Surveillance and control of arboviral diseases in the WHO African Region:

assessment of country capacities

World Health Organization

TDR For research on diseases of poverty

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Abbreviations and acronyms

NTD	Department of Control of Neglected Tropical Diseases
CSPEP	Community sensitization and participation in non-epidemic periods
DCN	Diagnostic and case notification
DS	Disease surveillance
ES	Entomological surveillance
MCSC	Management of cases and severe cases
PAO	Preparedness for arboviral disease outbreaks/epidemics
RVSC	Routine vector surveillance and control
TDR	Special Programme for Research and Training in Tropical Diseases
VS	Virological surveillance
WHO	World Health Organization

Executive summary

The growing threat and recent epidemics of *Aedes*-borne arboviral infections in Africa has put into question the adequacy of public health systems to control these vector-borne diseases. Adequacy relies on countries' capacity to assure timely, effective epidemiological and entomological surveillance and control of arboviral diseases to identify, prevent and respond to outbreaks.

The Special Programme for Research and Training in Tropical Diseases (TDR), the WHO department of control of Neglected Tropical Diseases (NTD) and the WHO Regional Office for Africa conducted a cross-sectional survey to determine the current capacity of countries in the African Region. A self-administered questionnaire covering seven relevant domains was used to measure capacity.

All 47 countries in the African Region contributed to the survey, and all the results for each dimension at regional and sub-regional levels are reported here. In general, the countries had adequate capacity for general disease surveillance, arbovirus diagnosis and notification and preparedness for disease outbreaks due to their long experience in the control of malaria and other diseases. Their capacities are not, however, adequately oriented to the surveillance and control of arboviral diseases, and huge gaps were identified in the management of cases and severe cases of arboviral diseases, virological surveillance, entomological surveillance and control of *Aedes* vectors and community sensitization and engagement related to arboviral diseases. The main challenge is the weakness of systems for arbovirus surveillance in humans, vectors and animals for early detection of outbreak events. Furthermore, despite the existence of a preparedness plan for outbreak events, cases and severe cases of arboviral diseases are not effectively managed in all countries because of lack of clinical knowledge and infrastructure.

The gaps explain current country status with regard to arbovirus transmission and/or the perceived risk of arboviral diseases outbreaks. This report calls on countries to address the gaps in order to be adequately prepared for arboviral diseases. The gaps are summarized, and possible ways to move forward are proposed. Planning and addressing these gaps according to the local context will undoubtedly be significant for protecting communities against the growing threat of arboviral diseases in the African Region.

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Introduction

Populations worldwide, except those living in very cold climates, have experiences in emerging and re-emerging arboviral (arthropod-borne viruses) diseases during the past two decades. The spread of arboviruses is favoured by anthropogenic factors such as human travel, unplanned urbanization, deforestation and livestock movements *(1–3)*; environmental factors such as climate change that allows vectors to invade, establish and amplify the viruses in new ecosystems; and evolutionary factors such as changes in viral genetics as well as vector genomes *(4–8)*. Such factors are dynamic, and their interactions, combined with lack of efficient vector control, few specific treatments and a general lack of licensed vaccines or strategies against *Aedes*-borne infections, pose major threats and public health challenges to control programmes *(9–11)*. Healthmap (https://www.healthmap.org/en/) often shows the global alerts of the occurrence of arboviruses in any online source worldwide when selecting these diseases. According to the WHO department of Control of Neglected Tropical Diseases (NTDs), in 2020, dengue was the most prevalent viral infection transmitted by *Aedes* mosquitoes, with more than 3.9 billion people at risk of contracting the disease worldwide and an estimated 96 million symptomatic cases and 40 000 deaths every year.

Arboviruses are transmitted by blood-feeding arthropod vectors, including mosquitoes, ticks, sand flies, mites, midges and lice *(1, 11–13)*; blood transfusion, organ transplantation, perinatal transmission, breast-feeding, laboratory exposures are other less important modes of transmission *(14)*. Except for the African swine fever virus, which has double-stranded DNA *(15)*, all the other arboviruses harbour an RNA genome and belong to one of five families: Flaviviridae, Togaviridae, Bunyaviridae, Rhabdoviridae and Reoviridae *(11)*. The *Aedes*-borne viruses consist of a subgroup that are transmitted mainly by females of the mosquito species *Aedes aegypti* and *Ae. albopictus (16, 17)*, such as dengue, chikungunya, Zika and yellow fever viruses *(18)*. Examples of arboviruses of medical importance not transmitted by *Aedes* spp. include the West Nile virus, Japanese encephalitis and Sindbis viruses (*Culex*-borne) *(19, 20)*, Crimean–Congo haemorrhagic fever virus, tick-borne encephalitis virus *(21, 22)* and Toscana virus (sandfly-borne) *(23)*.

The clinical signs and symptoms of arboviral infections range from mild febrile condition to severe forms, including haemorrhagic shock and encephalitis, and are classified as neuroinvasive and non-neuroinvasive disease according to the US Centers for Disease Control and Prevention *(14)*. The neuroinvasive category includes aseptic meningitis, encephalitis and acute flaccid paralysis, while the non-neuroinvasive category consists of headache, arthralgia, rash, myalgia, polyarthralgia, arthritis and gastrointestinal symptoms *(14)*. The symptoms imputed to dengue infection range from myalgia, rash, petechiae, leukopenia and mild

bleeding during the febrile phase to capillary leak, shock, severe haemorrhage and severe organ involvement at the critical phase *(24, 25)*. The symptoms reported for yellow fever infection include fever, muscle pain, backache, headache, vomiting and loss of appetite during the viraemic phase and high fever, chills, jaundice, bleeding from the mouth, nose, eyes and stomach, sometimes with renal and/or cardiovascular dysfunction during the toxaemic phase *(26)*. The symptoms of Zika virus infection overlap with some of those of dengue and chikungunya and include fever, maculopapular rashes, nonpurulent conjunctivitis, muscle and joint pain, headache and vomiting *(25, 27)*. Guillain-Barré syndrome was associated with Zika virus infection in an outbreak in French Polynesia *(28)*, and other neurological syndromes were observed in patients in Brazil *(29)*. Patients with chikungunya are often symptomatic *(30)*, with arthralgia, joint pain (ankles, wrists, fingers), migratory polyarthritis and vesiculobullous eruptions and ulcers *(25, 31)*. Most arboviral infections, however, are asymptomatic and vary in each individual. More detailed accounts of the association of clinical signs and symptoms with specific arboviral infections can be found in the literature *(25, 32)*.

The arboviral diseases that have caused the most morbidity and mortality in recent decades are Zika, dengue, yellow fever and chikungunya *(33)*. All are considered to be leading epidemic-prone diseases and require mandatory notification in many countries *(34)*. To contain these arboviral diseases, we must look back to the measures that led to successful control in the past. Clearly, countries in Latin America, South-East Asia and the Indian Ocean were the most heavily affected by arboviral diseases or reported more cases *(35)*. Badurdeen and collaborators *(36)* described the experiences of these affected countries and identified the strengths and limitations in their surveillance, outbreak preparedness, detection and response, recommending preparation of a contingency plan that could be adjusted by each country. African countries appear to be most in need of strengthening surveillance and control of arboviral diseases, because they have less experience in the control of arboviral diseases than of malaria, they are located in the tropical areas conducive to the spread of *Aedes* spp. and are facing an increasing burden of these diseases *(37–39)*. The WHO weekly bulletin on outbreaks and other emergencies reported several dengue outbreaks in Burkina Faso, Côte d'Ivoire, Liberia, Mali, Senegal and Seychelles in 2017; yellow fever outbreaks in Angola, Burkina Faso, Chad, Kenya, Mali and the United Republic of Tanzania in the same year *(40)*; and recent outbreaks of yellow fever in Ethiopia, Nigeria and Uganda *(41–43)*. All these countries were caught off guard by the outbreaks due to inadequate epidemiological and entomological surveillance and weak *Aedes* vector control systems. It is therefore essential to strengthen country capacity in these areas for the control of *Aedes*-borne arbovirus transmission and the response to outbreaks, in line with the priorities listed in the WHO Global Vector Control Response 2017-2030, such as a national vector control needs assessment (priority 1) and national entomology and cross-sectoral workforce assessment and strengthening of vector surveillance systems (priority 2) *(44)*.

In 2018–2019, TDR, in collaboration with the WHO NTD department and the Western Africa Health Organization, conducted an evaluation of country capacity for the surveillance and control of arboviral diseases in 16 Western African countries. The report (to be published) indicates that western African countries require support and paves the way for future situation analyses of country capacity. Following the evaluation in West Africa and in view of the urgency of preparing the health systems of African countries against the growing threat of arboviral diseases, TDR, WHO NTD and the WHO Regional Office for Africa extended the evaluation to all countries in the African Region. This report summarizes the results of the evaluation, which demonstrates the strengths and weaknesses in subregions and in the Region as a whole and indicates ways of strengthening national and regional capacity.

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The clinical signs and symptoms of arboviral infections range from mild febrile condition to severe forms, including haemorrhagic shock and encephalitis. **"**

Methods

The capacities of countries in the African region were assessed from a questionnaire adapted from that used for western African countries, with additional questions and more options for answers. The questionnaire (Annex 1) was in English and French, was available in hard copy (Word document) and an e-version, designed with LimeSurvey *(45)* and was hosted locally on the WHO online platform. The questionnaire consisted of 73 questions, of which 45 were scored, to explore countries' capacity in seven domains:

1. Disease surveillance system – 10 questions
2. Diagnosis and case notification – 5 questions
3. Management of cases and severe cases – 3 questions
4. Virological surveillance – 2 questions
5. Routine vector surveillance and control – 13 questions
6. Community sensitization and participation in non-epidemic periods – 5 questions
7. Preparedness for arboviral disease outbreaks and epidemics – 7 questions

The questions in each domain addressed specific indicators of capacity, and a final open question (not scored) elicited the perceived factors of success and failure of activities in the domain. The non-scored questions were open-ended to capture details of capacity indicators and data on cases of arboviral diseases during the previous 5 years (2015–2019).

The questionnaires were filled in by national experts at ministries of health, national health departments and research institutes in collaboration with WHO national professional officers and inter-country support teams, who were trained in filling in the questionnaire and submitting electronic versions to the WHO online platform. All the responses submitted were checked for consistency and completeness, and respondents were contacted again to complete unanswered questions or to provide further details on their responses when necessary.

The responses from the 47 countries (Fig. 1) were analysed to assess capacity in countries, subregions and the Region from the capacity indicators for each domain in the questionnaire.

To determine country scores, each indicator was given the same weight in the scoring system regardless of the domain, country or subregion, and the domains were given equal weight in the final scoring. Each country was given the same weight in the score of the subregion, and the three subregions (West Africa, Central Africa, East–Southern Africa) were given equal weight in the regional score. The rationale of the scoring was to score 1 ("on track") for each response that fully matched the definition of the capacity indicator, 0.5 ("in progress") if the response either matched the definition but gave few details (when requested) or if it matched some

Fig. 1. African countries that participated in the survey in 2021

Country participation
- Participating countries
- Data not available
- Outside African Region
- Not applicable

0   1000   2000 km
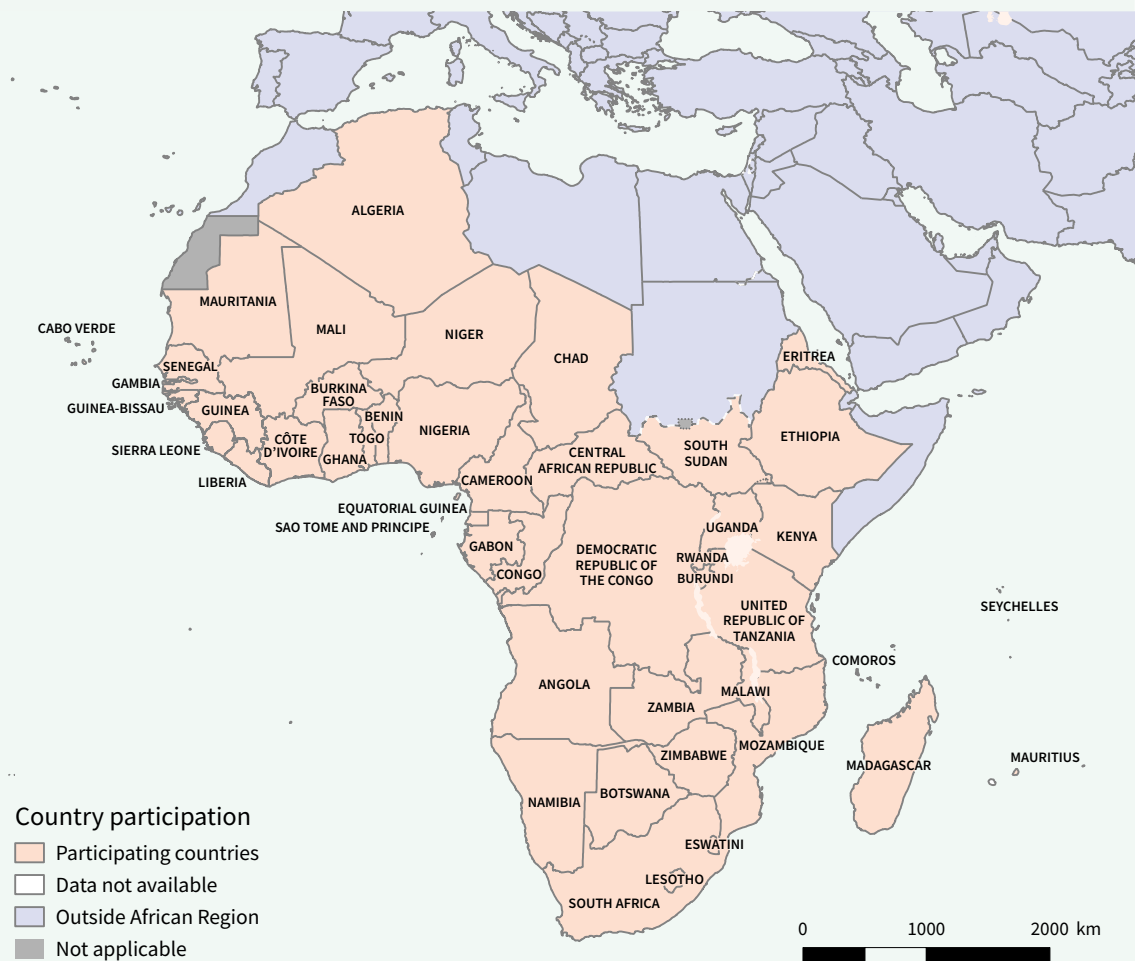
of the components of the definition of the indicator, or 0 ("not on track") if it did not match the definition at all. A score of 0.5 was given when there was limited nationwide capacity, the capacity was not explicitly related to arboviral diseases or when the capacity was not relevant to the criteria for prevention, control and management of arboviral diseases. For instances, countries with limited capacity for *Aedes* vector control but mainly targeted *Anopheles* (malaria vector) would be scored 0.5, as the capacity exists but requires strengthening to include arboviral vectors. Countries that had only one notifiable arboviral disease were also scored 0.5 because they had a disease notification system that should be extended to include other arboviral diseases.

A scoring programme for the 45 scored questions was generated with Python 3.7.0 *(46)* and run on Jupyter Notebook 6.1.3 *(47)*. The answers from countries were scored automatically, leaving unscored the answers that required review. These were scored manually after review. All data were managed with Python, and statistical analyses and graph designs were performed with R 4.0.5 *(48)*.

The scores were calculated as follow:

- Country score in a domain = $\dfrac{\text{total score of the indicators in the domain}}{\text{maximal score for that domain}} \times 100$

- Subregional score in a domain = $\dfrac{\text{sum of the country scores for the domain in the subregion}}{\text{total number of countries in the subregion}} \times 100$

- Regional score in a domain = $\dfrac{\text{sum of subregional scores in the domain}}{\text{total number of subregions}} \times 100$

- National capacity = $\dfrac{\text{sum of the national scores per domain in \%}}{\text{total number of domains}}$ *(7)*

- Subregional capacity = $\dfrac{\text{sum of national capacity in \%}}{\text{total number of countries in the subregion}}$

- Regional capacity = $\dfrac{\text{sum of subregional capacity in \%}}{\text{total number of subregions}}$ *(3)*

Capacity was classified into four categories according to the scores obtained:

- Inadequate capacity: 0 < score < 50%
- Partially satisfactory capacity: 50% ≤ score < 70%
- Almost adequate capacity: 70% ≤ score < 90%
- Adequate capacity: 90% ≤ score ≤ 100%

Results

The section reports the outcomes for the seven domains addressed in the questionnaire. For each domain, a figure depicts the country outcomes for the corresponding capacity indicators with a table listing the indicators. The outcomes include "On track", "Progress", "Not on track" and "No answer". Identified weaknesses in each domain are summarized in boxes, followed by an overview of the indicators of each domain at subregional and regional levels. Country capacity is classified according to each domain and mapped to indicate the situation of each country and the regional situation. Details of the country, subregional and regional scores for each domain are summarized in Annex 2.

3.1 *Disease surveillance system*

Ten capacity indicators were assessed for this domain, ranging from the existence of national guidelines on arbovirus disease surveillance and control to training of staff in activities related to the domain.

