Eastern Mediterranean Region held in Tunis, Tunisia, on 24–27 June 2018.

1.4.1 Policy framework for vector control

A clearly established policy landscape for vector control is needed to achieve the targets and milestones outlined in the GVCR. The existence of a national policy for comprehensive vector control is indicative of a country's commitment to providing an enabling environment and resources for the implementation of vector control as a fundamental approach to preventing vector-borne diseases and responding to outbreaks.

There is a lack of national vector control policy in the Region, and national policies and strategies to address individual vector-borne diseases tend to miss the opportunity to leverage the synergies available through taking an integrated approach that would enable the rationale use of limited resources for vector control.

Despite significant reliance on pesticides for vector control, there is a lack of national policy and comprehensive legislation on the management of public health pesticides, including policy on the prevention and management of insecticide resistance. Although national environmental policies addressing the regulation of production and/or use of pesticides, and health impact assessments of development projects, are available in most countries, they do not include adequate mechanisms and resources for their enforcement. In some countries, although municipalities undertake vector control activities, there is no specific regulatory or legislative framework to support vector control in municipal areas.

Some countries have developed national plans for insecticide resistance monitoring and management focusing on malaria alone, yet the data generated are usually not used in the management of resistance. There is also an urgent need to address insecticide resistance in the vectors of other major human vector-borne diseases, including arthropod-borne viral diseases.

In most countries, the major human vector-borne diseases are considered notifiable diseases, although the efficiency of the reporting system can be compromised in countries facing ongoing conflict. Most countries are signatory to the International Health Regulations (2005), with established national structures and procedures for their implementation (7). However, joint external evaluations of a number of countries in the Region have reported no or incomplete vector surveillance at points of entry.

1.4.2 Structural framework for vector surveillance and control

The GVCR advocates for greater integration between vector-borne disease control programmes, which may require placement of all such programmes under a single umbrella, as well as for the existence of a substantive unit for vector surveillance and control at central and subnational (provincial or state) levels, with a “multi-disease” mandate for optimal coordination and efficient use of resources. A formal mechanism should ensure close collaboration of the unit with other relevant health programmes, notably environmental health and health promotion, as well as with non-health sectors. This central vector surveillance and control unit would be responsible for the development of policies and strategies, and for guiding, supporting, overseeing and monitoring vector control operations, while the subnational (provincial or state) vector surveillance and control units would be responsible for the development, implementation, monitoring and evaluation of vector control interventions.

As some countries in the Region are approaching elimination of malaria, sustaining current human and other capacity through integration of vector-borne disease control programmes will ensure effective control of other vector-borne diseases, while securing the sustainability of malaria-free status. In addition, having adequate capacity for vector control at the periphery would ensure optimum adaptation and targeting of vector control interventions to the local context. Establishment of a single vector control unit at the central level will also further facilitate the coordination, planning, and targeted delivery of vector control services, and optimize the use of resources.

In many countries, integrated vector-borne disease control and integrated vector control approaches have yet to be fully implemented. In these countries, there are either separate vector-borne disease control programmes (with limited collaboration) or the existing vector-borne disease control programme does not encompass all major endemic and emerging human vector-borne diseases. In addition, in many countries there is no single unit to encompass and be responsible for vector surveillance and control of all vector-borne diseases.

The structures and systems of vector control programmes differ between countries of the Region; some have centralized planning and management, while others do not. Overall, there is a lack of mechanisms for strategic bottom-up planning of vector control activities by local government or communities, as envisaged in the IVM strategy (8) and advocated by the GVCR, to establish effective, locally-adapted and sustainable vector control interventions.

1.4.3 Basic/applied research and innovation

Knowledge of the biology, ecology and behaviour of vectors is crucial to understanding the dynamics of the diseases they transmit and for designing effective and sustainable vector control strategies and approaches. Timely data generation through research is therefore needed for evidence-based policy and strategy development, and for the planning and implementation of vector control interventions.

