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Implementation of the Regional Framework for Surveillance and Control of Invasive Mosquito Vectors and Re-emerging Vector-borne Diseases 2014–2020: lessons learned and the way forward

This report summarizes the progress on implementation of the Regional Framework for Surveillance and Control of Invasive Mosquito Vectors and Re-emerging Vector-borne Diseases in the WHO European Region 2014–2020 (Regional Framework).

The Regional Framework was adopted by the WHO Regional Committee for Europe at its 63rd session (RC63), in resolution EUR/RC63/R6, in response to the introduction, establishment and spread of *Aedes* mosquito species (*Aedes albopictus* and *Aedes aegypti*) in the WHO European Region and the increasing number of dengue and chikungunya outbreaks reported in the Region.

The Seventieth World Health Assembly, in resolution WHA70.16, welcomed the strategic approach for integrated global vector control and response. The resolution also requested the Director-General 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 on this topic that had been submitted to the Health Assembly.

Over the past four years, the Regional Office has made efforts to strengthen the capacities of countries to deal with invasive mosquitoes and re-emerging vector-borne diseases, and has provided technical assistance to countries in need.

In line with discussions at RC67, a Standing Committee of the Regional Committee for Europe subgroup on vector control was established to support the Secretariat in reviewing progress and challenges with regard to implementation of the Regional Framework. The subgroup also provides guidance on the preparation of an informed discussion to be held at RC68.

The SCRC subgroup on vector control, welcoming the strategic approach for integrated global vector control, considered as next steps the following three options: (1) developing in accordance with resolution WHA70.16 a regional plan on vector control; (2) expanding the scope of the existing Regional Framework to include other vector-borne diseases of concern; and (3) accelerating implementation of the Regional Framework and addressing other vector-borne diseases of concern on the basis of a disease-specific and subregional approach. The SCRC concluded with the proposal to further accelerate the implementation of the existing Regional Framework and to consider expanding its scope to include other vector-borne diseases of concern as needed – West Nile fever, Lyme borreliosis, Zika and tick-borne encephalitis. This, however, does not exclude the possibility of developing a new regional plan for vector control in the future.

Discussions at RC68 will guide future activities aimed at accelerating implementation of the Regional Framework and boosting capacities to prevent and rapidly control local transmission of vector-borne diseases.

Contents

Summary	3
Introduction	3
Situation analysis.....	5
Action taken since the adoption of the Regional Framework: achievements and challenges	6
Risk assessment	7
Capacity-building activities	7
Response actions.....	8
Communication activities	9
Lessons learned and next steps.....	9

Summary

1. The introduction into and establishment in the WHO European Region of *Aedes* mosquito species is a growing problem. Possible factors driving this problem are the increasing volume and pace of trade and travel, continuing urbanization and environmental challenges, which include climate change.
2. The Regional Framework for Surveillance and Control of Invasive Mosquito Vectors and Re-emerging Vector-borne Diseases (Regional Framework) was adopted by the WHO Regional Committee for Europe at its 63rd session (RC63) in 2013, in resolution EUR/RC63/R6. In order to align the Regional Framework with Health 2020, the European policy framework and strategy for the 21st century, an implementation time range of 2014–2020 was identified for the Regional Framework. This was in response to the introduction, establishment and spread of *Aedes* mosquito species (*Aedes albopictus* and *Aedes aegypti*) and the increasing number of dengue and chikungunya outbreaks reported in the WHO European Region. Since then, the Regional Office has intensified its work with Member States in close partnership with relevant stakeholders. Interventions in line with the Regional Framework have been fully applied to the prevention and control of Zika virus.
3. In 2017 the Seventieth World Health Assembly, in resolution WHA70.16, welcomed the strategic approach for integrated global vector control and response and urged Member States to develop or adapt, as appropriate, existing national vector control strategies and operational plans in alignment with the strategic approach for integrated global vector control and response, and consistent with the International Health Regulations (2005). The resolution also requested the Director-General 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 on this topic that had been submitted to the Health Assembly.
4. In accordance with resolution EUR/RC63/R6, the present report on implementation of the Regional Framework is submitted to RC68.
5. In line with the debate at RC67, discussions on this topic at RC68 will enable Member States to review the progress in and challenges of implementation of the Regional Framework; to discuss whether there is a need for, and added value in, developing a regional plan on vector control response; and to agree on the way forward.