Fig. 2. Status of indicators of disease surveillance capacity in the 47 countries

Code	Indicator
DS01	Formally approved national guidelines on arbovirus surveillance and control
DS02	A national programme on arboviral disease surveillance
DS03	Mandatory case reporting
DS04	National epidemiological surveillance of arboviral diseases in humans
DS05	Recording of case data for surveillance purposes
DS06	National epidemiological surveillance of arboviral diseases in animals
DS07	Sentinel animal surveillance or epizootic surveillance
DS08	Analysis of outbreak risk factors
DS09	Accessible individual and aggregated surveillance data in the health structure
DS10	Regular training of staff in use of disease surveillance tools

Legend:
- On track
- Progress
- Not on track
- No answer
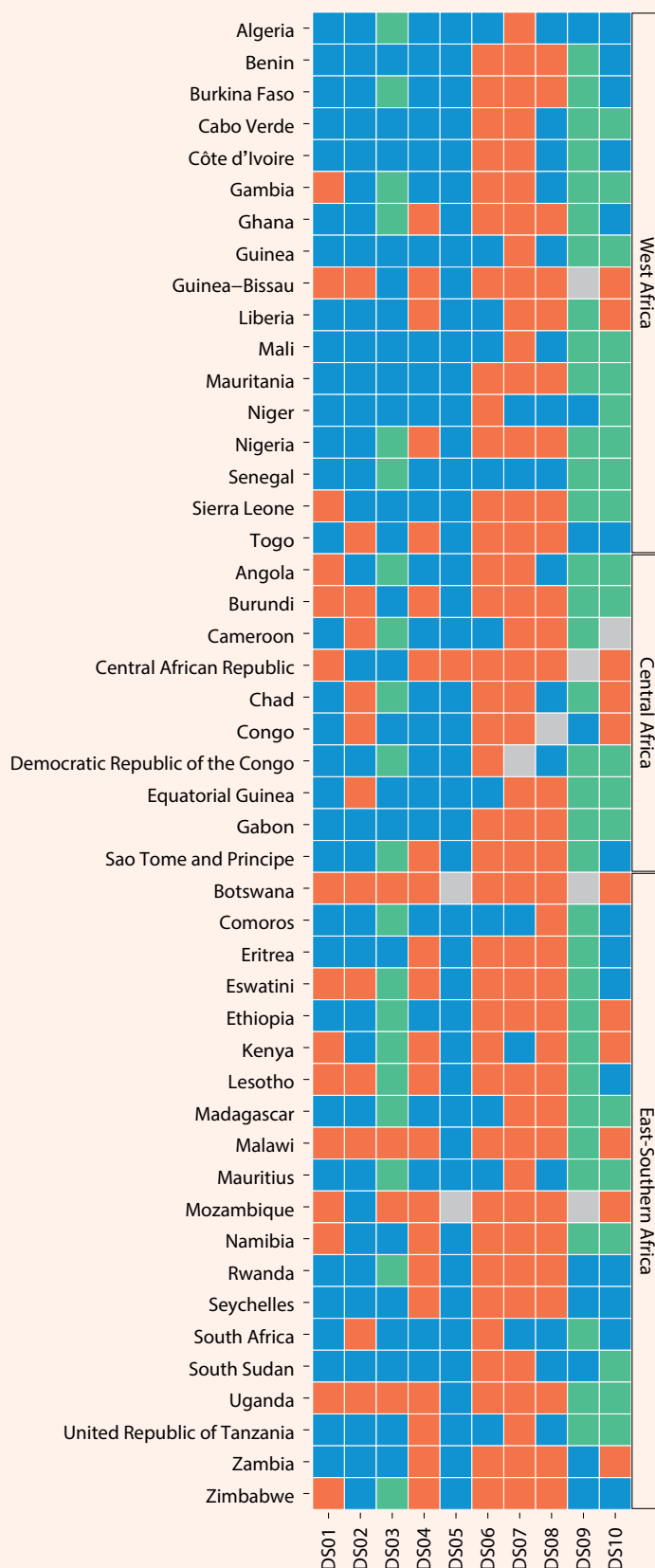
Box 1. Identified weaknesses in disease surveillance systems

- Lack of financial, human, technical and logistical resources
- Quasi-absence of epidemiological surveillance of arboviral diseases in animals
- Limited collection and analysis of outbreak risk factors
- No regular training of staff working in disease surveillance
- Surveillance data not available and accessible at all health structure levels
- Inadequate epidemiological surveillance of arboviral diseases in humans
- Lack of the community awareness on arboviral diseases

DS01. Formally approved national guidelines on arbovirus surveillance and control (question 1)

Table 1 lists the answers received on this capacity indicator in the three subregions. Thirteen of the 47 countries (28%) reported that they had no guidelines on arboviral disease surveillance or control. Most of these countries are located in East–Southern Africa. The source commonly used by 26 countries (55%) was the WHO technical guidelines for integrated disease surveillance and response *(49)*, whereas 7 had national guidelines. The guidelines covered yellow fever in 26 countries, dengue in 23, chikungunya in 18, Zika in 14 countries and other arboviral diseases (West Nile fever, Rift Valley fever, Sindbis fever, Congo–Crimean haemorrhagic fever, viral haemorrhagic fevers) in 15 countries.

Table 1. National guidelines on arboviral disease surveillance and control

Guidelines	West Africa	Central Africa	East–Southern Africa
Technical guidelines for integrated disease surveillance and response *(49)*	Algeria, Benin, Cabo Verde, Côte d'Ivoire, Ghana, Guinea, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Togo	Cameroon, Chad, Congo, Democratic Republic of the Congo, Gabon, Sao Tome and Principe	Comoros, Eritrea, Namibia, Seychelles, South Sudan, United Republic of Tanzania, Zambia
National guidelines	Burkina Faso	Equatorial Guinea	Ethiopia, Madagascar, Mauritius, Rwanda, South Africa
No guidelines[a]	Gambia, Guinea-Bissau, Sierra Leone	Angola, Burundi, Central African Republic	Botswana, Eswatini, Kenya, Lesotho, Mozambique, Uganda, Zimbabwe
Don't know			Malawi

[a] Countries that reported that they had no guidelines on arboviral disease surveillance and control

DS02. A national programme on arboviral disease surveillance (question 2, Fig. 2)

Eleven countries (23%) reported that they had no national programme on arboviral disease surveillance: six in East–Southern Africa (Botswana, Eswatini, Lesotho, Malawi, South Africa and Uganda), three in Central Africa (Burundi, Cameroon and Equatorial Guinea) and two in West Africa (Guinea-Bissau and Togo). Most countries (34, 72%) reported activities related to arboviral disease surveillance that were integrated into another health programmes. Two countries (Ethiopia and Zimbabwe) reported that they had a specific programme on arboviral disease surveillance.

West Africa. None of the countries in this subregion reported a specific programme on arboviral disease surveillance. In most, a package of activities was integrated into another programme, such as the national zoonotic disease control programme in Algeria, the epidemiological surveillance, monitoring and evaluation department in Benin, the national programme for the control of vector-borne diseases in Cabo Verde, the epidemiology and surveillance departments in Ghana and Mauritania, the disease control and outbreak response programme in Nigeria and the national institute of public hygiene in Côte d'Ivoire. Other countries (Burkina Faso, Guinea, Mali, Senegal and Sierra Leone) reported that arboviral disease surveillance had been assigned to their programme of integrated disease surveillance and response. Gambia, Liberia and Niger did not report which programme included arboviral disease surveillance.

Central Africa. Burundi, Cameroon and Equatorial Guinea did not report a national programme. Arboviral disease surveillance was assigned to the national malaria control programme in Angola and Congo, to the epidemiological surveillance department at the Ministry of Health in Chad, to the vector control department in the Central African Republic, to the department of disease control in the Democratic Republic of the Congo and to the integrated disease surveillance and response programme in Sao Tome and Principe. Gabon did not specify the programme that addressed arboviral disease surveillance.

East–Southern Africa. In this subregion, 12 countries reported integration of arboviral disease surveillance into other programmes: into the surveillance system in Comoros, the integrated disease surveillance and response programme and national malaria control programme in Eritrea, the malaria and disease surveillance programme in Kenya, the sentinel fever surveillance programme in Madagascar, the permanent border surveillance system in Mauritius, the directorate of special programmes for primary health care and health information and research in Namibia, the public health surveillance and emergency preparedness and response division in Rwanda, the disease surveillance and response unit in the Ministry of Health in Seychelles, and the integrated disease surveillance and response programme in South Sudan, the United Republic of Tanzania and Zambia. Mozambique did not specify the programme responsible for arboviral disease surveillance.

> 72% of countries reported activities related to arboviral disease surveillance that were integrated into another health programmes.

DS03. Mandatory case reporting (question 3)

Cases were reported in 43 countries (91%). Of these, 23 noted that case reporting was mandatory for all the major arboviral diseases, while 20 noted that reporting was mandatory for only some arboviral diseases. Botswana and Mozambique reported that case reporting was not compulsory, and Malawi and Uganda replied "Don't know" to the question.

West Africa. Case reporting is mandatory in all 17 countries in the subregion. In 11 countries (Benin, Cabo Verde, Côte d'Ivoire, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Sierra Leone and Togo), reporting is mandatory for all cases of arboviral disease for which a diagnosis is available. In the other six countries, reporting was mandatory for cases of only some arboviral diseases: Algeria (chikungunya, dengue, yellow fever, Zika, West Nile fever, Rift Valley fever); Burkina Faso (dengue, yellow fever, Zika, Rift Valley fever); and Ghana, Nigeria and Senegal (yellow fever, dengue). Senegal indicated that other arboviral diseases could be included by the national health authorities.

Central Africa. Case reporting is mandatory in all 10 countries in the subregion. Burundi, Central African Republic, Congo, Equatorial Guinea and Gabon noted reporting of all cases of arboviral disease for which a diagnosis is available. Reporting was mandatory for only some arboviral diseases in Angola (dengue, yellow fever), Cameroon (chikungunya, dengue, yellow fever, all haemorrhagic fevers), Chad (chikungunya, dengue, yellow fever), Democratic Republic of the Congo (chikungunya, yellow fever) and Sao Tome and Principe (dengue, yellow fever).

East–Southern Africa. In six countries, Eritrea, Seychelles, South Africa, South Sudan, United Republic of Tanzania and Zambia, reporting was mandatory for all cases of arboviral disease for which a diagnosis was available. In the other 10 countries, case reporting was mandatory for only some arboviral diseases: Comoros and Madagascar (chikungunya, dengue), Eswatini (yellow fever, Rift Valley fever, chikungunya and dengue), Ethiopia (yellow fever, dengue and viral haemorrhagic fevers), Kenya (yellow fever, Rift Valley fever), Lesotho (yellow fever), Mauritius (dengue, chikungunya, Zika, Rift Valley fever, West Nile fever), Rwanda (Rift Valley fever, yellow fever, chikungunya and haemorrhagic fevers), Zimbabwe (yellow fever, Rift Valley fever) and Namibia (yellow fever).

DS04. National epidemiological surveillance of arboviral diseases in humans (question 4)

Twenty-five countries (53%) reported having conducted national epidemiological surveillance in the previous 2 years: 12 in West Africa, 7 in Central Africa and 6 in East–Southern Africa. Eighteen countries (38%) had not conducted such surveillance: 12 in East–Southern Africa, 4 in West Africa and 2 in Central Africa. Four countries did not reply to the question.

> **53% of countries reported that they used a mixture of paper-based and electronic systems for surveillance.**

West Africa. Twelve countries reported having conducted epidemiological surveillance of arboviral diseases in the previous 2 years: Algeria, Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, Gambia, Guinea, Mali, Mauritania, Niger, Senegal and Sierra Leone. Surveillance was conducted continually in Algeria, Mauritania and Niger, routinely (period self-determined) in Gambia, weekly in Benin, Burkina Faso, Guinea and Sierra Leone, every trimester in Côte d'Ivoire and once a year in Cabo Verde, Mali and Senegal. Some countries reported having conducted active surveillance (Côte d'Ivoire, Mauritania, Sierra Leone) or passive surveillance (Benin, Burkina Faso and Cabo Verde), and the rest conducted a combination of active and passive surveillance (Algeria, Gambia, Guinea, Mali, Niger and Senegal). Four countries (Guinea-Bissau, Liberia, Nigeria and Togo) did not report any surveillance. Ghana replied "Don't know" to the question.

Central Africa. Seven countries (Angola, Cameroon, Chad, Congo, Democratic Republic of the Congo, Equatorial Guinea, Gabon) reported surveillance of arboviral diseases in humans in the previous 2 years. Surveillance was conducted weekly in Cameroon, Congo, Equatorial Guinea and Gabon, every trimester in Angola, every semester in Chad and once a year in Democratic Republic of the Congo. Surveillance was primarily active in Democratic Republic of the Congo and a combination of active and passive surveillance in Angola, Cameroon, Chad, Congo, Equatorial Guinea and Gabon. Two countries (Burundi and Central African Republic) did not report surveillance, and Sao Tome and Principe replied "Don't know" to the question.

East–Southern Africa. Six countries (Comoros, Ethiopia, Madagascar, Mauritius, South Africa, South Sudan) reported epidemiological surveillance of arboviral diseases in the previous 2 years. Surveillance was continuous in South Africa, routine in South Sudan, weekly in Ethiopia, every trimester in Madagascar and annual in Comoros. Surveillance was passive in Comoros and Ethiopia, active in South Africa and a combination of active and passive in Madagascar, Mauritius and South Sudan. Twelve countries (Botswana, Eritrea, Eswatini, Kenya, Lesotho, Malawi, Mozambique, Namibia, Rwanda, United Republic of Tanzania, Zambia and Zimbabwe) did not report surveillance. Seychelles and Uganda replied "Don't know" to the question.

DS05. Recording of case data for surveillance purposes; and DS09. Accessibility of individual and aggregated data on surveillance in the health structure (questions 5 and 9)

Central African Republic was the only country that reported that "no tool" was available at the Ministry of Health. Of the other countries, five had paper-based record systems at all levels, five had fully electronic systems at all levels, and 25 (53%) (10 in West Africa, 11 in East–Southern Africa and 4 in Central Africa) reported that they used a mixture of paper-based and electronic systems at all levels of their health structure (Table 2).

Table 2. Case data recording tools for surveillance

System	West Africa	Central Africa	East–Southern Africa
Electronic at all levels	Benin, Guinea	Cameroon	Lesotho, Rwanda
Electronic at specific levels	Niger		Ethiopia, Uganda
Mixed methods at all levels	Algeria, Cabo Verde, Côte d'Ivoire, Ghana, Guinea-Bissau, Liberia, Mali, Mauritania, Senegal, Togo	Burundi, Chad, Congo, Gabon	Eswatini, Kenya, Madagascar, Malawi, Mauritius, Seychelles, South Africa, South Sudan, United Republic of Tanzania, Zambia, Zimbabwe
Mixed methods at specific levels	Nigeria, Sierra Leone		
Paper-based at all levels	Gambia	Angola, Equatorial Guinea, Sao Tome and Principe	Comoros
Paper-based at specific levels	Burkina Faso	Democratic Republic of the Congo	
No tool		Central African Republic	

Four countries (8%) (Botswana, Central African Republic, Guinea-Bissau, Mozambique) reported having no individual or aggregated data at any level of their health structure. Sierra Leone reported the availability of both individual and aggregated data at district level. The other countries had either individual or aggregated data available at least at national level.

DS06. National epidemiological surveillance of arboviral diseases in animals; and DS07. Sentinel animal surveillance or epizootic surveillance (questions 6 and 7)

Twenty-one countries (45%) (11 in East–Southern Africa, 7 in West Africa, 3 in Central Africa) did not report surveillance in animals in the previous 2 years, and 15 (5 in each subregion) (32%) replied "Don't know" to the question. Only 11 countries (23%) (2 in Central Africa, 4 in East–Southern Africa, 5 in West Africa) replied positively. The frequency of surveillance was continuous in Cameroon, weekly in Guinea and Equatorial Guinea, every trimester in Madagascar, every semester in Liberia and annual in Algeria, Comoros, Mali, Mauritius, Senegal and United Republic of Tanzania. Surveillance was active in Liberia, passive in Comoros, Madagascar and Senegal, and a combination of active and passive in Algeria, Cameroon, Equatorial Guinea, Guinea, Mali, Mauritius and United Republic of Tanzania. Only four countries (Cameroon, Madagascar, Mali and Senegal) provided their surveillance reports.

Twenty-four countries (51%) (10 in West Africa, 9 in East–Southern Africa, 5 in Central Africa) did not report epizootic surveillance of arboviruses; 17 countries (36%) (8 in East–Southern Africa, 5 in West Africa, 4 in Central Africa) replied "Don't know" to the question; and only 5 countries (Comoros, Kenya, Niger, Senegal, South Africa) reported epizootic surveillance. Surveillance was focused on Rift Valley fever in all five countries and also on yellow fever in Comoros, Kenya and Niger. Senegal and Comoros had also added Crimean–Congo haemorrhagic fever and Q-fever, respectively. Senegal was the only country that attached its surveillance report.

DS08. Analysis of outbreak risk factors (question 8)

Twenty-seven countries (57%) (13 in East–Southern Africa, 8 in West Africa, 6 in Central Africa) did not regularly collect or analyse data on outbreak risk factors, and four countries replied "Don't know" to the question. Only 15 countries (8 in West Africa, 4 in East–Southern Africa, 3 in Central Africa) (32%) replied in the affirmative. Table 3 lists the outbreak risk factors reported.

Table 3. Collected outbreak risk factors

Indicator	West Africa	Central Africa	East–Southern Africa
House index	Algeria, Cabo Verde, Côte d'Ivoire, Guinea, Mali, Niger, Senegal		Mauritius, South Sudan, United Republic of Tanzania
Breteau index	Algeria, Cabo Verde, Côte d'Ivoire, Guinea, Mali, Niger, Senegal		Mauritius, South Sudan
Container index	Algeria, Cabo Verde, Côte d'Ivoire, Guinea, Mali, Senegal	Angola	Mauritius, South Sudan
Temperature	Senegal		Mauritius, United Republic of Tanzania
Rainfall	Niger, Senegal	Chad	Mauritius, South Africa, South Sudan, United Republic of Tanzania
Migration of a non-immune population	Guinea	Chad	
Other	Algeria (lymph index), Senegal (pupae index)		Mauritius (seasonal migratory birds and imported livestock)

DS010. Regular training of staff in use of disease surveillance tools (question 10)

Eight countries (17%) (Botswana, Central African Republic, Chad, Congo, Ethiopia, Guinea-Bissau, Liberia, Mozambique) reported that their staff were not trained regularly in disease surveillance. Malawi replied "Don't know" to the question.

The training frequency in the other 39 countries (83%) was once in 16 countries (8 in West Africa, 6 in East–Southern Africa, 2 in Central Africa) and routine in 13 countries (2 in Central Africa, 6 in East–Southern Africa, 5 in West Africa). No information on training frequency was reported by the other 10 countries. The type of training ranged from data management and analysis with Excel®, STATA, R, SAS, Epi Info and Open Data Kit; data mapping with geographical information system software; and use of the guidelines on integrated disease surveillance and response.

Perceived reasons for success or failure of the disease surveillance system (not scored)

Nearly all the countries (45, 96%) replied to this open question. Their challenges were related mainly to inadequate political commitment or leadership, lack of or limited financial support, insufficient well-qualified human resources, lack of or limited technical and logistical resources and lack of community awareness on arboviral diseases. Other concerns were:

- no specific guidelines on arboviral disease surveillance
- no programme dedicated to arboviral disease surveillance
- poor compliance with the guidelines on integrated disease surveillance and response
- no cooperation between ministries of health and public health bodies on activities related to arboviral disease surveillance
- difficulty in engaging the private sector
- lack of coordination among sectors for joint work
- lack of priority of arboviral disease surveillance
- lack of community education, sensitization and engagement on issues related to arboviral diseases
- closure of some local health facilities due to insecurity
- dependence on external donors.

Some of the 45 countries also reported factors considered as strengths in this system.