Although there is relatively good capacity for research in the Region, vector control programmes do not fully utilize this for evidence-based vector control. In the majority of countries, there has been no applied research agenda developed to guide scientists and research institutions in aligning their research focus with the priorities of vector-borne disease control programmes.

In general, there is a lack of formal expert committees tasked with translating research into practice to inform vector control interventions. It is therefore important for programmes to understand the merits and benefits of research, and to establish an applied research agenda in collaboration with research institutes and academia. Formal institutional (national and international) agreement is important to ensure that vector control programmes benefit from the availability of institutions with the capacity for applied research to generate data, especially given the current knowledge gap in vector control for malaria elimination and the control of other vector-borne diseases. In addition to conducting research, networking with national and international institutions can play a significant role in building the capacity of disease control programmes.

1.4.4 Capacity and capability

Effective and locally-adaptive vector control is dependent on sufficient human, infrastructural and health system capacity within all locally relevant sectors for vector surveillance and intervention delivery, and monitoring and evaluation. This includes

ongoing, routine vector control, as well as activities for specific circumstances, such as the response to outbreaks, epidemics or humanitarian crises. In particular, the latter can undermine capacity and capability for vector control due to the attrition of expertise, instability of programme structures and functions, and limited access to the facilities, equipment and supplies required to conduct activities. This significantly increases the cost of vector control operations relative to the amount budgeted based on stable conditions.

In the Eastern Mediterranean Region, although human resource development plans for the health sector exist in some countries, they do not address the needs of vector control. There is no clear overview of the sustained availability of the workforce for vector control, and no registry or licensing structures for vector control specialists in countries, as there are for professionals providing medical and allied health services. Nonetheless, it is clear that in the majority of countries, the human capacity and capability for vector control is inadequate, especially at the peripheral level. Moreover, no formal regulatory councils exist for vector control experts at the national level, and vector control experts are not perceived to be of the same status as medical practitioners.

While training initiatives are available, these are usually ad hoc and without any follow-up to assess impact. In some cases, the training is driven by donor priorities and may have limited sustainable impact on the ability of staff to perform their core functions. There are limited opportunities for on-the-job training, mentoring and coaching, which creates a lack of continuity and undermines capability. The lack of updated training modules and tools for capacity strengthening is another challenge faced in many countries.

While there is some capacity in the Region for tertiary-level training for the development of capability in vector control, a lack of focus on vector control and public health entomology¹ in recent decades has led to a dearth of qualified personnel in the Region. In those countries experiencing humanitarian crises, national capability for vector control has been (and is being) degraded through the collapse of academic and research institutes. There is currently no established network to leverage regional expertise and capacity in vector control and entomology in support of programme priorities, including for training, the provision of coordinated technical support, or the testing/verification of specimens by reference centres.

In most countries, the infrastructure for vector surveillance and the monitoring and evaluation of vector control operations is inadequate or non-existent. The infrastructure that does exist, largely supported by donors, does not adequately address the operational needs of vector surveillance, including insecticide resistance monitoring. This includes the availability of functional entomological laboratories, insectaries for major vector species, test kits, reagents, pesticide application equipment and a timely supply of spare parts. Countries also often lack capacity in the correct use of test procedures and equipment, and lack standard operating procedures.

¹ A public health entomologist is a professional with at least basic entomological and ecological knowledge and skills, who is also a public health practitioner skilled in epidemiology and programme management.

Shortage of financial resources for implementation of quality vector control at the required level of coverage is another constraint commonly observed in vector control programmes. Some high disease burden countries do allocate resources for vector-borne disease control, but this is not enough, so the funding gap is partly met by donors, mainly the Global Fund to Fight AIDS, Tuberculosis and Malaria. Countries with ongoing complex emergencies are fully dependent on external financial resources. All countries in the Region are in epidemiological transition, and noncommunicable diseases are being afforded higher priority over communicable diseases. This policy shift has increased the risk of outbreaks or reintroduction of vector-borne diseases.