Introduction

6. The WHO European Region has experienced an increase in the spread of invasive mosquitoes since the 1990s. *Aedes albopictus* and *Aedes aegypti*, in particular, have recently spread across parts of the Region.
7. *Aedes albopictus* and *Aedes aegypti* mosquitoes are effective vectors of potentially severe diseases such as dengue, chikungunya fever and Zika. Travellers returning from disease-endemic countries are increasingly introducing dengue and chikungunya viruses into the Region. A much rarer event is the introduction of the yellow fever virus, which can also be successfully transmitted by *Aedes* mosquito species. In areas where these invasive

mosquitoes have been established or re-established, there is a genuine risk of local transmission of these diseases.

8. A regional partnership between WHO, the European Mosquito Control Association and the European Centre for Disease Prevention and Control, with the involvement of the European Network for Arthropod Vector Surveillance for Human Public Health, has been set up to increase awareness and understanding of this growing threat and to assist countries in early detection and a prompt response.

9. A regional meeting was held in June 2012 on the development of a regional strategy for surveillance and control of invasive species of mosquitoes in the WHO European Region, with broad participation by governments, policy-makers and experts. The participants called for action to address the problem. In response, a regional framework was developed in order to improve the prevention, surveillance and control of the invasive mosquito vectors (*Aedes albopictus* and *Aedes aegypti*) and re-emerging diseases (dengue and chikungunya).

10. The Regional Framework adopted by RC63 aims to guide Member States in the development or updating of their own operational plans, harmonization of plans and approaches between countries, cross-border action, and mobilization of resources to implement these plans.

11. The goal of the Regional Framework is for the countries in the Region to prevent, carry out surveillance of and control re-emerging vector-borne diseases of public health importance, in particular dengue and chikungunya, that are transmitted by invasive species of mosquitoes.

12. The prevention of mosquito invasions and disease emergence fulfils and complements the requirements of the International Health Regulations (2005) for Member States to manage acute public health events and to develop and strengthen their capacities at designated ports, airports and ground crossings.

13. Strategic approaches proposed by the Regional Framework to achieve the objectives on prevention, surveillance and control of invasive mosquitoes and re-emerging vector-borne diseases are fully supported by Health 2020, which focuses on a set of integrated strategies and interventions, and are in line with the Health 2020 targets.

14. Achievement of the regional goal will contribute to addressing the social determinants of health, to tackling health inequities and to the attainment of the Sustainable Development Goals (SDGs).

15. Prevention and control of vector-borne diseases serve or are served by efforts to achieve the following SDGs:

- (a) SDG 1. No poverty: ending vector-borne diseases will reduce poverty and increase economic prosperity.
- (b) SDG 3. Good health and well-being: vector-borne diseases are a major contributor to global morbidity and mortality.
- (c) SDG 6. Clean water and sanitation: investment in clean water and sanitation can reduce the risk from vector-borne diseases.
- (d) SDG 11. Sustainable cities and communities: ending vector-borne diseases makes cities (and slums) safer.

- (e) SDG 13. Climate action: mitigating the impacts of climate change has the potential to reduce vector-borne diseases.
- (f) SDG 17. Partnership for the goals: mobilizing financial resources will help end vector-borne diseases.

16. To support the Secretariat in reviewing progress and challenges with regard to implementation of the Regional Framework and to provide guidance for the preparation of an informed discussion at RC68, a subgroup on vector control was established at the second session of the Twenty-fifth Standing Committee of the Regional Committee for Europe (SCRC). The SCRC subgroup also provided guidance on the present document and the way forward.

Situation analysis

17. Vector-borne diseases pose a major threat to the health of societies around the world. More than 80% of the global population lives in areas at risk from at least one major vector-borne disease, with more than half at risk from two or more. Morbidity and mortality rates are often disproportionately high in poorer populations. People who survive these diseases can be left permanently disabled or disfigured, compounding their disadvantaged status. Vector-borne diseases exact an immense toll on economies and restrict both rural and urban development.