"
Challenges were related mainly to inadequate political commitment or leadership, lack of or limited financial support, insufficient well-qualified human resources, lack of or limited technical and logistical resources and lack of community awareness on arboviral diseases. "

> " No countries have adequate capacity for arboviral disease surveillance. "

West Africa

- technical, logistical and human resources to conduct surveillance (Algeria, Cabo Verde)
- functional surveillance systems (Burkina Faso, Mali, Sierra Leone)
- laboratory resources and qualified human resources (Côte d'Ivoire)
- expertise and opportunities for collaboration (Ghana)
- surveillance structures from community to national level (Guinea, Liberia)
- good organization of the "health pyramid" for active surveillance of suspected cases of arboviral diseases, existence of various collaborations (WHO, Pasteur Institute) and use of the "One Health" approach (Senegal)

Central Africa

- political commitment gained in recent epidemics and routine surveillance system in place (Cameroon)
- existence of a yellow fever focal point (Burundi)
- availability of disease surveillance data (Democratic Republic of the Congo)
- designation of arboviral diseases as diseases for surveillance (Gabon), like yellow fever and dengue in Sao Tome and Principe

East–Southern Africa

- support from the SEGA (epidemiological surveillance and alert management) One Health network,[1] existence of sentinel sites and real-time electronic notification in the public health system (Comoros)
- use of and regular training of new health workers in integrated disease surveillance and response (Eritrea)
- multidisciplinary working groups for arboviral disease surveillance (Eswatini)
- national guidelines and strategic documents, capacity-building, adequate budget for regular disease surveillance (Ethiopia)
- health facilities in all communes, including in remote areas (Madagascar)
- systematic screening of travellers, blood donors and livestock (Mauritius)
- surveillance of yellow fever and other epidemic-prone diseases (South Sudan)
- well-developed disease surveillance system, trained staff and good Internet coverage (Zimbabwe)

Fig. 3 summarizes the status of disease surveillance systems in the African Region.

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[1] https://www.epiconcept.fr/en/produit/sega-one-health-network/

Fig. 3. Country capacity for arboviral disease surveillance
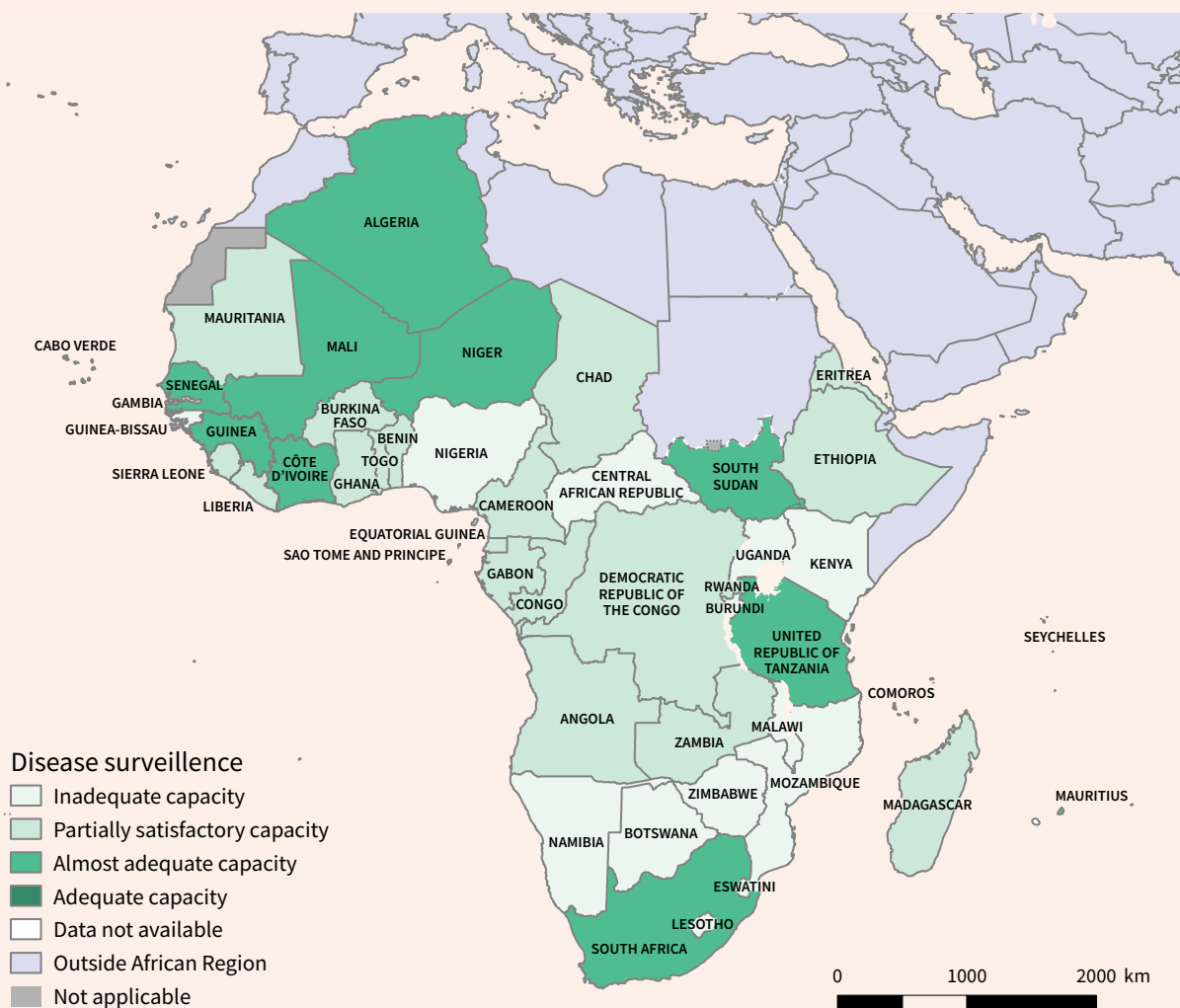
Based on total scores: inadequate capacity, 0 < score < 50%; partially satisfactory capacity, 50% ≤ score < 70%; almost adequate capacity, 70% ≤ score < 90%; adequate capacity, 90% ≤ score ≤ 100%.

3.2 *Diagnosis and case notification*

Diagnosis and case notification are considered core capacity requirements for a disease surveillance and response system *(49)*. Country capacity was assessed from five indicators in this domain (Fig. 4).

Fig. 4. Status of indicators of diagnostic and case notification in the 47 countries

Code	Indicator
DCN01	Notification of suspected and confirmed cases of major arboviral diseases
DCN02	Laboratory confirmation of suspected cases of major arboviral diseases
DCN03	Confirmation of positive cases of arboviral disease by a national reference laboratory
DCN04	Laboratory testing capacity for detection of arboviruses
DCN05	Regular training of health-care workers in notification of *Aedes*-borne arboviral diseases

■ **On track**

■ **Progress**

■ **Not on track**

■ **No answer**

Box 2. Identified weaknesses in diagnostic and case notification

- Limited case reporting and notification
- Limited confirmation of suspected cases
- Limited confirmation of positive cases of arboviral disease by a national reference laboratory
- Insufficient laboratory testing capacity for detection of arboviruses
- Limited regular training for health-care workers in diagnosis and case notification
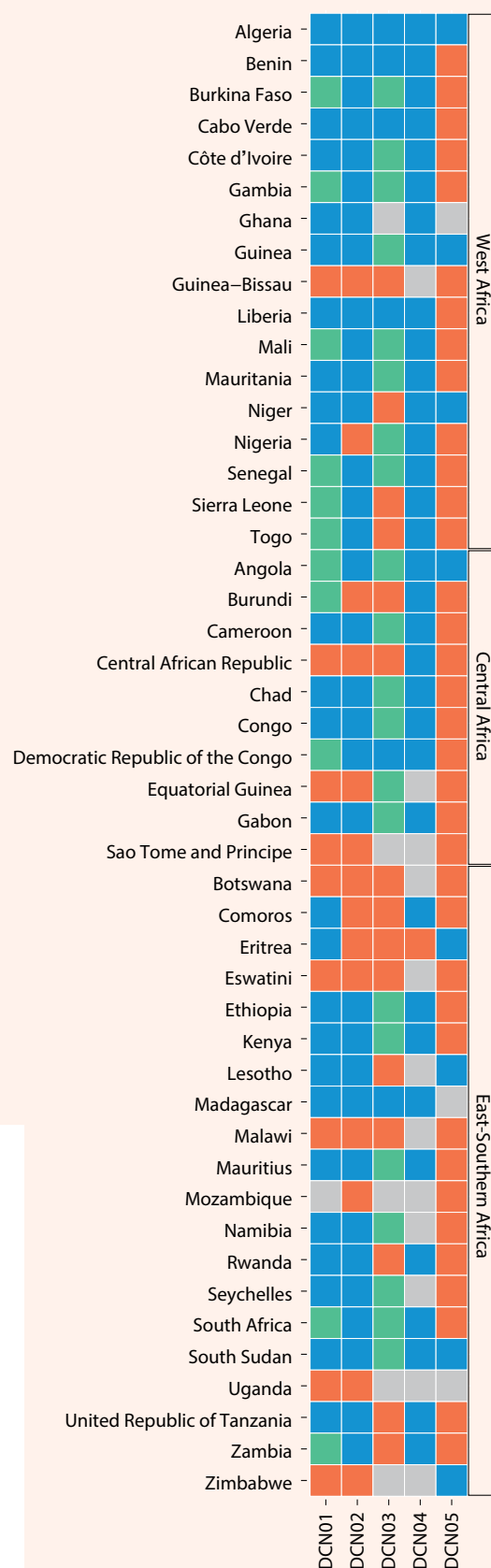
DCN01. Notification of suspected and confirmed cases of major arboviral diseases (question 16)

Nine countries (19%) reported that cases of arboviral disease were not reported: three in Central Africa (Central African Republic, Equatorial Guinea, Sao Tome and Principe), five in East–Southern Africa (Botswana, Eswatini, Malawi, Uganda, Zimbabwe) and one in West Africa (Guinea-Bissau). In 26 countries (55%), however, both suspected and confirmed cases are notified: 4 in Central Africa, 12 in East–Southern Africa, 10 in West Africa (Fig. 4). Eight countries reported that only suspected cases are notified (Burkina Faso, Burundi, Gambia, Mali, Senegal, Sierra Leone, Togo, Zambia), whereas others notified only confirmed cases (Angola, Democratic Republic of the Congo, South Africa). Table 4 lists the arboviral diseases notified by countries and the numbers according to subregion.

Table 4. Subregions and countries that notify arboviral diseases

Arboviral disease	African Region	West Africa		Central Africa		East–Southern Africa	
	Total	Suspected cases	Confirmed cases	Suspected cases	Confirmed cases	Suspected cases	Confirmed cases
Dengue	30	3	11	3	2	0	11
Yellow fever	32	6	8	2	5	4	7
Chikungunya	19	2	2	2	3	1	9
Zika	14	3	3	2	1	0	5
Rift Valley fever	7	1	2	0	0	0	4
Crimean–Congo haemorrhagic fever	3	1	1	0	0	0	1
West Nile fever	1	0	1	0	0	0	0

DCN02. Laboratory confirmation of suspected cases of major arboviral diseases; DCN03. Confirmation of positive cases of arboviral disease by a national reference laboratory; and DCN04. Laboratory testing capacity for detection of arboviruses (questions 17–19)

Eleven countries (23%) reported that suspected cases were not confirmed: three in Central Africa (Burundi, Central African Republic, Sao Tome and Principe), six in East–Southern Africa (Botswana, Comoros, Eritrea, Eswatini, Mozambique, Zimbabwe) and two in West Africa (Guinea-Bissau, Nigeria). Thirty-three countries (70%) reported that suspected cases were confirmed: 8 countries only during outbreaks (Chad, Congo, Democratic

Republic of the Congo, Lesotho, Madagascar, Mauritania, Namibia, United Republic of Tanzania), 9 countries routinely and 16 countries both routinely and during outbreaks. Some of the 33 countries also reported the percentage of suspected cases tested for confirmation (Table 5).

Table 5. Proportions of case confirmation

Case confirmation (%)		West Africa	Central Africa	East–Southern Africa
Routinely	100%	Côte d'Ivoire, Gambia, Sierra Leone	None	Ethiopia, Mauritius, South Africa
	20–25%	None	Gabon	None
	10–20%	Benin	Angola	None
	< 10%	Burkina Faso, Guinea, Senegal, Cabo Verde	Cameroon	Rwanda
During outbreaks	50–100%	Côte d'Ivoire	Gabon	Mauritius, Namibia, Rwanda
	20–40%	Guinea	None	None
	10–20%	Burkina Faso, Togo	None	Ethiopia, South Sudan
	< 10%	Senegal	None	None

Fifteen countries (32%) reported that positive cases of arboviral disease had not been confirmed by a reference laboratory in the previous 2 years: two in Central Africa (Burundi, Central African Republic), nine in East–Southern Africa (Botswana, Comoros, Eritrea, Eswatini, Lesotho, Malawi, Rwanda, United Republic of Tanzania, Zambia) and four in West Africa (Guinea-Bissau, Niger, Sierra Leone, Togo). Of these, five countries (Botswana, Central African Republic, Eritrea, Guinea-Bissau, Togo) did not send their samples abroad for confirmation, whereas nine sought technical support overseas. Twenty-seven countries (57%) reported that positive cases were confirmed by a national reference laboratory or through collaboration overseas.

Most countries reported use of various laboratory testing methods for arbovirus detection and confirmation. In decreasing order, they used reverse transcriptase polymerase chain reaction, immunoglobulin M and G antibodies, antigen testing, virus isolation, neutralizing antibody testing, viral gene and genome sequencing. Eritrea did not report use of any of these methods for arbovirus detection. Twelve countries (26%) did not reply to the question.

Additional capacity for adequate detection of arboviral diseases (not scored); and DCN05. Regular training of health-care workers in notification of Aedes-*borne arboviral diseases (question 21)*

Most countries reported additional requirements for satisfactory detection of arboviruses: 35 countries (74%) for staff training and laboratory equipment and 21 countries (45%) for staff (full-time equivalent). Table 6 provides more details according to subregion.

Table 6. Expressed needs for the adequate detection of arboviruses

Additional requirements	West Africa	Central Africa	East–Southern Africa
Additional staff training	Algeria, Benin, Burkina Faso, Côte d'Ivoire, Gambia, Ghana, Guinea, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, Togo	Burundi, Cameroon, Central African Republic, Chad, Congo, Equatorial Guinea, Gabon, Sao Tome and Principe	Comoros, Eritrea, Eswatini, Ethiopia, Kenya, Madagascar, Mauritius, Mozambique, Namibia, Rwanda, South Sudan, United Republic of Tanzania, Zambia, Zimbabwe
Additional laboratory equipment	Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Liberia, Mali, Niger, Nigeria, Sierra Leone, Togo	Angola, Burundi, Cameroon, Central African Republic, Congo, Equatorial Guinea, Gabon, Sao Tome and Principe	Comoros, Eritrea, Eswatini, Ethiopia, Kenya, Madagascar, Mauritius, Mozambique, Namibia, Rwanda, South Africa, South Sudan, United Republic of Tanzania, Zambia, Zimbabwe
Additional staff (full-time equivalent)	Benin, Ghana, Liberia, Niger, Senegal, Sierra Leone, Guinea	Burundi, Cameroon, Central African Republic, Congo, Sao Tome and Principe	Comoros, Eswatini, Ethiopia, Madagascar, Mauritius, Namibia, Rwanda, South Sudan, United Republic of Tanzania, Zimbabwe

Training was reported as a critical component at all levels of public health structures and as a huge gap. Thirty-two countries (68%) reported that they did not provide regular training for health-care workers in detection and notification of *Aedes*-borne arboviral diseases. Only eight countries (17%) replied in the affirmative.

Personal perceptions of factors of success and challenges in relation to case detection and notification (not scored)

Forty-three countries (91%) replied to the question. The challenges reported are similar to those cited for disease surveillance: lack of political commitment and leadership, limited financial support, insufficient qualified human resources, insufficient training, limited technical and logistical laboratory resources and lack of community awareness about arboviral diseases. Other concerns were:

- logistical challenges in sending samples nationally and internationally for quality control
- difficulty of health-care workers in filling out notification forms
- weak surveillance systems
- lack of laboratory resources for case detection and confirmation
- no WHO-certified laboratory for arbovirus disease diagnosis
- limited active case detection
- limited resources for data management
- no programme for arboviral disease surveillance
- lack of priority of arboviral diseases in the reporting system
- lack of arbovirus-specific guidelines and knowledge about arboviral disease surveillance
- difficulty in engaging the private sector
- lack of community engagement

The factors of success cited by some countries included:

- continued staff training, a national reference laboratory and a functional surveillance system (Algeria, Cabo Verde, Mauritius, Senegal)
- guidelines and well-defined reporting channels (Burkina Faso, Eswatini, Ethiopia, Gabon, Nigeria)
- a functional surveillance system (Cameroon)
- a diagnostic platform at the Pasteur Institute (Central African Republic)
- a national epidemiological surveillance or entomology department, regional collaboration through the "One health" approach (Comoros)
- trained staff (Côte d'Ivoire, Guinea, Mauritania)
- experience of health-care workers in vigilance and case notification of existing and emerging infectious diseases (Eritrea)
- surveillance staff (Togo)

Fig. 5 summarizes the status of diagnostic and case notification in the African Region.

> Factors of success included continued staff training, a national reference laboratory and a functional surveillance system.