1.4.5 Inter- and intra-sectoral collaboration

The reduction of the burden and threat of vector-borne diseases is a shared responsibility of all members of society. Collaboration between the health and other sectors and civil society is key to the implementation of IVM. Activities in sectors such as agriculture, environment, education, water, housing, transport, and local government, and in communities, may contribute to vector proliferation or put people at risk of infection of vector-borne diseases. Establishing formal collaboration among the health and other sectors, according to GVCR recommended membership and principles,² with strong political commitment by national governments, is an important step in increasing the participation of these sectors in vector control. It requires agreeing upon a shared vision, defining the goals and scope of work of each partner and identifying vested interests. The role of partnerships is to conduct joint planning and evaluation and to comply with agreed actions and timetables. Effective coordination of vector control activities within the health sector, such as for malaria and other vector-borne diseases, environmental health, health promotion, and maternal and child health, is also very important and will maximize efficiencies and optimize the use of resources. The One Health Initiative is an example of a multidisciplinary collaborative approach that elevates action beyond the health sector (9).

Intersectoral collaboration has been institutionalized in only a few countries of the Region, but its full functionality has yet to be realized and needs to be further strengthened. In addition, the minimal intrasectoral coordination and collaboration within the health sector in many countries represents a serious challenge that needs to be addressed through appropriate mechanisms, including the development of a shared strategy and joint planning.

² “Key stakeholders should be convened into an inter-ministerial task force whose mandate is the oversight, coordination and strengthening of vector control. The core decision-making members should consist of high-level officers from relevant ministries. Membership should also extend to local authorities and communities as well as stakeholders from other constituencies such as development partners and the private sector. Supporting committees, working groups or networks should be formulated per needs identified by the core members. Roles and responsibilities of all members should be clearly defined to differentiate decision-makers from partners, with competing interests proactively managed.”

1.4.6 Community engagement and mobilization

Communities play a major role in the success and sustainability of vector control. In many countries, vector control interventions, such as the use of long-lasting insecticidal nets in malaria control or the use of source reduction for dengue vector control, have remained underutilized. This is the result of the limited attention given to the social, behavioural and economic aspects of the targeted population, and limited awareness among the population of the significance of such interventions in disease prevention. Participatory community-based approaches would help to ensure that healthy behaviours become part of the social norms of the community and that communities take ownership of vector control activities. Communication for behavioural impact (COMBI) that brings together and integrates social mobilization, communication and community participation into a single cohesive approach has proven effective as a tool for community mobilization in public health, and is recommended for use in the prevention and control of vector-borne diseases (10).

In countries of the Region, there are successful examples of community education and mobilization. However, there is a lack of national strategies and plans for community mobilization for vector-borne disease prevention and vector control. To rectify this will require close collaboration between the health promotion department of the Ministry of Health and civil society organizations. In addition, in most countries, the monitoring and evaluation component of community engagement, mobilization, and communication strategies is absent.

1.4.7 Vector surveillance and monitoring and evaluation of interventions

Effective vector-borne disease control requires knowledge of the biology and ecology of local vector species, their behaviour and their susceptibility to insecticides. Periodic, systematic collection, analysis and interpretation of entomological data are essential for risk assessment and the planning, implementation, monitoring and evaluation of vector control interventions. Appropriate technical capacity within vector-borne disease control programmes at national and subnational levels is needed to facilitate the collection, analysis and interpretation of data, and to ensure the effective and timely use of data to inform vector-borne disease strategies and their implementation. Appropriate infrastructure, including functional insectaries, entomological laboratories and associated equipment are also essential to support such activities. Entomological, epidemiological, and intervention data should be linked in an integrated database in order to collate, validate, analyse and present the aggregated statistical data required for the stratification of transmission risk that is needed for planning preventive control measures, guiding routine vector and epidemiological surveillance, and facilitating assessment of the impact of interventions.