18. Well into the twentieth century, vector-borne diseases were the cause of some of the most important public health problems in Europe. Malaria was a serious problem in much of southern and eastern Europe as well as in England (United Kingdom) after the First World War. Louse-borne typhus, relapsing fever and trench fever were scourges of armies and civilians during the First World War, and, to a lesser extent, during the Second World War.

19. In the past, epidemics of dengue fever occurred in southern Europe at a time when the vector *Aedes aegypti* was locally present. In 1927–1928, a large dengue epidemic caused significant morbidity and mortality in Greece.

20. In the mid-twentieth century, the vector and the disease disappeared from the Region mainly due to the nearly universal use of piped water supplies, which led to the virtual disappearance of containers such as jars and barrels for the storage of water for household use. Consequently, *Aedes aegypti* as a species had not been reported in Europe for many years until recently.

21. Introduction of invasive vector mosquitoes, together with the geographical expansion of some native vector mosquitoes, has substantially increased the threat of re-emerging vector-borne diseases in the Region. Of most concern is the rapid expansion of the geographical range of *Aedes albopictus*, as well as reports of the establishment of *Aedes aegypti* along coastal areas of the Black Sea and in Madeira, Portugal. While *Aedes albopictus* was established in only three countries of the WHO European Region in 1995, as of January 2018 this vector was established in 19 countries.

22. Since 2007, locally acquired cases of dengue and chikungunya have been reported in countries of the European Region as follows: outbreaks of chikungunya in Italy (2007, 2017); dengue cases in Croatia (2010); dengue and chikungunya cases in France (2010, 2013, 2014, 2017); and an outbreak of dengue in Madeira, Portugal (2012).

23. Dengue and chikungunya are frequently introduced into the European Region by travellers returning from endemic countries, and a viremic traveller bitten by *Aedes albopictus* or *Aedes aegypti* can be a source of renewed dengue and chikungunya transmission. According to the available information, in 2016 the countries of the Region reported 2410 imported cases of dengue and 355 imported cases of chikungunya.

24. Along with dengue and chikungunya, which are addressed in the Regional Framework, other vector-borne diseases such as West Nile fever, Zika and Lyme borreliosis are also causes for concern.

25. West Nile virus is widespread in the European Region and is transmitted by several species of mosquitoes. It is a cause of periodic, often severe, outbreaks in humans and horses. According to European Centre for Disease Prevention and Control data, in the 2017 transmission season 204 human West Nile fever cases were reported in the European Union: Romania (66 cases); Italy (57); Greece (48); Hungary (21); Austria and Croatia (5 each); and France and Bulgaria (1 each). In countries outside the European Union, 84 cases were reported: Serbia (49); Israel (28); and Turkey (7). Twenty-six deaths due to West Nile fever were reported, with a case fatality rate of 9%: Romania (14 deaths); Greece (5); Hungary (2); Serbia (2); and Italy, Croatia and Turkey (1 each).

26. Lyme borreliosis is the most common vector-borne disease in temperate zones of the northern hemisphere. About 85 000 cases are reported annually in Europe (estimated from available national data). However, this number is largely underestimated, as case reporting is highly inconsistent in Europe and many Lyme borreliosis infections go undiagnosed.

27. These events present a clear warning signal to the Region that emerging diseases may occur and even spread and intensify in the years ahead. In the absence of effective treatment or vaccines against emerging diseases, early detection of human cases and prevention through vector control are of vital importance to protect the vulnerable human populations of the Region.

Action taken since the adoption of the Regional Framework: achievements and challenges

28. Over the past four years the Regional Office has made efforts to strengthen the capacities of countries to deal with invasive mosquitoes and (re-)emerging vector-borne diseases, and has provided technical assistance to countries in need despite limited resources. However, gaps in the availability of resources pose a challenge to countries' implementation of the Regional Framework.

Risk assessment

29. In 2013 the Regional Office commissioned a review, Dengue and dengue vectors in the WHO European Region: past, present, and scenarios for the future, which was published in the Lancet in 2014. The review noted that “Models show that Europe has a low risk of dengue transmission, although managing dengue risk remains challenging. Travel-related or migration-related influx of dengue virus into the European Region, however, will continue to increase as long as the dengue situation worsens in endemic countries. When the virus originates from an infected patient, secondary transmission is possible in areas where a vector is established, at least during summer. Large parts of Europe have high summer temperatures and environmental characteristics similar to those of the dengue endemic subtropical and tropical areas”.