Fig. 5. Country capacity for the diagnostic and case notification of arboviral diseases
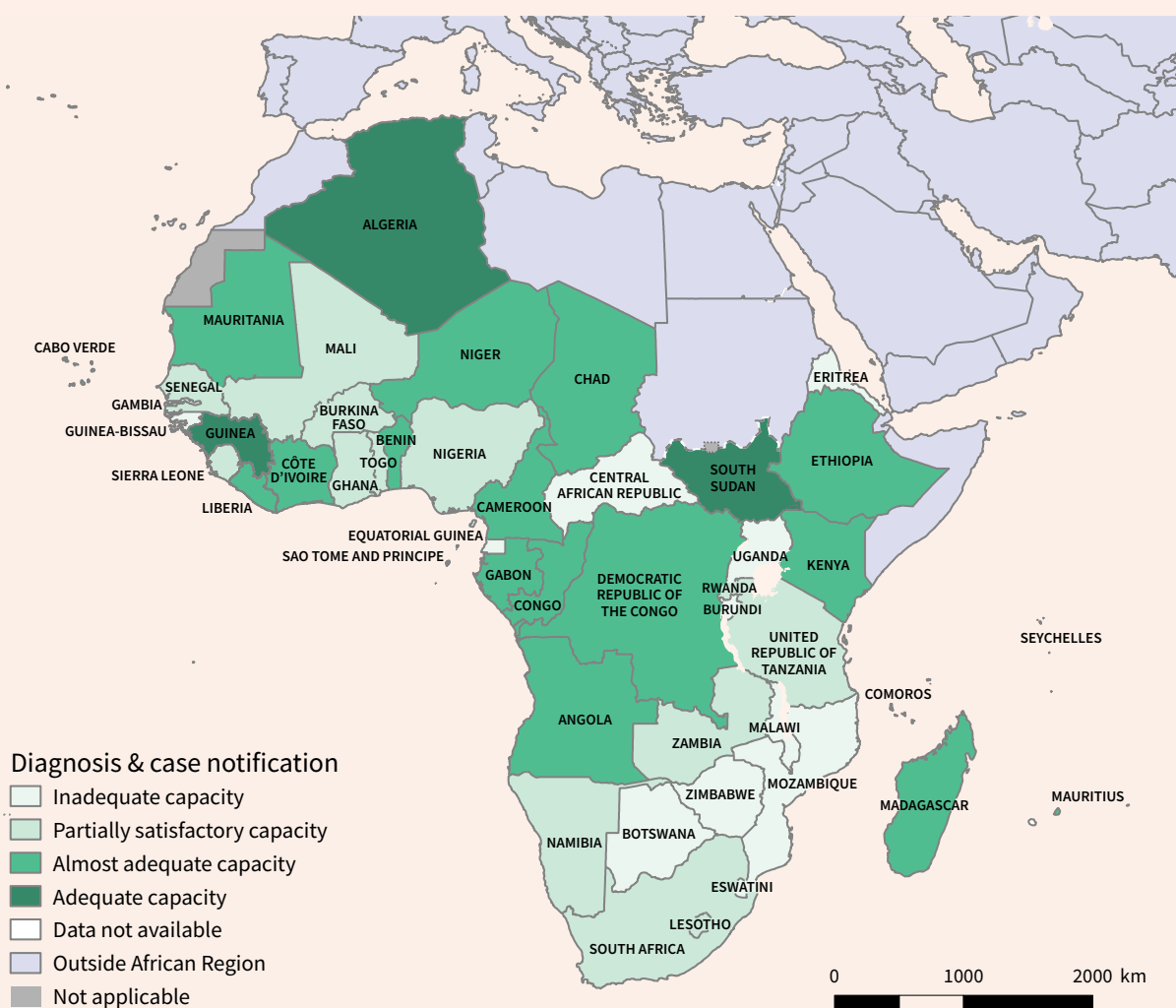
Based on total scores: inadequate capacity, 0 < score < 50%; partially satisfactory capacity, 50% ≤ score < 70%; almost adequate capacity, 70% ≤ score < 90%; adequate capacity, 90% ≤ score ≤ 100%.

3.3 *Management of cases and severe cases*

Management of cases is considered a core function of health systems *(49)*. Country capacity was assessed from three indicators in this domain.

Fig. 6. Status of indicators of management of cases and severe cases in the 47 countries

Code	Indicator
MCSC01	Availability of standardized procedures or guidelines for triage and management of cases and severe cases of arboviral diseases
MCSC02	Facilities for management of patients with severe arboviral disease
MCSC03	Regular training of health-care workers in clinical diagnosis and management of *Aedes*-borne arboviral diseases

On track

Progress

Not on track

No answer

Box 3. Weaknesses identified in the management of cases and severe cases

- Limited availability of guidelines on clinical management of cases of *Aedes*-borne arboviral diseases
- Insufficient medical equipment for managing severe cases
- Gaps in training of health-care workers in clinical management of severe cases
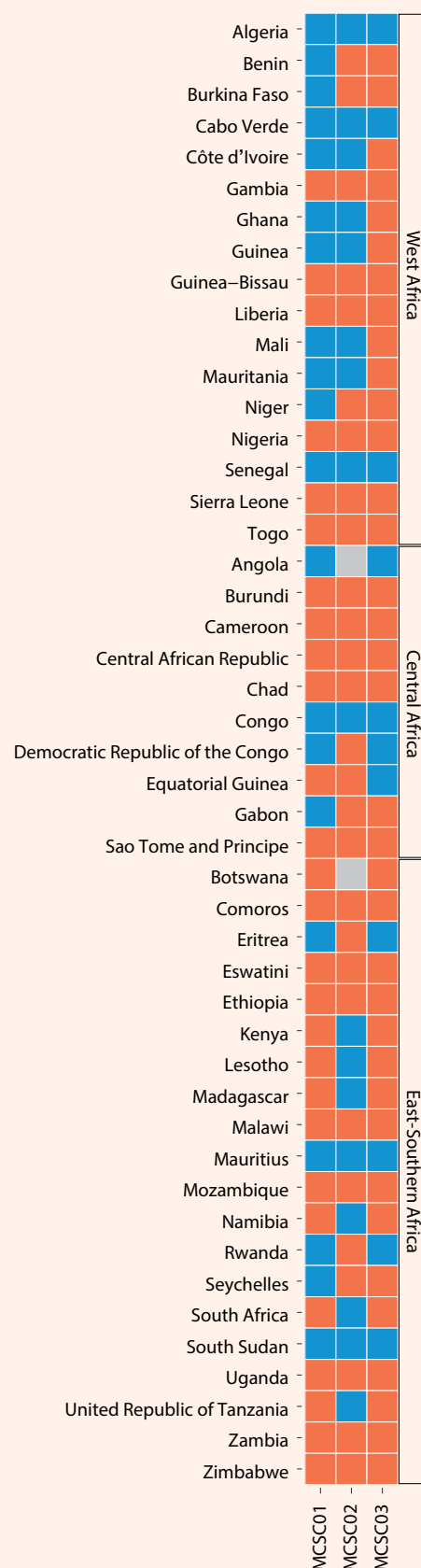
MCSC01. Availability of standardized procedures or guidelines for triage and management of cases and severe cases of arboviral diseases; MCSC02. Facilities for management of patients with severe arboviral disease (questions 23 and 24)

Most countries (25, 53%) reported that they had no standardized national procedures or guidance for the management of cases and severe cases: 5 in Central Africa, 15 in East–Southern Africa, 5 in West Africa (Table 7); however, 20 countries (43%) replied in the affirmative.

Table 7. Countries with no national guidance or facilities for management of cases and severe cases of arboviral diseases

Guidance or facilities for managing cases and severe cases	West Africa	Central Africa	East–Southern Africa
No guidance	Gambia, Guinea-Bissau, Liberia, Sierra Leone, Togo	Burundi, Cameroon, Central African Republic, Equatorial Guinea, Sao Tome and Principe	Botswana, Comoros, Eswatini, Ethiopia, Kenya, Lesotho, Madagascar, Malawi, Mozambique, Namibia, South Africa, Uganda, United Republic of Tanzania, Zambia, Zimbabwe
No facilities	Benin, Burkina Faso, Gambia, Guinea-Bissau, Liberia, Niger, Sierra Leone, Togo	Burundi, Cameroon, Central African Republic, Chad, Democratic Republic of the Congo, Gabon, Sao Tome and Principe	Comoros, Eritrea, Eswatini, Ethiopia, Mozambique, Seychelles, Zambia, Zimbabwe

With regard to facilities for the management of cases of arboviral diseases, 23 countries (49%) reported that they had no special area for such patients: eight in West Africa, eight in East–Southern Africa and seven in Central Africa (Table 7). Countries reported that these cases were managed in general hospitals (Ethiopia, Sierra Leone, Seychelles), isolation units or selected health facilities (Cameroon, Democratic Republic of the Congo) or as outpatients (Chad). Sixteen countries (36%) reported facilities for the management of severe cases of arboviral diseases. Eleven countries (23%) (Algeria, Cabo Verde, Comoros, Eritrea, Ethiopia, Guinea, Mauritius, Namibia, Sao Tome and Principe, South Sudan, United Republic of Tanzania) reported that beds were available in the event of a large disease outbreak.

MCSC03. Regular training of health-care workers in clinical diagnosis and management of Aedes-borne arboviral diseases (question 26)

As for the previous domain, thirty-three countries (70%) reported that they did not provide regular training for their health-care workers in clinical diagnosis and management of *Aedes*-borne arboviral diseases: six in Central Africa, fourteen in East–Southern Africa and thirteen in West Africa. Only eleven countries (23%) replied in the affirmative.

Personal perceptions of the factors for success and challenges in case management (not scored)

Thirty-eight countries (81%) replied to the question, similarly to those for previous domains. The reported challenges were related to political commitment and leadership, limited financial support, insufficient qualified human resources, training gaps, limited laboratory technical and logistical resources and lack of the community awareness on arboviral diseases. Other concerns were:

- lack of prioritization of arboviral diseases
- delays in case notification
- lack of guidelines and a case management system
- no specific management facilities
- lack of laboratory and health facility infrastructure
- lack of neglected tropical disease departments that include arboviral diseases
- inadequate logistics in health facilities during outbreaks
- incorrect treatment of cases of arboviral disease as malaria or influenza
- insecurity
- high turnover of health-care workers
- inadequate availability of essential medicines in lower-level facilities

The factors for success reported by some countries included:

- adequate stocks of medicines and free treatment for patients with dengue (Burkina Faso)
- experience gained from past epidemics (Cabo Verde)
- logistical support for the management of cases through the SEGA[2] One Health network, possible herd immunity of populations gained through past dengue and chikungunya epidemics (Comoros)
- trained staff; a department dedicated to the management of severe cases (Côte d'Ivoire)
- early treatment-seeking by the public and prompt management of patients (Eritrea)
- screening for febrile illnesses in selected hospitals (Liberia)

> "Only 11 countries reported providing regular training for their health-care workers in clinical diagnosis and management of *Aedes*-borne arboviral diseases."

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[2] https://www.epiconcept.fr/en/produit/sega-one-health-network/

- health facilities with the necessary numbers of health-care workers and case definitions (Madagascar)
- routine and permanent surveillance as well as case notification (Mali)
- case management centralized and free of charge (Mauritius)
- a syndromic sentinel surveillance system to identify febrile episodes and cases of suspected arboviral disease, speedy delivery of test results at the Pasteur Institute in Dakar (Senegal)

Fig. 7 shows country capacity for the management of cases and severe cases of arboviral diseases.

Fig. 7. Country capacity for management of cases and severe cases of arboviral diseases
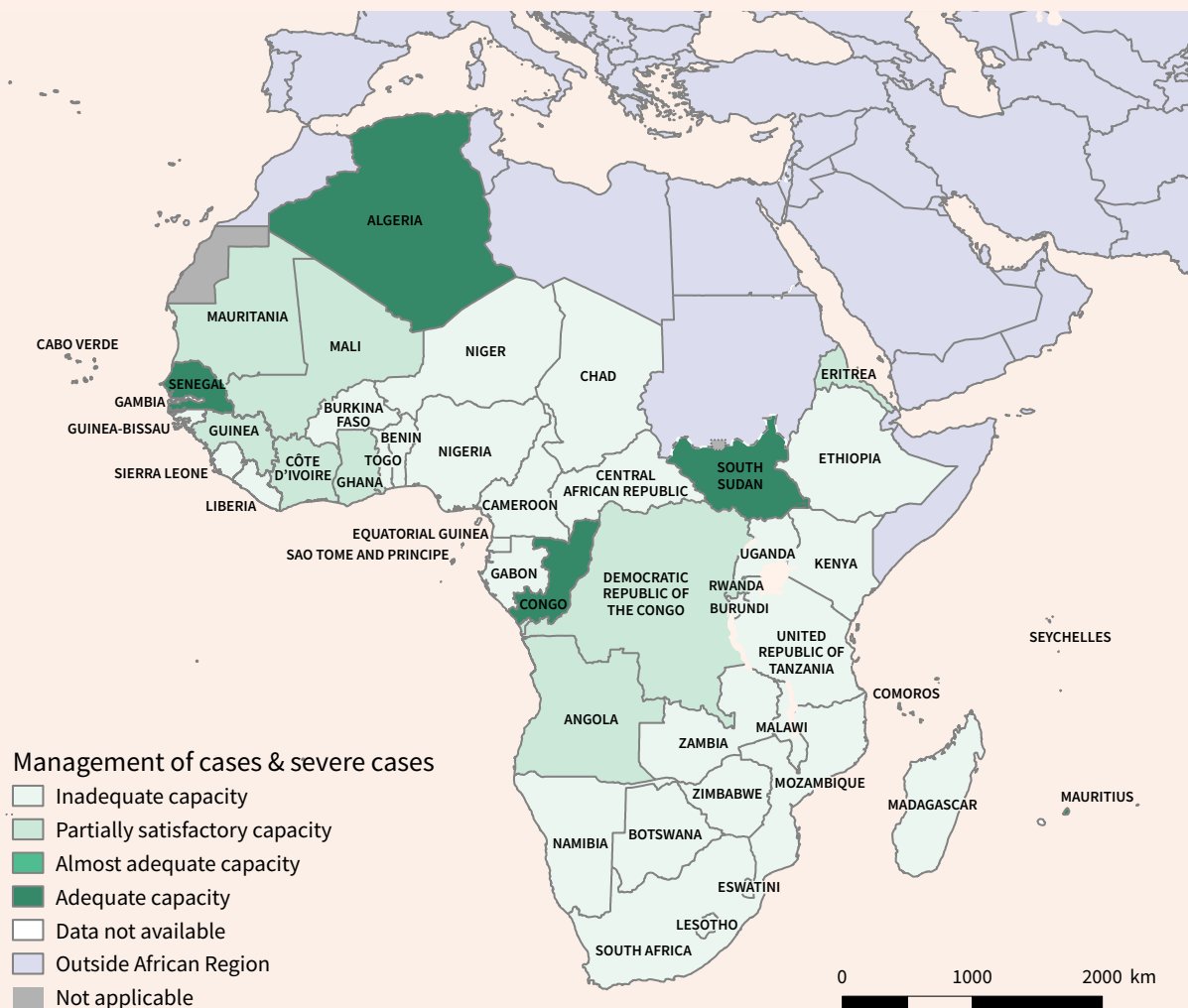
Management of cases & severe cases
- Inadequate capacity
- Partially satisfactory capacity
- Almost adequate capacity
- Adequate capacity
- Data not available
- Outside African Region
- Not applicable

Based on total scores: inadequate capacity, 0 < score < 50%; partially satisfactory capacity, 50% ≤ score < 70%; almost adequate capacity, 70% ≤ score < 90%; adequate capacity, 90% ≤ score ≤ 100%.

3.4 *Virological surveillance*

Country capacity for virological laboratory-based surveillance was assessed according to two capacity indicators (Fig. 8).

Fig. 8. Status of indicators of virological surveillance in the 47 countries

Code	Indicator
VS01	Arbovirus surveillance
VS02	Regular training of health-care workers in virological surveillance of arboviruses

■ On track

■ Progress

■ Not on track

■ No answer
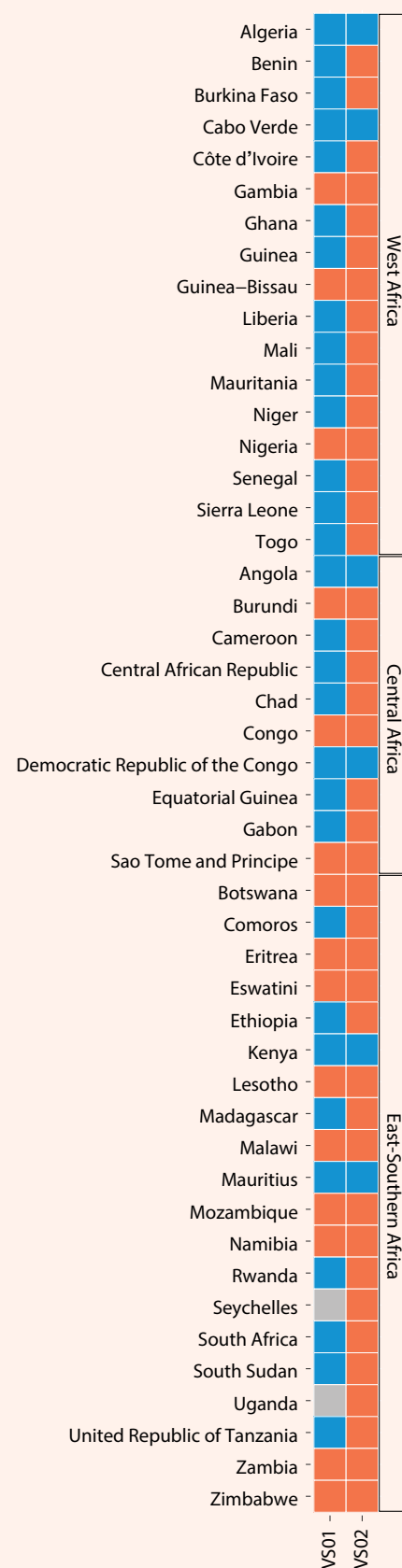
Box 4. Weaknesses in virological surveillance identified

- Limited virological surveillance
- Inadequate regular training of health-care workers in virological surveillance of arboviruses

VS01. *Arbovirus surveillance (question 28)*

Table 8 lists the arboviruses known to circulate in the 47 countries. In decreasing order, dengue virus was reported by 26 countries (55%), yellow fever virus by 24 (51%), chikungunya virus by 19 (40%) and Zika virus by 9 (19%). Other arboviruses reported accounted for 51%.