While significant progress has been made in some countries of the Region in the surveillance of vectors, especially of malaria, the surveillance of vectors of other major human vector-borne diseases is generally weak. Moreover, the routine monitoring of the susceptibility of major disease vectors to public health pesticides is grossly inadequate

or non-existent. The absence of updated WHO test procedures and discriminating concentrations for monitoring the susceptibility of major vectors other than malaria to insecticides contributes to this weakness. The quality assurance/control of vector control interventions and the linking of entomological and epidemiological data for evidence-based decision-making are also generally weak.

At points of entry (especially those that are designated), there is a need to ensure sufficient vector surveillance and control procedures are in place to protect against the import and export of vectors (especially invasive species). Staff working in health protection at points of entry should have a specific role in achieving the aim of the International Health Regulations (2005) to prevent the risk of spread of diseases of international concern. Methods will need to be found to engage staff already working in these fields, where effective systems may already exist for infectious disease control, in extending this role to that of vector surveillance and control.

1.4.8 Scale-up and integration of tools and approaches

Most vector-borne diseases can be prevented through vector control, if interventions are well planned and implemented, and sustained. A comprehensive and integrated approach to vector control can accelerate the achievement of disease-specific national and regional targets, advance human and economic development, and contribute to attainment of the SDGs. Whereas significant progress has been made towards surveillance and control/elimination of malaria in the Region, further investment is required to achieve universal coverage of interventions in many countries. In contrast, there are no clear national or regional targets for control of other vector-borne diseases, including containment of emerging arboviral diseases such as dengue and chikungunya. Information on the coverage of at-risk populations for these diseases with appropriate vector control interventions is limited. This neglect is partly due to limited national, as well as global, financial support for research on novel approaches and tools, and on the implementation of vector control interventions, and limited awareness of emerging vector-borne diseases.

Good knowledge of the biology and ecology of the vectors, the timely availability of surveillance data, and human capacity and capability, are all crucial for utilizing and scaling up available interventions. The use of stratification, as a means to tailor interventions to the local context and ensure efficient use of resources, is crucial to scaling up interventions. Stratification is well established in the majority of countries in the Region, but mainly for malaria control. Stratification of the risk of other vector-borne diseases, including arboviral diseases, is urgently needed for the tailoring of interventions to local contexts and for their scaling up.

Public health pesticides play a crucial role in control of vector-borne diseases. A strong regulatory framework, along with appropriate programme structures and supporting mechanisms, are required to support and facilitate the safe and effective use of vector control tools and the availability of novel vector control products, while contributing to reducing the risk of vector resistance.

Overall, the management of public health pesticides throughout their life-cycle, especially as it relates to disposal of obsolete pesticides, pesticide waste and pesticide containers is weak. In addition, access to well-resourced and qualified laboratories for quality control of vector control pesticides is limited in several countries. Many countries have yet to institutionalize the collection of data on pesticide poisoning incidents and establish a central unit to collect information on pesticide poisoning, which would support the national pesticide regulatory authority in the development of relevant guidelines and a course of action. In some countries, there is no legal requirement for reporting poisoning events or availability of standard formats for such reporting.

The framework for action on the sound management of public health pesticides in the Eastern Mediterranean Region 2012–2016 provides specific guidance and recommended actions for countries for the implementation of resolution EM/RC58/R.10 on managing the use of public health pesticides in the face of the increasing burden of vector-borne diseases (11).

Table 3 summarizes the major challenges identified in vector surveillance and control of vector-borne diseases in countries of the Region, following the elements of the GVCR framework (enabling factors, foundation and pillars).

Table 3. Summary of major challenges in vector surveillance and control of vector-borne diseases in countries of the Region