30. A Zika interim risk assessment for the European Region was published in May 2016. It assessed the likelihood of local Zika virus transmission at country level in the European Region, evaluated the existing capacity in the Region to prevent and rapidly control local transmission from developing into a large outbreak, and assessed the composite risk of a Zika virus outbreak in the Region. Results of the assessment highlighted the fact that while the overall likelihood of local Zika virus transmission and the subsequent risk of a widespread Zika virus outbreak is generally moderate to low across the Region, the risk varies at country level.

31. The risk assessment noted that several countries in the Mediterranean basin have a moderate likelihood of local Zika virus transmission due to established populations of *Aedes albopictus*. In addition, there are three geographical areas with established populations of *Aedes aegypti*, which subsequently have a higher likelihood of local Zika virus transmission. Regarding the capacity of the Region to contain the transmission of Zika virus, four main factors were evaluated in order to derive a country capacity score: integrated vector management, clinical surveillance, laboratory capacity and emergency risk communication. In terms of integrated vector management, 21 countries in the Region (40%) reported having no entomological surveillance in place, eight (15%) reported having entomological surveillance systems but no vector management plans in place, and 23 (45%) reported having both entomological surveillance and vector management plans in place. Of the countries with no entomological surveillance, 15 had a low likelihood of local Zika virus transmission, two had a very low likelihood, and four had no likelihood. Of the countries with entomological surveillance but no vector management plans, five had a low likelihood of local Zika virus transmission, two had a very low likelihood, and one had no likelihood. All the countries with areas that have a high likelihood of local Zika virus transmission reported having both entomological surveillance and vector management plans in place.

32. Data on vector-borne diseases provided by Member States to WHO are not accurate, and data submission is not regular.

Capacity-building activities

33. A training workshop on invasive mosquitoes and (re-)emerging vector-borne diseases in the European Region was conducted in Georgia in September 2015 for 12 experts from the national and subnational administrative levels of the country.

34. The Secretariat developed a training curriculum on invasive mosquitoes and (re-)emerging vector-borne diseases in the European Region in October 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 contexts.

35. The Secretariat conducted a training course in Croatia in November 2016 for 31 participants from the national and subnational levels, to strengthen the capacities of policy-makers, decision-makers and programme managers involved in the planning, implementation and evaluation of national or subnational strategies to prevent the introduction of, and/or to control, invasive mosquito vectors and vector-borne diseases.

36. WHO conducted a training workshop in April 2017 in Croatia on invasive mosquitoes and (re-)emerging vector-borne diseases in the WHO European Region for 24 specialists from Albania, Armenia, Bosnia and Herzegovina, Croatia, Montenegro, Romania and Slovenia. The workshop provided participants with knowledge and analytical skills relevant to the key issues surrounding invasive mosquitoes and (re-)emerging vector-borne diseases, enabling them to improve strategic planning and implementation of activities.

37. In September 2017 a three-day seminar was conducted in Tajikistan for specialists from all regions of the country on relevant aspects of biology and surveillance of invasive mosquitoes, as well as methods for control of mosquitoes and the principles of integrated vector management.

38. In late 2017 two three-day training courses on invasive mosquitoes and (re-)emerging vector-borne diseases were conducted in Armenia for public health managers, epidemiologists and specialists working in points of entry.

Response actions

39. Following detection of *Aedes albopictus* for the first time in Armenia in October 2016, the Regional Office, together with the Armenian Ministry of Health and the national centres for disease control conducted a five-day training course on identification of larvae and adult mosquitoes in October 2016, with the participation of 12 entomologists.

40. In May 2017, in response to queries from Member States, the Regional Office initiated the revision of the regional manual on vector control, with the final draft of the document planned for the end of April 2018.

41. Between August and October 2017 the Secretariat supported the development of a study on invasive mosquitoes in Tajikistan that aimed to audit the species composition of mosquitoes of the genus *Aedes* in nine districts of the country representing different landscape and ecological zones. A total of 21 species of mosquitoes of five genera were detected: *Aedes* genus (5 species); *Anopheles* genus (5); *Culex* genus (6); *Culiseta* genus (4); and *Uranotaenia* genus (1). *Aedes aegypti*, *Aedes albopictus*, *Aedes japonicus* and *Aedes koreicus* were not detected.