Table 8. Arboviruses that are or were circulating in the 47 countries

Region	Country	Number of arboviruses reported	Dengue virus	Chiku-ngunya virus	Zika virus	Yellow fever virus	Rift Valley fever virus	West Nile virus	Crimea–Congo haemorrhagic fever virus	Others
West Africa	Algeria	2						✓		Toscana virus
	Benin	2	✓			✓				
	Burkina Faso	2	✓			✓				
	Cabo Verde	0								
	Côte d'Ivoire	2	✓			✓				
	Gambia	Not reported								
	Ghana	2	✓			✓				
	Guinea	5	✓	✓	✓	✓	✓			
	Guinea-Bissau	2		✓	✓					
	Liberia	3	✓	✓		✓				
	Mali	4	✓			✓	✓		✓	
	Mauritania	1	✓							
	Niger	2	✓					✓		
	Nigeria	2	✓			✓				
	Senegal	7	✓	✓	✓	✓	✓	✓	✓	
	Sierra Leone	0								
	Togo	2	✓			✓				

Region	Country	Number of arboviruses reported	Dengue virus	Chiku-ngunya virus	Zika virus	Yellow fever virus	Rift Valley fever virus	West Nile virus	Crimea–Congo haemorrhagic fever virus	Others
Central Africa	Angola	2	✓			✓				
	Burundi	0								
	Cameroon	1				✓				
	Central African Republic	7	✓	✓	✓	✓	✓	✓		Onyong-nyong virus
	Chad	2		✓		✓				
	Congo	3	✓	✓		✓				
	Democratic Republic of the Congo	2		✓		✓				
	Equatorial Guinea	1				✓				
	Gabon	4	✓	✓	✓	✓				
	Sao Tome and Principe	0								
East-Southern Africa	Botswana	0								
	Comoros	3	✓	✓			✓			
	Eritrea	2	✓	✓						
	Eswatini	0								
	Ethiopia	7	✓	✓	✓	✓	✓	✓		Sandfly fever virus
	Kenya	8	✓	✓	✓	✓	✓	✓	✓	Onyong-nyong virus
	Lesotho	0								
	Madagascar	3	✓	✓			✓			
	Malawi	0								
	Mauritius	2	Sporadic outbreak	✓						
	Mozambique	2	✓	✓						
	Namibia	2	✓			✓				
	Rwanda	1					✓			
	Seychelles	2	✓	✓						
	South Africa	4		✓			✓	✓		Sindbis virus
	South Sudan	1				✓				
	Uganda	0								
	United Republic of Tanzania	5	✓	✓	✓	✓	✓			
	Zambia	4	✓	✓	✓	✓				
	Zimbabwe	0								

VS02. Regular training of health-care workers in arbovirus surveillance (question 31)

Thirty-nine countries (83%) reported that regular training was not provided for health-care workers in virological surveillance of arboviruses: 8 in Central Africa, 17 in East–Southern Africa and 14 in West Africa (Fig. 8). Six countries replied in the affirmative.

Personal perceptions of factors of success and challenges in relation to virological surveillance (not scored)

Forty countries (85%) replied to the question, with remarks similar to those for previous domains. The reported challenges were related to political commitment and leadership, limited financial support, insufficient qualified human resources, insufficient training, limited laboratory technical resources, reagents and logistics and lack of community awareness about arboviral diseases. Other concerns were:

- lack of standardized laboratories for the diagnosis of arboviruses
- difficulty in diagnosis because of delays in blood sampling
- weak surveillance system
- no programme for virological surveillance
- disruptions due to COVID-19
- lack of capacity, sampling equipment and laboratories to conduct tests for virological surveillance
- insecurity
- no routine surveillance
- issues with the quality of blood sampling, storage and transport

The factors for success reported by countries in this domain included:

- national reference laboratories (Algeria, Burkina Faso)
- experience gained in previous dengue and Zika epidemics (Cabo Verde)
- well-qualified staff, a specific programme on arboviruses (Côte d'Ivoire)
- community surveillance systems, logistical resources for transport of samples and availability of laboratory resources (Guinea)
- case definitions and reporting tools (Nigeria)
- a well-equipped technical platform capable of detecting more than 200 viruses (Senegal)

Fig. 9 shows country capacity for virological surveillance.

"

Thirty-nine countries (83%) reported that regular training was not provided for health-care workers in virological surveillance of arboviruses.

"

Fig. 9. Country capacity for the virological surveillance of arboviruses
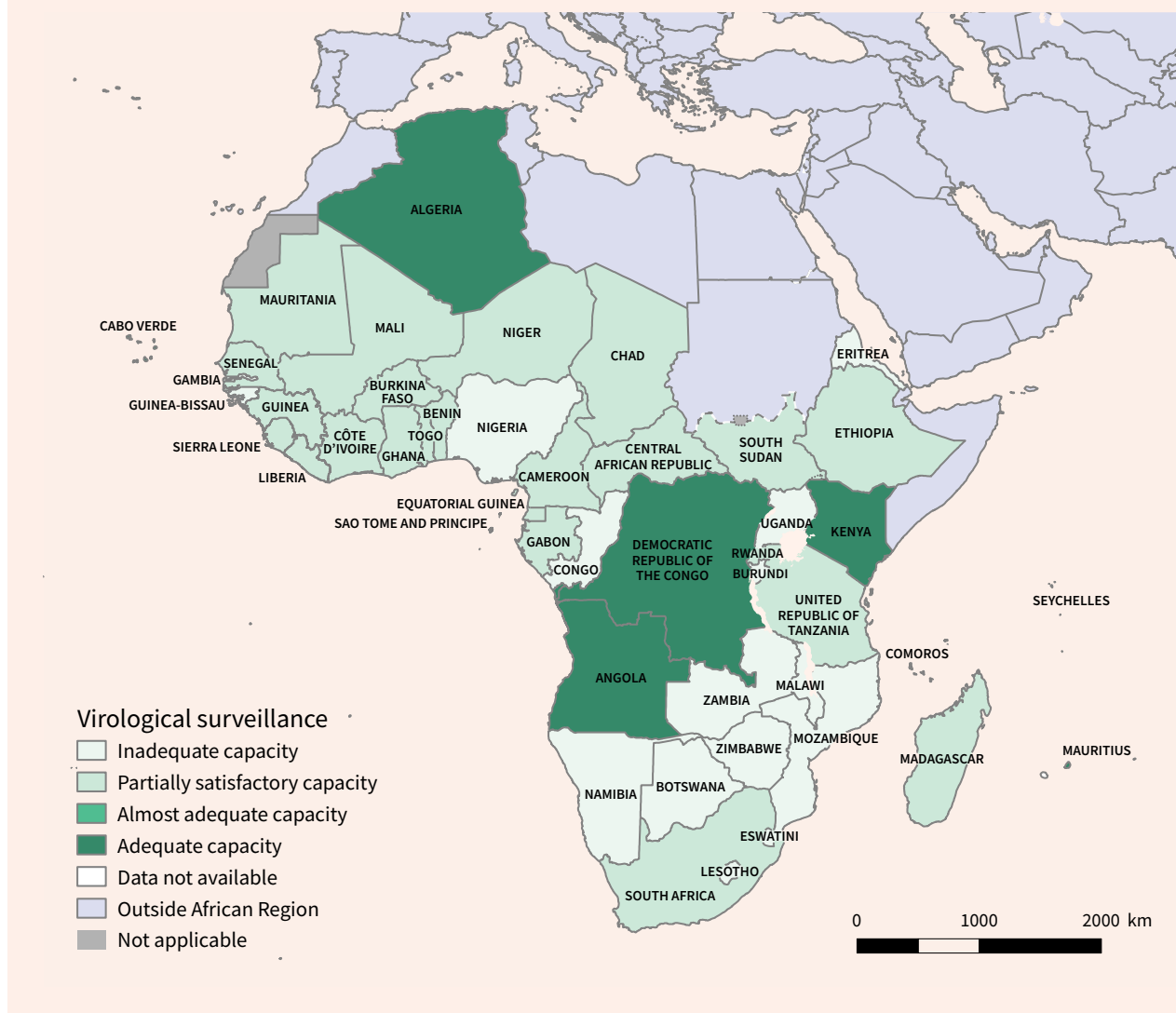
Based on total scores: inadequate capacity, 0 < score < 50%; partially satisfactory capacity, 50% ≤ score < 70%; almost adequate capacity, 70% ≤ score < 90%; adequate capacity, 90% ≤ score ≤ 100%.

3.5 *Routine vector surveillance and control*

These capacities were assessed on the basis of 13 indicators (Fig. 10).

Fig. 10. Status of indicators of routine vector surveillance and control in the 47 countries

Code	Indicator
RVSC01	A national institution or agency for arbovirus vector surveillance
RVSC02	A national record of *Ae. aegypti* or *Ae. albopictus*
RVSC03	Entomological surveillance of vectors of arboviruses
RVSC04	A formal institution for reporting entomological surveillance data to the ministry of health
RVSC05	Surveillance of adult vectors of arboviruses
RVSC06	Surveillance of larvae and pupae of vectors of arboviruses
RVSC07	Identification of vectors of arboviruses
RVSC08	Determination of minimum infection rates for major arboviral diseases
RVSC09	A national laboratory for screening collected mosquito pools for arboviruses
RVSC10	Implementation of core vector control approaches
RVSC11	Regular training of staff in vector control and surveillance
RVSC12	A plan for control of mosquito-borne diseases including indicators that would result in recommendations for vector control
RVSC13	Monitoring of insecticide resistance among vectors of arboviruses

Legend:
- On track
- Progress
- Not on track
- No answer

Box 5. Identified weaknesses in routine vector surveillance and control

- Limited programme or structure dedicated to *Aedes* vector surveillance
- Poor entomological surveillance of *Aedes* mosquitoes
- Limited control of the vectors of arboviruses
- Lack of expertise in entomology and vector control with respect to arboviral diseases
- Lack of surveillance of resistance of *Aedes* to insecticides
- No regular training sessions for specialists in vector control and surveillance of *Aedes* vectors

RVSC01. A national institution or agency for arbovirus vector surveillance; RVSC02. A national record of Ae. aegypti or Aedes albopictus (questions 33 and 34)

Nineteen countries (40%) reported that they did not have a national institution or other entity responsible for arbovirus vector surveillance: four in Central Africa, seven in East–Southern Africa and eight in West Africa, whereas 24 (51%) replied in the affirmative. The institutions were national malaria control programmes (Burundi, Comoros, Côte d'Ivoire, Mozambique), national vector-borne disease control programmes or neglected tropical disease departments (Namibia, Kenya), universities (Togo), national research institutes (Algeria, Benin, Cabo Verde, Democratic Republic of the Congo, Ghana) or special departments within the ministry of health (Central African Republic, Eritrea, Lesotho, Seychelles, South Sudan).

With regard to national records on *Ae. aegypti* and *Ae. albopictus* in the previous 5 years, 15 countries (32%) replied in the affirmative for *Ae. aegypti,* 2 (4%) for *Ae. albopictus* and 11 (23%) for both species. Ten countries (21%) indicated that neither vector had been identified in their country at the time of the survey but did not exclude their presence.

RVSC03. Entomological surveillance of vectors of arboviruses; RVSC04. A formal institution for reporting entomological surveillance data to the ministry of health; RVSC05. Surveillance of adult vectors of arboviruses; RVSC06. Surveillance of larvae and pupae of vectors of arboviruses; RVSC07. Identification of vectors of arboviruses; RVSC13. Monitoring of insecticide resistance among vectors of arboviruses (questions 35–38 and 46)

> " Surveillance of adult mosquitoes was not conducted in most countries. "

Twenty-five countries (53%) reported that they had not conducted entomological surveillance for vectors of arboviruses in the previous 2 years: 2 in Central Africa, 13 in East–Southern Africa and 10 in West Africa. Fifteen countries (32%) had conducted such surveillance, whereas seven countries replied "Don't know". Surveillance was restricted to specific locations in 11 countries (23%) and was countrywide in 3 countries. Four countries (Benin, Comoros, Mali and Sierra Leone) provided their surveillance reports, and nine countries reported the number of sentinel surveillance sites at the time of the survey: 10 sites in Benin and Mauritius; 6 sites in Comoros, Côte d'Ivoire; 4 sites in Angola, Democratic Republic of the Congo, Mali and Sierra Leone; and 3 sites in Algeria. Entomological surveillance was conducted once a year in Comoros, Kenya and Sierra Leone; every semester in Democratic Republic of the Congo and Mali; and every trimester in Angola, Benin and Côte d'Ivoire. Algeria and Equatorial Guinea conducted surveillance weekly, Mauritius monthly and Gambia on an ad hoc basis.

The institutions responsible for reporting entomological surveillance data to the ministry of health or health department were state or provincial health agencies in 16 countries, universities or other academic institutions in 16 countries, national agencies in 6 countries, local mosquito control organizations in 5 countries and city health departments in 4 countries. Surprisingly, private companies were not mentioned by any country.

Surveillance of adult mosquitoes was not conducted in most countries: 23 (49%) reported that they had not conducted surveillance of adult *Aedes*, and 22 (47%) reported no surveillance of larvae or pupae; however, 17 countries (36%) and 20 countries (43%), respectively, had conducted such surveillance. Twenty-five countries (53%) indicated that they identified the species of mosquito trapped, while 11 (23%) did not.

Most countries (37, 79%) reported that they did not have a surveillance system to monitor the resistance of *Aedes* to insecticides. These comprised all 10 countries in Central Africa, 16 in East–Southern Africa and 11 in West Africa. Only 5 countries (11%) reported having such a system.

RVSC08. Determination of minimum infection rates for major arboviral diseases; RVSC09. A national laboratory for screening mosquito pools for arboviruses (questions 40 and 41)

Twenty-four countries (51%) reported that they did not calculate minimum infection rates, while 12 (26%) responded in the affirmative. Kenya reported estimation of minimum infection rates in outbreak situations and during vector competence studies, and Senegal reported calculation of minimum infection rates for dengue, yellow fever, Rift Valley fever and Crimea-Congo haemorrhagic fever.

Five countries did not conduct screening of mosquito pools for arboviruses (Benin, Eritrea, Gambia, Niger and Seychelles). Eighteen countries replied "Not applicable" to the question, as *Aedes* surveillance was not conducted at national level: four in Central Africa (Burundi, Cameroon, Congo, Sao Tome and Principe), six in East–Southern Africa (Eswatini, Lesotho, Malawi, Mozambique, Namibia, Rwanda) and eight in West Africa (Burkina Faso, Cabo Verde, Guinea, Guinea-Bissau, Liberia, Mauritania, Nigeria, Togo). The remaining 24 countries reported screening of mosquito pools for arboviruses in national institutions, university laboratories or public health centres.
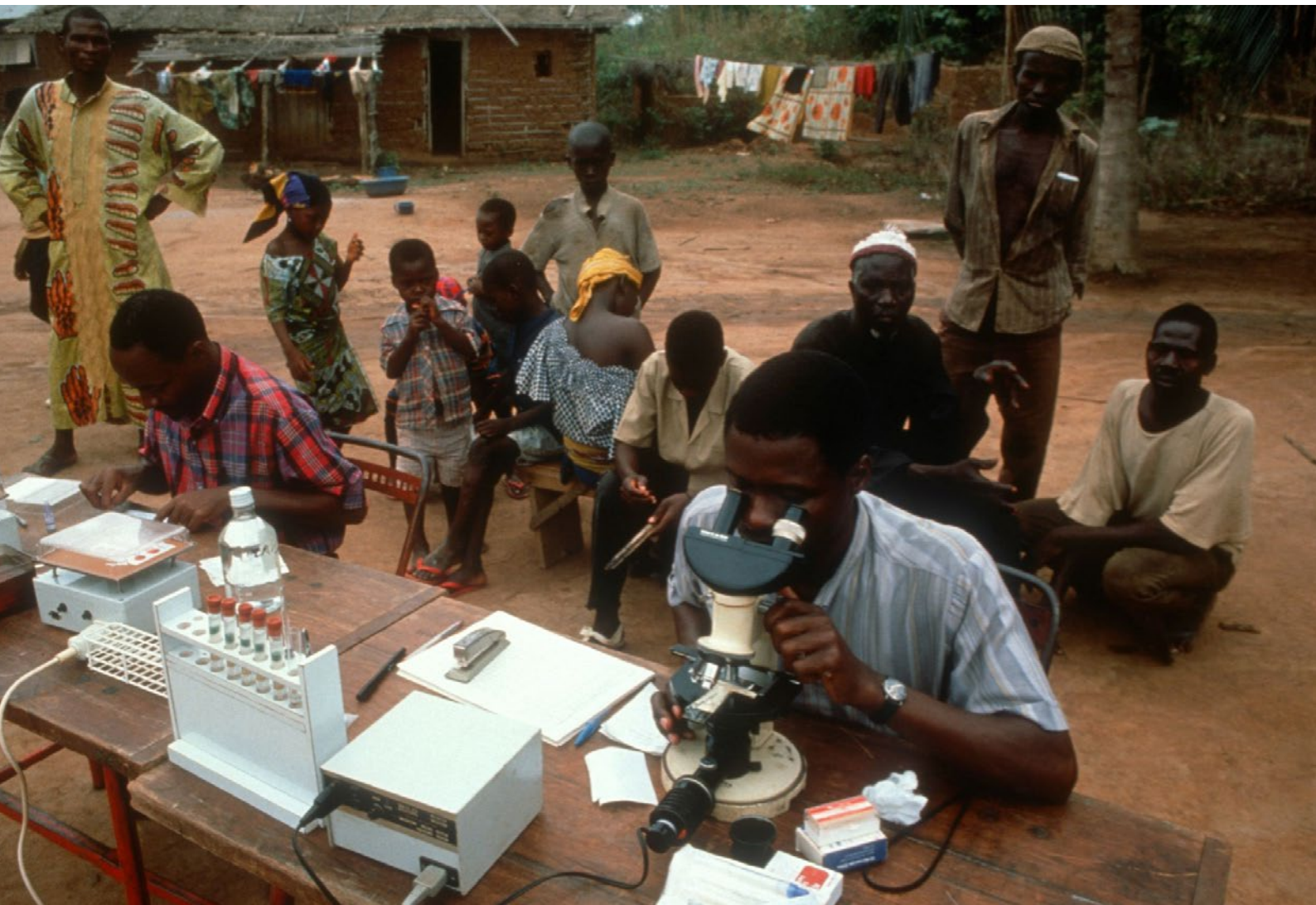
Potential public health threat of *Ae. albopictus* and *Ae. aegypti* (not scored)

Table 9 illustrates the potential public health threat of *Aedes* vectors by country and region.