Elements of GVCR framework	Major challenges
Enabling factors	<p>Policy framework for vector control</p> <ul style="list-style-type: none"> • Absence of national vector control policy. • Policies and strategies are generally developed for individual diseases. • Inadequate mechanisms and resources for the enforcement of agricultural and environmental policies. • Lack of national policy and comprehensive legislation on public health pesticides in some countries. <p>Financial resources</p> <ul style="list-style-type: none"> • Insufficient allocation of domestic and external resources to control malaria and other vector-borne diseases.
	<p>Capacity and capability</p> <ul style="list-style-type: none"> • Lack of an integrated vector-borne disease control programme and integrated vector control approach in many countries. • Inadequate human capacity and capability in the majority of countries, especially at the periphery. • In some countries, although a human resource development plan exists, it does not fully reflect the needs of vector control. • High turnover of trained qualified entomology staff in some countries. • Inadequate infrastructure for vector surveillance and control, including at points of entry, in the majority of countries. <p>Research and innovation</p> <ul style="list-style-type: none"> • Limited contribution of research in the development of vector control policies and strategies, and the lack of: 1) an agenda on priority research needs of vector-borne disease control programmes; 2) expert committees to review research findings and translate them into policies and actions; 3) effective collaboration and networking with research institutions; and 4) financial resources.
Pillars	<p>Inter- and intrasectoral collaboration</p> <ul style="list-style-type: none"> • Absence in some countries of a formal structure within the health sector to ensure joint planning, close collaboration and coordination for vector control. • Lack of a formal, well-functioning, task force for multisectoral engagement on vector control, and for coordination and resource mobilization, in many countries. • Limited collaboration by the health sector with neighbouring countries.
	<p>Engaging and mobilizing communities</p> <ul style="list-style-type: none"> • Lack of national plans and evidence-based strategies for community mobilization for vector-borne disease prevention and vector control.

Elements of GVCR framework	Major challenges
Pillars (cont'd)	<p>Vector surveillance and monitoring and evaluation of interventions</p> <ul style="list-style-type: none"> • Weak vector surveillance systems for covering all major vector-borne diseases, including the monitoring and management of insecticide resistance, and monitoring and evaluation of vector control interventions. • Limited capacity for surveillance of invasive vector species at points of entry and lack of training and awareness for conducting risk assessment for vectors. • Weak linking of entomological, epidemiological and intervention data, preferably done through the use of a data management information system. <p>Scale-up and integration of tools and approaches</p> <ul style="list-style-type: none"> • Limited vector control and a neglect of vector-borne diseases other than malaria. • While coverage of core malaria vector control interventions has increased, universal coverage has not yet been achieved. • Low usage of long-lasting insecticidal nets by communities in all countries. • Unsatisfactory quality of indoor residual spraying for malaria and leishmaniasis control in some countries. • Weak life-cycle management of insecticides, including storage and disposal of insecticide waste and insecticide containers.

2. OBJECTIVE

The objective of the regional plan of action for implementation of the GVCR is to support countries in strengthening their capacity and capability for effective, locally-adaptive and sustainable vector control interventions for vector-borne disease control, including response to outbreaks, epidemics and humanitarian crises, with the aim of reducing the burden and threat of such diseases in the Eastern Mediterranean Region.

The plan of action is intended to support countries in the implementation of World Health Assembly resolution WHA70.16 on the GVCR (see Box 1). It also seeks to support the implementation of the relevant resolutions of the WHO Regional Committee for the Eastern Mediterranean (see Box 2).

Whereas implementation of the GVCR is of high priority for countries endemic for major vector-borne diseases, strengthening the capacity of non-endemic countries for vector surveillance and control, especially at points of entry, is also of high priority for the rapid detection and curtailment of outbreaks and implementation of the International Health Regulations (2005).

Box 2. Resolutions of the WHO Regional Committee for the Eastern Mediterranean relevant to vector control

- EM/RC52/R.6 on Integrated vector management (2005).
- EM/RC54/R.3 on Neglected tropical diseases: an emerging public health problem in the Eastern Mediterranean Region (2007).
- EM/RC54/R.4 on Growing threat of viral haemorrhagic fevers in the Eastern Mediterranean Region: a call for action (2007).
- EM/RC55/R.9 on Malaria elimination in the Eastern Mediterranean Region: vision, requirements and strategic outline (2008).
- EM/RC58/R.4 on Dengue: call for urgent interventions for a rapidly expanding emerging disease (2011).
- EM/RC58/R.10 on Managing the use of public health pesticides in the face of the increasing burden of vector-borne diseases (2011).
- EM/RC62/R.1 on Annual report of the Regional Director for 2014 (4.4 Update the national plans in line with the regional action plan for malaria 2016–2020) (2015).
- EM/RC63/R.1 on Annual report of the Regional Director for 2015 (3.2 Review and implement national action plans based on the updated strategic framework for integrated vector management) (2016).