42. On 14–15 June 2018 a technical consultation on prevention and control of vector-borne diseases in the WHO European Region was conducted in Athens, Greece. The meeting brought together specialists from four countries as well as experts from WHO and the European Mosquito Control Association. Acknowledging the increasing risks of vector-borne diseases in the European Region, participants discussed key challenges that are hampering

implementation of appropriate surveillance and control measures for vector and vector-borne disease in European countries. Lack of human resources capacity, particularly in the area of entomological surveillance and vector management in many countries of the Region was identified as an area requiring an urgent response. The need to strengthen/build the capacity of medical workers on emerging and non-endemic (in the WHO European Region) vector-borne diseases was indicated as a key measure for early detection and rapid containment of the spread of vector-borne diseases. It was recognized that timely and tailored communication is extremely important for raising public awareness and, consequently, triggering response actions from the responsible authorities. The critical role of WHO in elevation of political commitment at the country, subregional (European Union) and regional levels was specifically indicated.

Communication activities

43. WHO supported the implementation of the “stop breeding mosquitoes” campaign in Croatia from June to October 2017. The objectives of the campaign were to educate the public about measures they can take to reduce the number of mosquitoes, raise awareness among the public about mosquito-borne diseases, and inform and influence individual and community decisions that enhance health. This campaign was particularly important in the Dubrovnik region of Croatia given the influx of tourists in the summer season which coincides with the mosquito breeding season.

44. In August 2017 the Regional Office published a response guide, Zika virus and emerging mosquito-borne diseases: the European emergency risk communication challenge. The guide is designed to assist public health authorities in European Member States to communicate effectively in response to possible outbreaks of Zika and other mosquito-borne diseases, and to apply lessons learned from the experiences of other regions on how to communicate about Zika in the European context. The guide also aims to support countries in strengthening their national risk communication preparedness and response to mosquito-borne diseases in general.

Lessons learned and next steps

45. To achieve the regional goal, which is to prevent, carry out surveillance of and control (re-)emerging vector-borne diseases of public health importance, in particular dengue, chikungunya and other diseases transmitted by invasive species of mosquitoes, action is needed in the areas described below.

- (a) Strengthening intersectoral and intrasectoral action and collaboration: reduction of the disease burden through vector control is a shared responsibility of all members of society. Effective coordination of vector control activities is required between the health and non-health sectors, as well as within the health sector.
- (b) Communities play a major role in, and are key to the success and sustainability of, vector control. Community engagement and mobilization requires working with local residents to improve vector control and build resilience against future disease outbreaks.

- (c) Enhancing vector surveillance, and monitoring and evaluating interventions.
- (d) Strong political commitment supported by appropriate human and financial resources is needed to enable an integrated approach to vector control to be undertaken at national and subnational levels, including within local governments and municipalities.

46. The Secretariat will continue to work with Member States on accelerating implementation of the Regional Framework.

47. Given the increasing number of locally acquired cases of diseases such as dengue, chikungunya, and West Nile fever, the establishment of reliable disease and vector surveillance systems and the development of comprehensive national plans for prevention and control of (re-)emerging vector-borne diseases are becoming important tasks.

48. The SCRC subgroup on vector control, welcoming the strategic approach for integrated global vector control, considered as next steps the following three options: (1) developing in accordance with World Health Assembly resolution WHA70.16 a regional plan on vector control; (2) expanding the scope of the existing Regional Framework to include other vector-borne diseases of concern; and (3) accelerating implementation of the Regional Framework and addressing other vector-borne diseases of concern on the basis of a disease-specific and subregional approach. The SCRC concluded with the proposal to further accelerate the implementation of the existing Regional Framework and to consider expanding its scope to include other vector-borne diseases of concern as needed – West Nile fever, Lyme borreliosis, Zika and tick-borne encephalitis. This, however, does not exclude the possibility of developing a new regional plan for vector control in the future.

49. The Secretariat will take the necessary action in line with the guidance of the Regional Committee.

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