Table 9. Potential public health threat of *Aedes* vectors in the African Region

Potential public health threat	West Africa	Central Africa	East–Southern Africa
Aedes aegypti			
Found occasionally and does not pose a significant public health threat	Mauritania, Niger	Burundi	Eswatini, Zambia, Zimbabwe
Abundant, and arboviruses are circulating	Benin, Côte d'Ivoire, Guinea, Liberia, Senegal, Sierra Leone	Angola, Cameroon	Kenya, Mozambique
Restricted to a few sites and does not pose a significant public health threat	Gambia		
Spreading and poses a significant public health threat	Burkina Faso, Cabo Verde, Guinea-Bissau, Togo	Central African Republic, Congo, Democratic Republic of the Congo, Sao Tome and Principe	Comoros, Eritrea, Ethiopia, South Africa, South Sudan, United Republic of Tanzania
Stable in some areas and poses a significant public health threat	Mali		Madagascar
No data	Algeria, Ghana, Nigeria	Chad, Equatorial Guinea, Gabon	Botswana, Lesotho, Malawi, Namibia, Rwanda, Uganda
Not present			Mauritius, Seychelles
Aedes albopictus			
Found occasionally and does not pose a significant public health threat	Burkina Faso, Côte d'Ivoire, Guinea, Niger		Zimbabwe
Abundant, and arboviruses are circulating	Sierra Leone		Seychelles
Restricted to a few sites and does not pose a significant public health threat	Benin, Gambia, Nigeria	Sao Tome and Principe	Madagascar, United Republic of Tanzania
Spreading and poses a significant public health threat	Algeria	Central African Republic, Congo, Democratic Republic of the Congo	Ethiopia, Mauritius, Mozambique, South Africa
Stable in selected areas and pose a significant public health threat	Mali		Comoros
No data	Ghana, Guinea-Bissau, Liberia, Mauritania, Senegal, Togo	Angola, Burundi, Chad, Equatorial Guinea, Gabon	Botswana, Eritrea, Eswatini, Kenya, Lesotho, Malawi, Namibia, Rwanda, South Sudan, Uganda, Zambia
Not present	Cabo Verde		

RVSC10. Implementation of core vector control approaches; RVSC12. A plan for control of mosquito-borne diseases including indicators that would result in recommendations for vector control (questions 43 and 45)

Sixteen countries (34%) reported that no adulticiding and/or larviciding operations had been conducted in the previous 2 years: three in Central Africa (Cameroon, Central African Republic, Congo), seven in West Africa (Gambia, Guinea-Bissau, Liberia, Mauritania, Nigeria, Sierra Leone, Togo) and six in East–Southern Africa (Lesotho, Malawi, Mozambique, Namibia, Rwanda, Zambia). These results do not necessarily indicate lack of capacity for vector control but rather the situation in the country at the time of the survey. Twenty-seven countries (57%) reported that they had conducted adulticiding and/or larviciding: 7 in Central Africa, 11 in East–Southern Africa and 9 in West Africa.

Six countries indicated that they would have conducted vector control if sufficient funds were available: Gambia, Liberia, Mauritania, Namibia, Nigeria and Sierra Leone, while six others replied in the negative without indicating the reason: Central African Republic, Lesotho, Mozambique, Rwanda, Togo and Zambia.

Countries were asked whether they followed a plan for vector control activities for mosquito-borne disease control. Twenty-three countries (49%) replied that they had no formal plan: 6 in Central Africa, 5 in East–Southern Africa and 12 in West Africa. Fourteen countries (30%) reported that they had a plan but no indicator that would result in a recommendation to trigger vector control: four in Central Africa, eight in East–Southern Africa and two in West Africa. Only eight countries reported a plan with indicators to trigger vector control. The indicators were: concurrent human cases (Côte d'Ivoire, Eswatini, South Africa, South Sudan, Zimbabwe), Breteau index (Cabo Verde, Côte d'Ivoire, Mauritius, South Sudan), house or container index (Cabo Verde, Côte d'Ivoire, South Sudan), vector density (Côte d'Ivoire, Zimbabwe) and minimum infection rate (Zimbabwe).

> "
> Only eight countries reported a plan with indicators to trigger vector control. "

RVSC11. Regular training of staff in vector control and surveillance (question 44)

Similar gaps in training were reported as for previous domains. Twenty-four countries (51%) reported that they did not provide regular training for staff responsible for vector control and surveillance: 5 in Central Africa, 10 in East–Southern Africa and 9 in West Africa. Eleven countries (23%) reported that their staff were trained in both activities, whereas four countries reported training only in vector control.

Personal perceptions of factors of success and challenges in vector surveillance and control (not scored)

Forty countries (85%) replied to the question, with results similar to those for previous domains. The reported challenges were related to political commitment and leadership, lack of or limited financial support dedicated to vector surveillance and control, lack of or insufficient qualified human resources, training gaps and limited laboratory technical and logistical resources. Other concerns included:

- difficulty in accessing houses for spraying or to install mosquito traps (Angola)
- no vector control programme or department (Burkina Faso, Guinea)
- no surveillance system (Burundi, Cameroon, Equatorial Guinea, Guinea)
- vector control focused on malaria vectors (Comoros, Guinea, Namibia)
- no coordination of vector control activities (Congo, Guinea)
- limited technical resources and laboratory reagents for monitoring insecticide resistance, difficulty in obtaining insecticides, obsolete equipment (Côte d'Ivoire, Guinea)
- no national guidelines on *Aedes* vector surveillance and control (Ethiopia, Guinea)
- limited collaboration between public health institutes and the ministry of health for surveillance and control of vectors of arboviruses (Ethiopia)
- insecurity (Mali)

The factors of success reported by countries in this domain included:

- availability of expertise and standard operating procedure (Algeria, Senegal)
- insectariums and vector control programmes (Côte d'Ivoire)
- motivated, well-trained, well-organized vector control teams, availability of insecticides and monitoring of *Aedes* resistance to insecticides (Cabo Verde)
- malaria vector control programmes and entomology departments (Comoros, Eswatini, South Sudan)
- vector control programmes for malaria and human African trypanosomiasis and renowned researchers working on mosquitoes and tsetse flies
- a strategic plan for surveillance of diseases with epidemic potential (Guinea)
- collaboration between the national malaria control programme and multisectoral entities (Madagascar)

Fig. 11 shows the situation of routine surveillance and control of *Aedes* vectors in African Region.

Fig. 11. Country capacity for routine vector surveillance and control
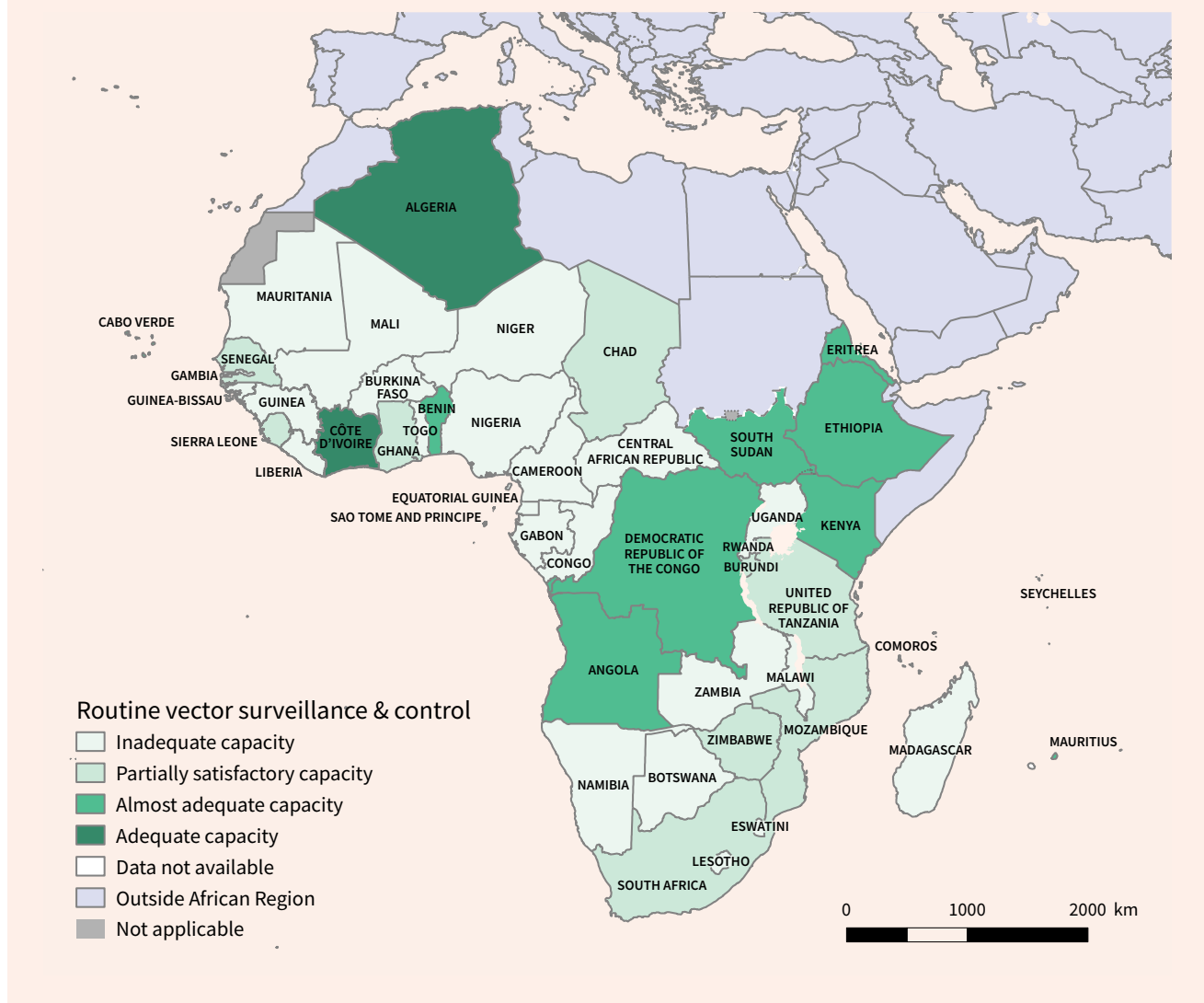
Routine vector surveillance & control
- Inadequate capacity
- Partially satisfactory capacity
- Almost adequate capacity
- Adequate capacity
- Data not available
- Outside African Region
- Not applicable

Based on total scores: inadequate capacity, 0 < score < 50%; partially satisfactory capacity, 50% ≤ score < 70%; almost adequate capacity, 70% ≤ score < 90%; adequate capacity, 90% ≤ score ≤ 100%.

3.6 *Community sensitization and participation in non-epidemic periods*

Five capacity indicators were used to assess country capacity in this domain.

Fig. 12. Status of indicators of community sensitization and participation in non-epidemic periods in the 47 countries

Code	Indicator
CSPEP01	Community outreach programme on arboviral diseases and vectors
CSPEP02	Effective communication of an outreach programme on local risks of transmission and possible vector control activities
CSPEP03	Regular training of staff responsible for community sensitization and mobilization
CSPEP04	Geographical extension of the outreach programme
CSPEP05	Financial resources for the outreach programme

■ On track

■ Progress

■ Not on track

■ No answer

Box 6. Identified weaknesses in community sensitization and participation in non-epidemic periods

- Lack of financial support
- Large gaps in training of health-care workers and community health-care workers
- Lack of educational and reference materials for community sensitization and education for both health departments and communities
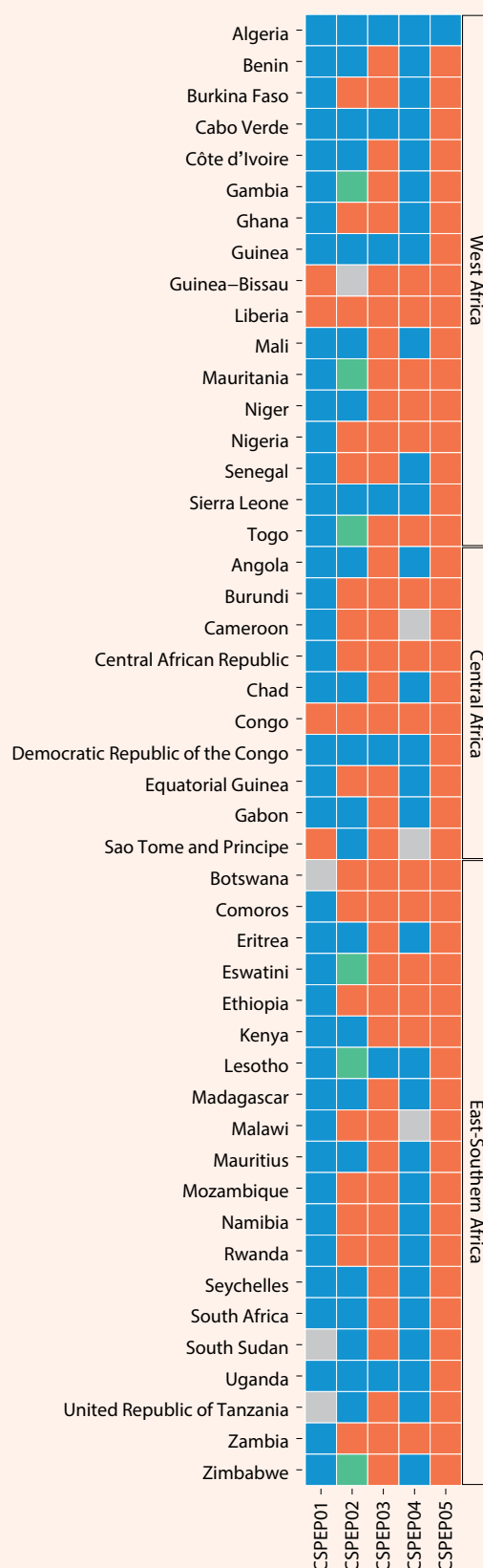
Almost all the countries (43, 94%) reported an outreach programme. Four did not have such a programme: Congo, Guinea-Bissau, Liberia and Sao Tome and Principe.

The existence of an outreach programme contrasted with their operational status, however, as 19 countries (40%) reported that their national arboviral disease programmes had not publicly communicated on any activities and had not issued prevention messages related to arboviral diseases in the previous 2 years: five in Central Africa, nine in East–Southern Africa and five in West Africa. Six countries (Eswatini, Gambia, Lesotho, Mauritania, Togo, Zimbabwe) reported that they had not communicated on arboviral diseases in the previous 2 years because there was no perceived risk of transmission. Nevertheless, 26 countries (55%) reported that messages on prevention or on activities related to the control of arboviral diseases had been communicated by national, state or local public health agencies.

The channels used to deliver messages to local communities were, in decreasing order, television and radio, press releases, town, community or neighbourhood meetings, agency webpage, social media, door-to-door outreach, passive distribution of information brochures, mosques and churches.

Most countries indicated that their communications were national (23 countries, 49%), while six countries (13%) issued communications only in selected areas (Burkina Faso, Chad, Madagascar, Senegal, South Africa, South Sudan).

One of the major challenges identified for outreach programmes was financial support. Forty-three countries (91%) reported that they received insufficient funds to cover staff time and activities: 9 in Central Africa, 19 in East–Southern Africa and 15 in West Africa. Only Algeria reported that the necessary funds were available. The second important challenge was reported to be training. Thirty-seven countries (79%) did not provide regular training for staff responsible for community sensitization and mobilization to ensure acceptance of interventions for the control of arboviral diseases: 8 in Central Africa, 17 in East–Southern Africa and 12 in West Africa.

Other requirements necessary to achieve adequate capacity included:

- educational materials for the public in 35 countries: 5 in Central Africa, 19 in East–Southern Africa and 11 in West Africa
- educational and reference materials for trainers and communities in 34 countries: 7 in Central Africa, 16 in East–Southern Africa and 11 in West Africa
- educational and reference materials for local health departments in 31 countries: 8 in Central Africa, 14 in East–Southern Africa and 9 in West Africa
- additional staff in 23 countries: 7 in Central Africa, 12 in East–Southern Africa and 4 in West Africa

“

94% of countries reported an outreach programme. ”

Personal perceptions of factors for success and challenges in relation to community participation (not scored)

Forty-two countries (89%) answered the question. The reported challenges were related to political commitment, lack of financial support for community sensitization and participation in activities, lack of qualified human resources and training and limited logistical resources. Other concerns included:

- misunderstanding or misinterpretation of messages in the community (Angola)
- no outreach programme (Cameroon, Eswatini, Guinea-Bissau)
- few community health workers (Comoros, Eswatini, Mauritania)
- no communication plan (Congo)
- limited communication on arboviral diseases (Equatorial Guinea)
- no national strategic guidelines for outreach programmes (Ethiopia)
- poor stakeholder engagement (Ethiopia, Guinea)
- limited educational materials (Ghana)
- lack of local data for setting priorities (Malawi)
- insecurity (Mali)
- little awareness among community health workers about arboviral diseases and vector control (Namibia)

The factors for success reported by some countries in this domain included:

- adequate human and material resources (Algeria)
- translation of messages into local languages, use of television for communication (Angola)
- an outreach programme and dedicated staff at all levels of the health pyramid (Benin)
- events-based activities (Burkina Faso)
- experience gained from past epidemics and specific days dedicated to cleaning at national and local levels (Cabo Verde)
- availability of the community to participate in activities for the control of arboviral diseases (Democratic Republic of the Congo)
- good community acceptance of interventions (Eritrea)
- multisectoral collaboration in epidemic situations (Madagascar)

Fig. 13 shows country capacity in relation to community sensitization and participation in non-epidemic periods in the African Region.

Fig. 13. Country capacity for community sensitization and participation in non-epidemic periods
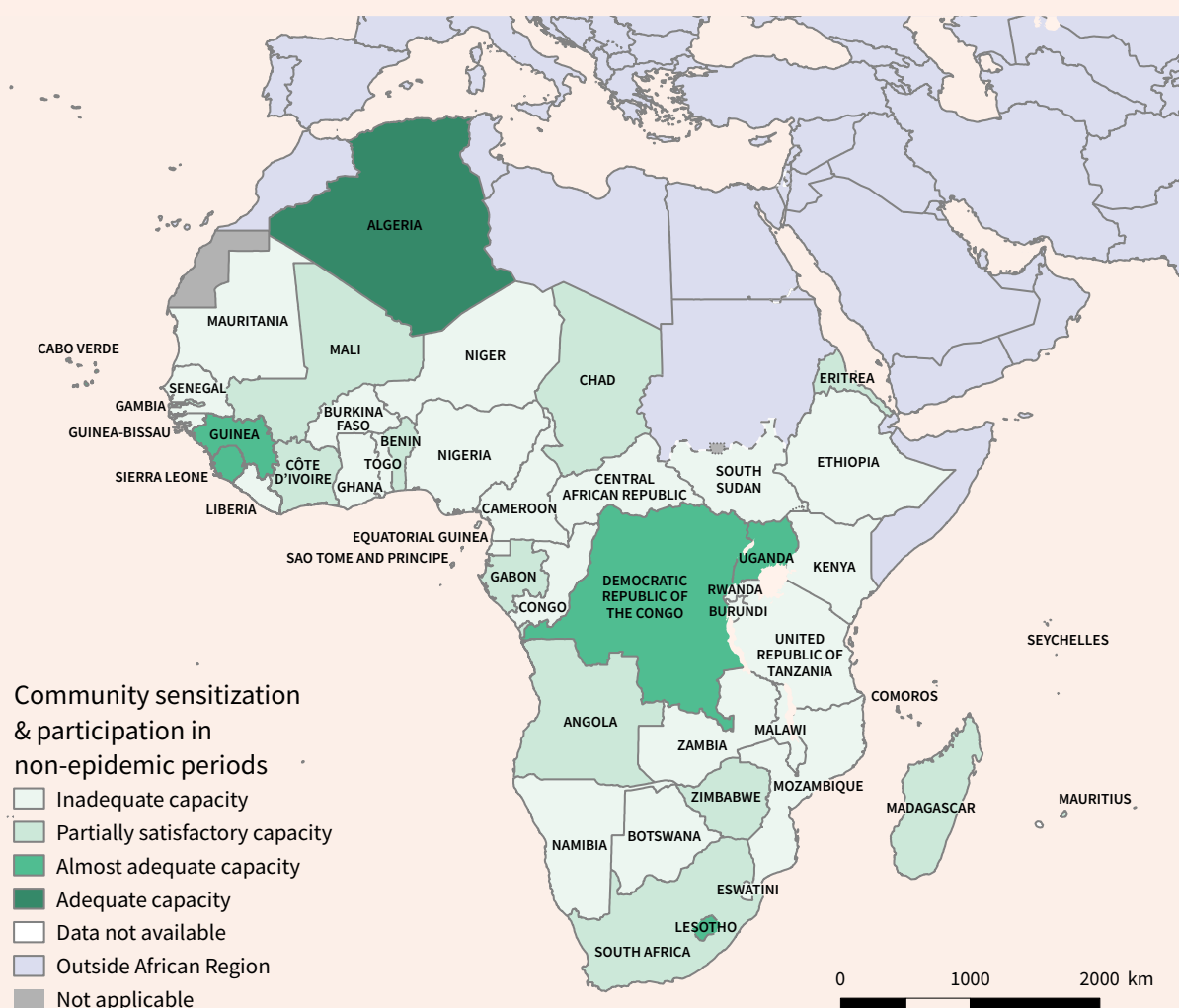
Based on total scores: inadequate capacity, 0 < score < 50%; partially satisfactory capacity, 50% ≤ score < 70%; almost adequate capacity, 70% ≤ score < 90%; adequate capacity, 90% ≤ score ≤ 100%.