3. PRIORITY ACTIVITIES AND TARGETS

The priority activities listed below in Table 4 are based on the major challenges presented in Table 2 and are presented with implementation targets for 2019, 2021 and 2023. The priority activities and targets will be revised in 2023 for the subsequent 2023–2030 response period.

Conducting/updating vector control needs assessments, establishing and/or revising national policy and strategy for vector control, and establishing a well-functioning multisectoral inter-ministerial taskforce to oversee, coordinate and strengthen vector control activities and to mobilize national resources, are enabling factors that should receive the highest priority.

Table 4. Priority activities and targets

Priority activities	Number of countries		
	2019	2021	2023
1. National vector control needs assessment conducted or updated	11	All	All
2. National vector control policy and strategy developed in accordance with WHO guidelines and/or recommendations	–	16	All
- Regional guidelines on development of national vector control policy and strategy developed	Yes	–	–
3. National and regional resource mobilization plans for vector surveillance and control developed and financial resources allocated	–	–	–
- National resource mobilization plan developed and financial resources allocated	12	All	All
- Regional resource mobilization plan developed and resources mobilized	Yes	Yes	Yes
4. National entomology and cross-sectoral workforce strengthened to meet identified requirements for vector control	3	11	All
- Human resource development plan developed (related to key strategic needs)	–	–	–
- Vector control unit with multi-disease vector-borne disease control mandate established in health system	–	–	–
- Relevant staff from ministries of health and/or their supporting institutions trained in public health entomology	–	–	–
- Additional entomology and vector control staff recruited, trained as per country needs and maintained	–	–	–
- Staff in municipalities and other relevant sectors trained in public health entomology and in vector surveillance and control	–	–	–
5. National and regional institutional networks to support training/education in public health entomology and provide technical support established and functioning	–	–	–
- National institutional network to support training/education in public health entomology and technical support established and functioning	7	8	8
- A regional network for vector surveillance and control established and functioning	Yes	Yes	Yes
- A regional roster of entomology/vector control experts for rapid outbreak response established and regularly updated	Yes	Yes	Yes

Priority activities	Number of countries		
	2019	2021	2023
6. National agenda for basic and applied research on entomology and vector control established and/or progress reviewed	6	12	12
- Agenda on priority research needs of vector-borne disease control programmes established and their implementation supported	—	—	—
- National expert committee established to review research findings and translate them into policies and actions	—	—	—
- Networking and collaboration with research institutes established and functioning	—	—	—
7. National inter-ministerial task force for multisectoral engagement in vector control established, in accordance with the GVCN-recommended membership and principles, and functioning	12	All	All
- Terms of reference developed and memorandum of understanding signed with relevant stakeholders	—	—	—
- Task force established and regular meetings held	—	—	—
- Respective strategic plans of each of the partners reviewed and relevant vector control components integrated and implemented	—	—	—
8. National plan for effective community engagement and mobilization in vector control developed	—	4	11
- Evidence-based strategy for community mobilization developed to support development of the national plan	—	—	—
9. National vector surveillance systems, including for early detection and outbreak response, strengthened and integrated with the health information system and disease surveillance to guide vector control	3	12	All
- Sentinel sites established, functional and routinely surveyed	—	—	—
- Indicators for monitoring and evaluation established and defined	—	—	—
- National plan for insecticide resistance management developed and routine monitoring of insecticide resistance in major vector-borne disease vectors carried out	—	—	—
- Data management system for entomological and epidemiological data on vector-borne diseases established and functional	—	—	—
- At least 5% of the vector-borne disease control programme budget allocated for vector surveillance, including resistance monitoring	—	—	—
- Regional risk maps on major disease vectors, including invasive vectors correlated with environmental factors, developed and made available to countries	Yes	Yes	Yes
- Vector surveillance at points of entry and early detection/confirmation of invasive vectors strengthened	—	—	—
10. Capacity for public health pesticide management strengthened	7	15	All
- Capacity for safe handling and application of pesticides in vector control strengthened	—	—	—
- Capacity for safe disposal of pesticide waste and used containers strengthened	—	—	—
- Scheme for monitoring of pesticide exposure by spray workers established and functional	—	—	—