3.7 *Preparedness for outbreaks and epidemics of arboviral disease*

A critical aspect of any outbreak is timely collective action to reduce both the temporal and the spatial spread of the disease. For collective action to be taken without delay, countries must be prepared in advance. Five capacity indicators were used to screen country capacity in this domain (Fig. 14).

Fig. 14. Status of indicators of preparedness for arboviral disease outbreaks and epidemics in the 47 countries

Code	Indicator
PAO01	A national committee for surveillance of outbreaks and response
PAO02	A national outbreak response and contingency plan
PAO03	Definition or definitions of arboviral disease outbreaks
PAO04	Cooperation agreements in outbreak situations
PAO05	Vector control interventions during outbreaks
PAO06	Emergency fund for arboviral disease outbreak response
PAO07	Regular training of staff responsible for preparedness for arboviral disease outbreaks and epidemics

Legend:
- On track
- Progress
- Not on track
- No answer

Box 7. Weaknesses identified in preparedness for arboviral disease outbreaks and epidemics

- Lack of adequate training in arboviral disease outbreaks
- Lack of financial support for activities related to outbreak preparedness
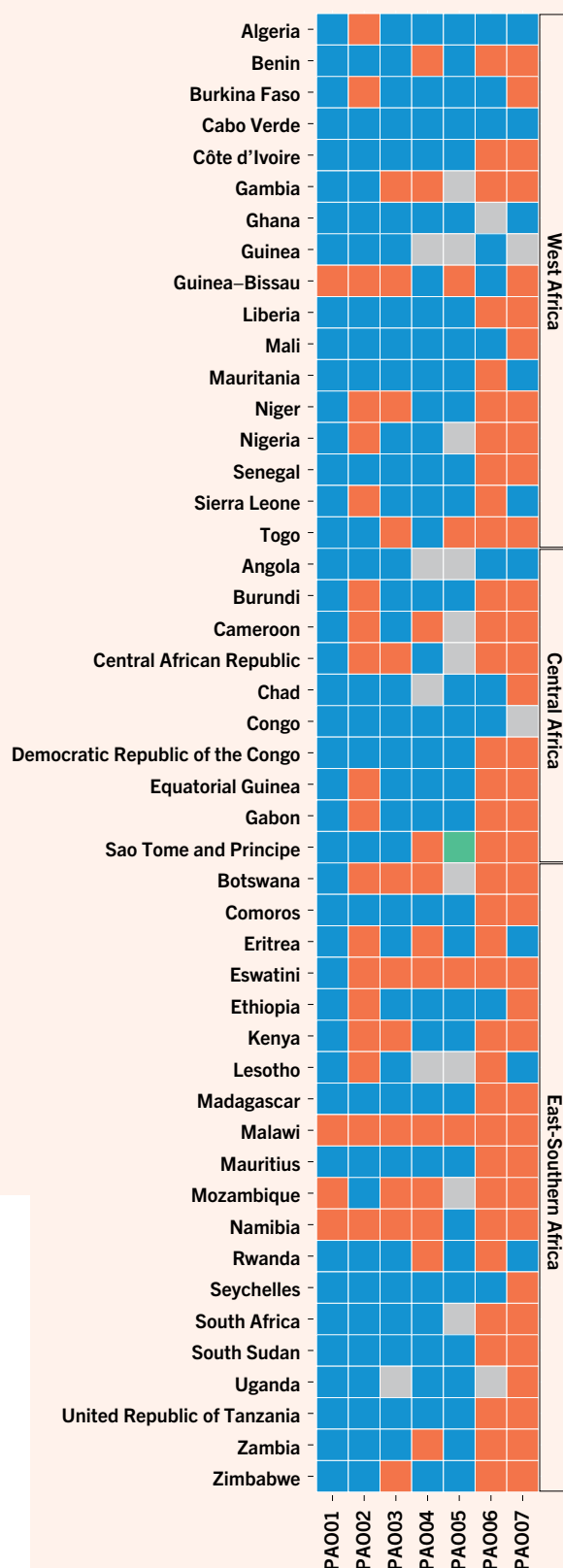
PAO01. A national committee for surveillance and outbreak response; PAO02. A national outbreak response and contingency plan; PAO03. Definition or definitions of arboviral disease outbreaks (questions 56–58)

Guinea-Bissau, Malawi and Namibia were the only three countries that reported they had no national surveillance and outbreak response committee. Although 43 countries reported they had such a committee, 16 countries (34%) did not have a contingency plan for organizing health-care services during an outbreak: five in Central Africa, six in East–Southern Africa and five in West Africa. Twenty-eight countries (60%) reported having such a plan.

With regard to definition of arboviral disease outbreaks, 10 countries (21%) indicated that they had no established criteria for declaring an outbreak of dengue, Zika, chikungunya or any other arboviral disease in their countries: one in Central Africa (Central African Republic), five in East–Southern Africa (Botswana, Eswatini, Kenya, Namibia, Zimbabwe) and four in West Africa (Gambia, Guinea-Bissau, Niger, Togo). Thirty-four countries (72%) had definitions for arboviral disease outbreaks.

> " Thirty-four countries (72%) had definitions for arboviral disease outbreaks. "

PAO04. Cooperation agreements in outbreak situations (question 59)

Only nine countries (19%) reported that they had no established collaboration with national or regional research institutions or international agencies that could be activated in case of an arboviral disease outbreak. Thirty-one countries (66%) indicated that they could rely on such a collaboration. These included:

- universities (Algeria, Central African Republic, Côte d'Ivoire, Togo)
- national research or public health institutes (Burundi, Congo, Kenya, Mauritania, Mali)
- regional support (Comoros, Guinea-Bissau, Mauritius)
- WHO (Burkina Faso, Cabo Verde, Congo, Ethiopia, Niger, Sierra Leone)
- other international institutions, such as the United Nations Children's Fund, US Centers for Disease Control and Prevention, Food and Agriculture Organization of the United Nations, United Nations Development Programme, International Cooperation Centre on Agrarian Research for Development (Comoros, Niger, South Africa, Zimbabwe)

PAO05. Vector control interventions during outbreaks (question 60)

Ten countries (21%) reported that vector control interventions had not been used in emergencies, while 37 countries (79%) had done so.

PAO06. Emergency fund for arboviral disease outbreak response (question 61)

Financial challenges were reported by most countries in the survey. Thirty-four countries (72%) reported that they did not have an emergency fund or a specified emergency funding mechanism for arbovirus disease outbreak response in the previous 2 years: 7 in Central Africa, 17 in East–Southern Africa and 10 in West Africa. These results do not entirely reflect the capacity of these countries to address arboviral disease outbreaks, as the question referred only to the previous 2 years and funding mobilization might depend on a country's risk of an arboviral disease outbreak. Only nine countries (19%) indicated that they had emergency funds for an arboviral disease outbreak response in the previous 2 years.

PAO07. Regular training of staff responsible for preparedness for arboviral disease outbreaks and epidemics (question 62)

The responses in this domain reflect those to previous questions regarding training. Thirty-four countries (72%) reported that they did not provide regular training for staff and had no committee in charge of preparedness for arboviral disease outbreaks and epidemics: 8 in Central Africa, 15 in East–Southern Africa and 11 in West Africa. Nine countries (19%) reported regular training of staff.

Personal perceptions of factors for success and challenges in relation to preparedness for arboviral disease outbreaks and epidemics (not scored)

Thirty-seven countries (79%) replied to the question. The reported challenges were related to political commitment, lack of financial support dedicated to community sensitization and participation in activities, lack of qualified human resources, lack of regular training of health professionals in preparedness and limited logistical resources. Other concerns included:

- delays in fund mobilization (Angola, Ethiopia)
- lack of priority for preparedness for arboviral disease outbreaks and epidemics (Benin)
- no outreach programme (Comoros, Democratic Republic of the Congo)
- unsuccessful collaboration between national and regional research institutions (Eritrea)
- no contingency plan and no preparedness for events related to arboviral disease outbreaks (Eswatini)
- difficult working conditions (Guinea-Bissau)

The factors for success in this domain reported by some countries included:

- human and financial resources (Algeria, Cabo Verde, Côte d'Ivoire)
- an annual response plan for arboviral diseases (Burkina Faso)
- health emergency response centres (Burkina Faso)
- contingency plans (Cabo Verde, Gabon)
- multisectoral collaboration (Comoros)

Fig. 15 shows country preparedness for arboviral disease outbreaks and epidemics in the African Region.

Fig. 15. Country capacity for preparedness for arboviral disease outbreaks and epidemics
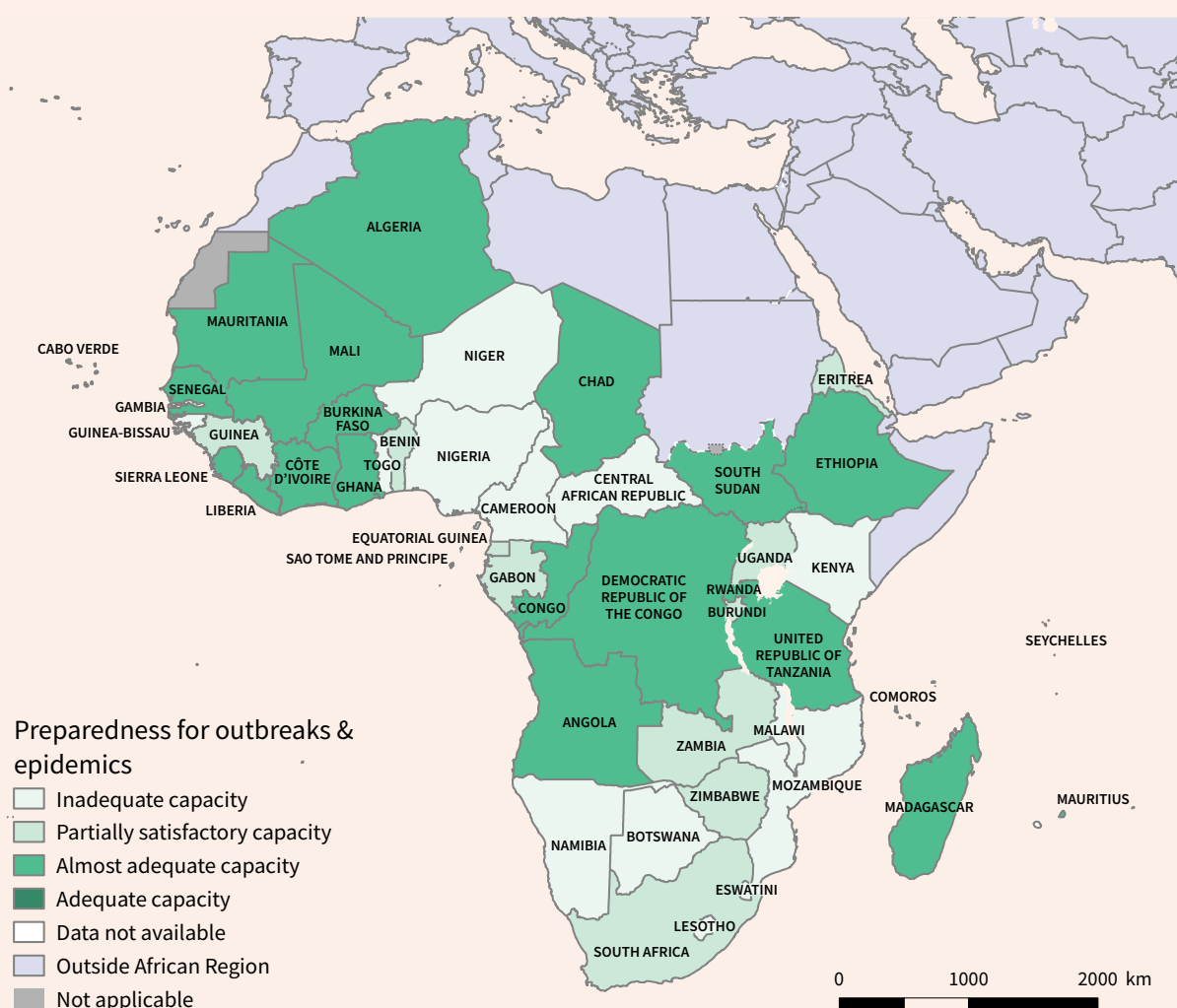
Based on total scores: inadequate capacity, 0 < score < 50%; partially satisfactory capacity, 50% ≤ score < 70%; almost adequate capacity, 70% ≤ score < 90%; adequate capacity, 90% ≤ score ≤ 100%.

Regional capacity assessment

Regional and subregional capacity for arboviral disease surveillance and control are summarized in Fig. 16.

Fig. 16. Average regional and subregional capacity in the seven domains assessed

Percentages are average scores for each domain.
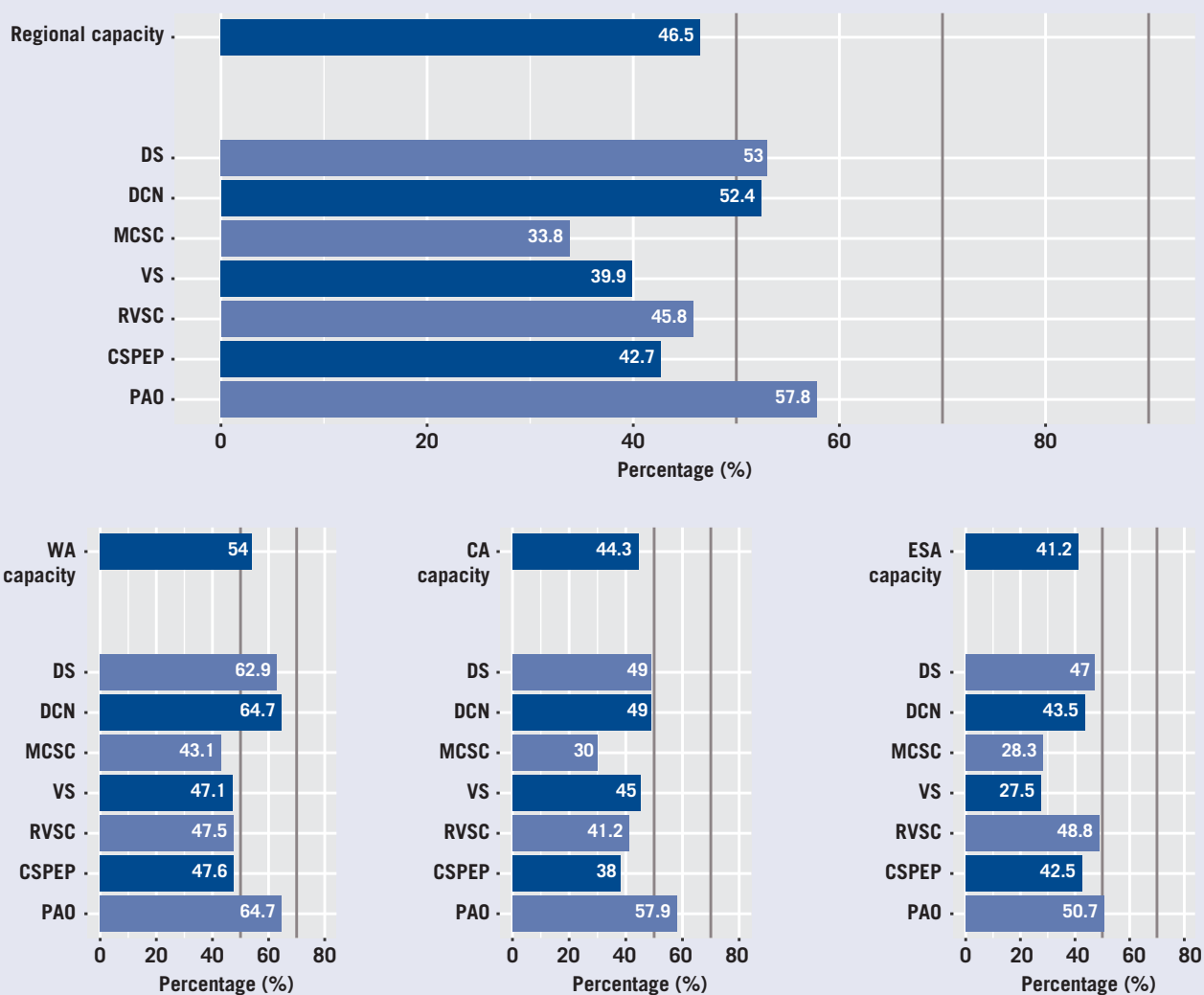
WA, West Africa; CA, Central Africa; ESA, East–Southern Africa; DS: disease surveillance system; DCN: diagnostic and case notification; MCSC: management of cases and severe cases; VS: virological surveillance; RVSC: routine vector surveillance and control; CSPEP: community sensitization and participation in non-epidemic periods; PAO: preparedness for arboviral disease outbreaks and epidemics.