4. IMPLEMENTATION COST

The estimated cost for the implementation of the regional plan of action for the implementation of the GVCR 2017–2030 is US\$ 60 million per year and includes the cost of human resources, planning, coordination, training and surveillance. It also includes the estimated cost of US\$ 1.2 million per year for support provided by the WHO Regional Office and country offices to countries. The implementation cost does not include the cost of vector control commodities and their deployment. Accurate estimates of individual country resource requirements and costs will be made through national comprehensive needs assessments and the development of resource mobilization and investment plans.

The estimated annual cost equates to an average of US\$ 0.09 per person, twice that estimated in the GVCR (US\$ 0.05), noting the vast diversity among countries in the Region and humanitarian crises in some countries. The estimated cost, however, represents a modest investment in relation to the implementation of core vector control interventions such as indoor residual spraying (estimated at US\$ 4.24 per person protected per year) (3).

Some countries in the Region, particularly those with a high burden of vector-borne diseases, and especially countries facing humanitarian emergencies, rely mainly on external resources, and this situation may continue for the coming years. Establishment of a regional mechanism for resource mobilization to support these countries in their transition to a more sustainable situation for investment in public health, including capacity-strengthening for vector-borne disease prevention and outbreak response, is therefore a priority. Countries are otherwise expected to take responsibility for resource mobilization to cover the financing of their initiatives and to improve the efficiency of their investments. An inter-ministerial task force for multisectoral engagement on vector control should serve as a suitable mechanism to support internal resource mobilization.

5. PROGRESS INDICATORS

Monitoring and evaluation of this plan of action will be based on the measurement of the indicators listed in Table 5, accompanied by a technical note (available separately, upon request), and through an annual progress report by countries of the Region.

Table 5. Progress indicators

Priority activities	Level	Progress indicators
National vector control needs assessment conducted or updated	National	National vector control needs assessment completed within the previous three years
	Regional	Number of countries with national vector control needs assessment completed within the previous three years
National vector control policy and strategy developed in accordance with WHO guidelines and/or recommendations	Regional	Regional guidelines on development of national vector control policy and strategy available
	National	National vector control policy and strategy developed or reviewed and aligned with WHO guidelines and recommendations
	Regional	Number of countries with national vector control policy and strategy aligned with regional guidelines
National and regional resource mobilization plans for vector surveillance and control developed and financial resources allocated	National	National resource mobilization plan developed within the previous three years
	National	Percentage of required annual budget mobilized from national resources
	Regional	Regional resource mobilization plan for vector surveillance and control developed
	Regional	Percentage of required biennial budget mobilized from external resources
National entomology and cross-sectoral workforce appraised and enhanced to meet identified requirements for vector control	National	Human resource development plan aligned with the GVCR
	National	Vector control unit with multi-disease vector-borne disease control mandate established in the health system (at national and periphery levels)
	Regional	Number of countries with vector control unit established in the health system with multi-disease mandate
	National	Percentage of required national, provincial and district staff in position in previous 12 months
	National	Percentage attrition of required national, provincial and district staff in previous 12 months
	National	Number and percentage of staff at national and periphery levels trained in public health entomology in previous 12 months
	National	Number and percentage of relevant staff at national and periphery levels who have received refresher training in vector surveillance and control in previous 12 months
	National	Number and percentage of staff in municipalities and other relevant sectors trained in public health entomology and or vector surveillance and control

Priority activities	Level	Progress indicators
National and regional institutional networks to support training/education in public health entomology and provide technical support established and functioning	Regional	Number of countries that have reached their staff target based on their updated national human development plan
	Regional	Number of countries with relevant staff trained in public health entomology based on their updated national human development plan
	National	National programme of training or education (degree/diploma/certificate) that includes vector surveillance, urban development, programme planning and implementation for vector control conducted in previous 12 months
	National	National registry of experts with relevant experience available and updated within previous 12 months
	Regional	Regional registry of experts with relevant experience available and updated within previous 12 months
	Regional	Regional network for vector surveillance and control established and functioning
National agenda for basic and applied research on entomology and vector control established and/or progress reviewed	Regional	Regional roster of entomology/vector control experts for rapid outbreak response established and regularly updated
	National	National agenda on priority research needs of vector-borne disease control programmes established/updated within previous 12 months
	National	National expert committee established to review research findings and translate them into recommended policies and actions
	National	Networking and collaboration with research institutes established and functioning
National inter-ministerial task force for multisectoral engagement in vector control established, in accordance with the GVCR-recommended membership and principles, and functioning	Regional	Number of countries with national agenda on priority research needs of vector-borne disease control programmes established or updated within previous 12 months
	National	Representative national task force for multisectoral engagement in vector control functional and meeting convened within previous 12 months
	National	Supporting committees, working groups or networks established with clear terms of reference and convened within previous 12 months
	National	Respective strategic plans of each of the partners reviewed and relevant vector control components integrated and implemented
National plan for effective community engagement and mobilization in vector control developed	Regional	Number of countries with representative national task force for multisectoral engagement in vector control functional and meeting convened within previous 12 months
	National	Evidence-based strategy for community mobilization developed to support development of the national plan
	National	National vector control strategy incorporates effective community engagement and mobilization for sustained ownership of vector control interventions
	Regional	Number of countries with national vector control strategy that incorporates effective community engagement and mobilization for sustained ownership of vector control interventions

Priority activities	Level	Progress indicators
National vector surveillance systems, including for early detection and outbreak response, strengthened and integrated in the health information system and disease surveillance to guide vector control	National	Routine and systematic vector surveillance for all significant local vectors, and at points of entry for invasive species, conducted within previous 12 months
	National	Number of points of entry that have undertaken specific awareness and/or training exercises
	National	Number of risk assessment processes completed for vectors at points of entry
	National	National plan for insecticide resistance management developed and routine monitoring of insecticide resistance in major vector-borne disease vectors carried out within previous 12 months
	Regional	Number of countries with national plan for insecticide resistance management developed and routine monitoring of insecticide resistance in major vector-borne disease vectors carried out within previous 12 months
	National	National entomological database established and updated within previous 12 months
	Regional	Number of countries with national entomological database established and updated within previous 12 months
	National	Vector surveillance system, including at points of entry, integrated in health information system to allow linkage of vector, epidemiology and intervention data
	Regional	Number of countries with vector surveillance system, including at points of entry, integrated in the health information system to allow linkage of vector, epidemiology and intervention data
	National	Entomological, epidemiological and intervention data reviewed by national expert committee within previous 12 months
	National	At least 5% of the vector-borne disease control programme budget allocated for vector surveillance, including resistance monitoring
	Regional	Number of countries with at least 5% of the vector-borne disease control programme budget allocated for vector surveillance, including resistance monitoring
Capacity for public health pesticide management strengthened	Regional	Regional risk maps on major disease vectors, including invasive vectors correlated with environmental risk factors, developed and made available to countries
	National	National guidelines on safe handling and application of pesticides in vector control and on disposal of waste developed/updated within the previous three years
	National	Number and percentage of staff at national and periphery levels trained on safe handling and application of pesticides in vector control and on disposal of pesticide waste and used containers
	National	National scheme for monitoring of pesticide exposure by spray workers established and functional in previous 12 months
	Regional	Number of countries supported in management of public health pesticides

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