4.1 *Region*

As a whole, the WHO African Region has "inadequate capacity" to control arboviral diseases in due form, as the regional average score was 46.5% (Fig. 16). No domain scored more than 60%, indicating that strengthening is necessary in all seven domains. The areas of work to be strengthened, in increasing order of priority (i.e., from lowest to highest capacity) are:

- management of cases and severe cases
- virological surveillance
- community sensitization and participation in non-epidemic periods
- routine vector surveillance and control
- diagnosis and case notification
- disease surveillance
- preparedness for arboviral disease outbreaks and epidemics

At subregional level, West Africa has partially satisfactory capacity and Central Africa and East–Southern Africa have inadequate capacity in all domains except for preparedness for arboviral disease outbreaks and epidemics (Fig. 17). Details of each country's situation regarding the seven domains are provided in Annex 2.

Fig. 17. Overall country capacity in the seven domains assessed
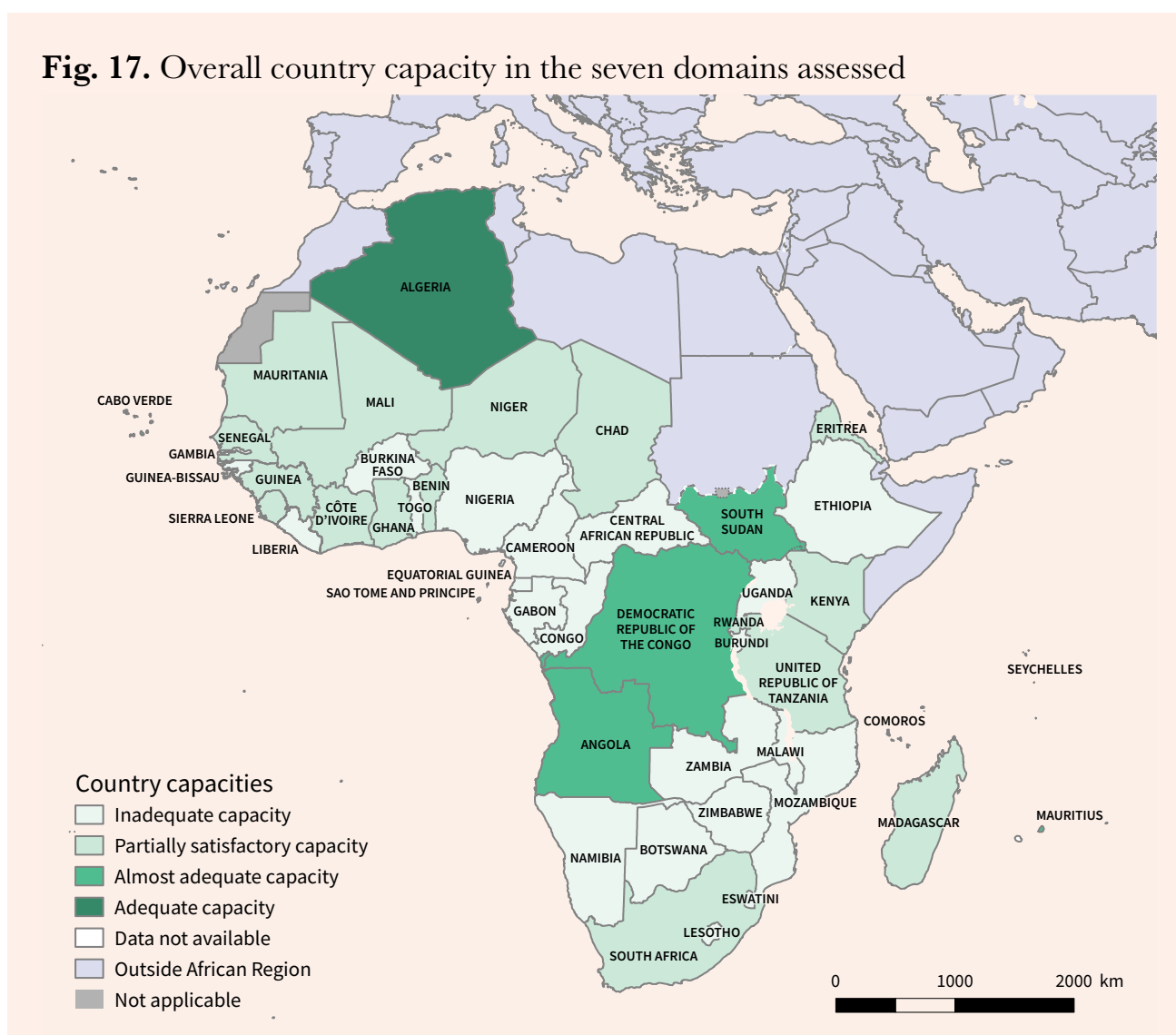
Country capacities
- Inadequate capacity
- Partially satisfactory capacity
- Almost adequate capacity
- Adequate capacity
- Data not available
- Outside African Region
- Not applicable

Based on total scores: inadequate capacity, 0 < score < 50%; partially satisfactory capacity, 50% ≤ score < 70%; almost adequate capacity, 70% ≤ score < 90%; adequate capacity, 90% ≤ score ≤ 100%.

4.2 *West Africa*

West Africa was the only subregion in which capacity is increasing in three of the seven domains: disease surveillance, diagnosis and case notification and preparedness for arboviral disease outbreaks and epidemics, with average scores for these domains of 50–70%. The subregion had "inadequate capacity" in the four remaining domains, with average scores of < 50% (Fig. 16).

With regard to surveillance and control of arboviral diseases overall, most countries in West Africa (15 of 17, 88%) had "inadequate capacity" or "partially satisfactory capacity". Only Algeria and Cabo Verde had "adequate capacity" and "almost adequate capacity", respectively, for surveillance and control of arboviral diseases. In all the other countries, capacity should be strengthened.

4.3 *Central Africa*

In Central Africa, more domains were challenged, as the subregion had "inadequate capacity" in all, except for "preparedness for arboviral disease outbreaks and epidemics" (Fig. 16). Except for Angola and Democratic Republic of the Congo, which had "almost adequate capacity", the other eight countries (80%) had "inadequate" or "partially satisfactory" capacity.

4.4 *East–Southern Africa*

This subregion showed similar trends to those of Central Africa, as "inadequate capacity" was found in all domains other than "preparedness for arboviral disease outbreaks and epidemics". Fig. 17 shows that only Mauritius and South Sudan had "almost adequate capacity", while the remaining 18 countries (90%) had "inadequate" or "partially satisfactory" capacity.

Discussion and suggestions for moving forward

This situation analysis of country capacity for epidemiological and entomological surveillance and control of arboviral diseases is based on answers to a self-administered questionnaire. The answers provide an overview of existing capacity as well as the weaknesses in addressing the growing threat of these diseases. Of the 47 countries that participated in the survey, only six (13%) (Algeria, Angola, Cabo Verde, Democratic Republic of the Congo, Mauritius and South Sudan) were found to have "adequate" or "almost adequate" capacity for arboviral disease surveillance and control. This indicates that most countries on the continent would experience detrimental effects if waves of epidemics of arboviral diseases occur. The capacity of some countries should, however, be viewed in the context of their current situation with regard to transmission of arboviruses.

Ae. aegypti and *Ae. albopictus* are reported to be present in 32 and 23 countries, respectively (Table 9). The presence of both vectors on the continent has also been reported in the literature *(50, 51)*, confirming the data shared by countries. As in this report, *Ae. aegypti* has been reported as more prevalent on the continent than *Ae. albopictus (50, 51)*. The preponderance of *Ae. aegypti* over *Ae. albopictus*, which originated from Asia *(52)*, is explained by its long establishment in Africa, from which it may even have originated, although a genetic study has linked its origin to the southwestern Indian Ocean *(53)*. Although its origin is under investigation, its wide distribution in continental Africa is a certainty, as reported in Gabon, Ghana, Namibia and Nigeria in the past few years *(50, 51, 54)*.

Arboviruses were reported in 38 countries (Table 8) – more countries than those ones that reported the presence of *Ae. aegypti* and *Ae. albopictus*. This discrepancy confirms that the vectors are present in some countries that have no data on their presence, although they are involved in the transmission of arboviruses. These countries include Chad, Equatorial Guinea, Gabon, Ghana and Namibia. The presence of arboviruses has also been reported in other countries: Rift Valley fever virus in Botswana, Gambia and Zimbabwe; yellow fever and chikungunya viruses in Burundi, Sierra Leone and Uganda; dengue virus in Cabo Verde, Sao Tome and Principe and Uganda; and Zika virus in Burundi *(50, 51, 55–57)*. These observations underline the importance of collaboration and communication among researchers and national health departments and authorities to maximize the effectiveness of the surveillance of arboviral diseases and evaluation of risks of transmission.

Most countries (24/47) did not report cases or deaths from arboviral disease during the past 5 years. A common response was "data not available", which could indicate either "no data" or "data exist but are not available at national level". Some countries reported that individual or aggregated data were available only at regional and district levels of the health structure. Lack of such epidemiological data at national level indicates an inadequate arboviral disease surveillance system, making it difficult for countries to evaluate the burden of arboviral diseases. Ignorance of a danger (here, silent circulation of arboviruses) means that countries do not take preventive or control actions, and a weak disease surveillance system (here, the arboviral disease surveillance system) cannot indicate whether that danger exists or not. In another words, countries with or without arbovirus transmission must have robust disease surveillance systems, including for arboviral diseases, in order to assess the threat and trigger action, including prevention.

5.1 *Main weaknesses and possible actions*

Overall, the countries have huge gaps in their capacity for the management of cases and severe cases, virological surveillance, entomological surveillance and control of *Aedes* vectors and community sensitization and engagement on arboviral diseases. The countries had some capacity for disease surveillance in general, diagnosis and notification of arboviral disease and preparedness for disease outbreaks. Their crucial challenge is weak systems for surveillance of arboviruses in humans, vectors and animals for early detection of outbreaks. In addition, despite preparedness for disease outbreaks, cases and severe cases of arboviral diseases might not be managed adequately in all the countries because of huge gaps in clinical knowledge and infrastructure.

Three recurrent gaps were reported by most countries for all seven domains: lack of training and retraining for staff involved in surveillance and control of arboviral diseases, lack of financial and technical support and lack of community awareness on arboviral diseases. Table 10 summarizes the main gaps identified in each domain and suggests possible actions to address those gaps. Most of the proposed actions are derived from the Global Vector Control Response and WHO guidance to countries for control of arboviral diseases and diseases in general. They should be adapted locally and prioritized according to each country's situation. Countries in each subregion are listed according to the scores obtained in each domain. Thus, the absence of other country names in each main category does not necessarily imply that they do not also have such gaps.

Table 10. Identified gaps and suggestions for moving forward in the countries identified

Recurrent gaps: training, lack of financial and technical support, limited awareness of arboviral diseases

Recurrent suggested actions:

- clear training plan emphasizing staffing needs, type of training, frequency and budget
- consider online Global Vector Control Response courses and free and/or distance training
- lobbying legislators and domestic and external funders
- conducting awareness campaigns on arboviral diseases

Main gaps identified	Specific gaps	Suggested ways for moving forward	Countries		
			West Africa	Central Africa	East–Southern Africa
Limited virological surveillance in humans and inadequate diagnosis and case notification	• No routine surveillance	• Integrate arbovirus surveillance into the national work package with diseases, such as malaria, with a dedicated projected budget.	Gambia, Guinea Bissau, Nigeria	Burundi, Central African Republic, Congo, Equatorial-Guinea, Sao Tome and Principe	Botswana, Comoros, Eritrea, Eswatini, Lesotho, Malawi, Mozambique, Namibia, Seychelles, Uganda, Zambia, Zimbabwe
	• Limited confirmation of suspected and positive cases and difficulty in shipping samples abroad for quality control	• Increase laboratory technical, logistical and human resources, and prioritize regional collaboration for quality control testing in the absence of a reliable domestic laboratory.	Benin, Burkina Faso, Côte d'Ivoire, Ghana, Guinea, Liberia, Mali, Mauritania, Niger, Senegal, Togo	Cameroon, Chad, Gabon	Ethiopia, Madagascar, Rwanda, South Africa, South Sudan, United Republic of Tanzania
	• Limited case reporting	• Comply with the guidelines for integrated disease surveillance and response (34), including for arboviral diseases, and make reporting of all major arboviral diseases mandatory.			
	• Insufficient well-qualified human resources	• Recruit new qualified staff and/or develop a training plan for training and retraining available staff.			

Main gaps identified	Specific gaps	Suggested ways for moving forward	Countries		
			West Africa	Central Africa	East–Southern Africa
Poor entomological surveillance and control of vectors of arboviruses	Limited programme or structure dedicated to entomological surveillance and control of vectors of arboviruses	Integrate activities related to entomological surveillance and control of vectors of arboviruses into the same national work package with malaria and other vector-borne diseases. A department of neglected tropical diseases should be created in countries without one.	Burkina Faso, Equatorial Guinea, Gambia, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Togo	Cameroon, Central African Republic, Congo, Gabon	Botswana, Eswatini, Lesotho, Madagascar, Malawi, Namibia, Rwanda, Uganda, Zambia,
	Lack of national guidelines on *Aedes* vector surveillance and control	Conduct a national needs assessment for vector control with a tool such as that developed by WHO and TDR *(58)*, and use the report to generate a national vector control strategic plan in line with the Global Vector Control Response *(44)*. Refer to WHO guidance documents *(59, 60)*.			
	Lack of expertise in entomology and control of *Aedes* vectors	Fellowships for non-academic entomologists and ensure a clear career pathway for entomologists to arouse their interest	Ghana, Senegal, Sierra Leone	Burundi, Chad, Sao Tome and Principe	Mozambique, Seychelles, South Africa, United Republic of Tanzania, Zimbabwe
	Limited collaboration among public health and research institutes and the ministry of health for surveillance and control of vectors of arboviruses	Implement and promote a multisectoral approach with the conceptual framework developed by WHO and TDR *(61)*.			
Inadequate management of cases and severe cases of *Aedes*-borne arboviral diseases	Limited guidelines on clinical management of cases of *Aedes*-borne arboviral diseases	Refer to the integrated management strategy for arboviral disease prevention and control developed and reviewed by WHO in 2020 *(62)* and other guidance by WHO and TDR *(63)*.	Benin, Burkina Faso, Gambia, Guinea-Bissau, Liberia, Niger, Nigeria, Sierra Leone, Togo	Burundi, Cameroon, Central African Republic, Chad, Equatorial Guinea, Gabon, Sao Tome and Principe	Botswana, Comoros, Eswatini, Ethiopia, Kenya, Lesotho, Madagascar, Malawi, Mozambique, Namibia, Seychelles, South Africa, Uganda, United Republic of Tanzania, Zambia, Zimbabwe
	Lack of health-care infrastructure and essential medicines at lower levels	Lobby legislators and domestic and external funders to cover the gap in resources.			
	High turnover of health-care workers	Recruit and train new health staff in integrated management of arboviral disease prevention and control.	Côte d'Ivoire, Ghana, Guinea, Mali, Mauritania	Angola, Democratic Republic of the Congo	Eritrea, Rwanda

Main gaps identified	Specific gaps	Suggested ways for moving forward	Countries		
			West Africa	Central Africa	East–Southern Africa
Lack of community sensitization and engagement on arboviral diseases	• Absence of outreach programme on arboviral diseases	• Establish outreach programmes on or including arboviral diseases, at least at district level.	Burkina Faso, Ghana, Guinea-Bissau, Liberia, Mauritania, Niger, Nigeria, Senegal, Togo	Burundi, Cameroon, Central African Republic, Congo, Equatorial Guinea, Sao Tome and Principe	Botswana, Comoros, Eswatini, Ethiopia, Kenya, Malawi, Mozambique, Namibia, Rwanda, South Sudan, United Republic of Tanzania, Zambia
	• Absence of national educational and reference materials for community sensitization and education	• Refer to WHO guidance on community engagement and other documents (64–66).			
	• Limited number of community health workers	• Recruit new, qualified community health workers and/or train existing staff.	Benin, Côte d'Ivoire, Gambia, Mali	Angola, Chad, Gabon, Madagascar	Eritrea, Mauritius, Seychelles, South Africa, Zimbabwe
Inadequate epidemiological surveillance of arboviral diseases	• Lack of a specific national programme on or including surveillance of arboviral diseases	• Create a department of neglected tropical diseases that includes arboviral diseases, or integrate surveillance of arboviral diseases into the national work package on malaria and other vector-borne diseases.	Guinea-Bissau, Nigeria	Burundi, Central African Republic	Botswana, Eritrea, Eswatini, Ethiopia, Kenya, Lesotho, Madagascar, Malawi, Mozambique, Namibia, Rwanda, Seychelles, Uganda, Zambia, Zimbabwe
	• Inadequate epidemiological surveillance of arboviral diseases in animals	• Establish a decision framework for epidemiological surveillance of arboviral diseases, including in animals.	Benin, Burkina Faso, Gambia, Ghana, Liberia, Mauritania, Sierra Leone, Togo	Angola, Cameroon, Chad, Congo, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Sao Tome and Principe	Eritrea, Ethiopia, Madagascar, Rwanda, Seychelles, Zambia
	• No collection or analysis of outbreak risk factors	• Integrate collection and analysis of risk factors for arboviral disease outbreaks into the activities of the department of neglected tropical diseases.			
	• Limited collaboration between public health bodies and ministry of health in the surveillance of arboviral diseases	• Implement and promote a multisectoral approach with the conceptual framework developed by WHO and TDR (61).			

Main gaps identified	Specific gaps	Suggested ways for moving forward	Countries		
			West Africa	Central Africa	East–Southern Africa
Inadequate preparedness for arboviral disease outbreaks and epidemics	• No contingency plan	• All countries should have a contingency plan (67).	Gambia, Guinea-Bissau, Niger, Nigeria, Togo	Cameroon, Central African Republic	Malawi, Botswana, Eswatini, Mozambique, Namibia, Kenya, Lesotho
	• No preparedness for events related to arboviral disease outbreaks	• Develop a business case for arboviral diseases outbreaks, and use it to involve the private sector in activities and financing for outbreak preparedness.	Benin, Guinea	Burundi, Equatorial Guinea, Gabon, Sao Tome and Principe	Eritrea, South Africa, Uganda, Zambia, Zimbabwe
	• Limited collaboration among national and regional instances	• Implement and promote a multisectoral approach with the conceptual framework developed by WHO and TDR (61).			
	• Difficulty in community sensitization and participation in activities	• Refer to WHO guidance on community engagement and others documents (64–66).			

5.2 *Limitations*

This survey has some strengths but also certain limitations. The questionnaire was self-administered, and the country focal persons collected information from national experts. Only one of the 47 countries sought clarification of the questionnaire, indicating that the questions were clear. Nevertheless, some participants might have misunderstood some questions, which might have affected their responses.

Self-administered questionnaires are prone to bias and cannot replace onsite review and assessment of country capacity. The scoring system developed for each domain was not tested for internal consistency; therefore, the scores of countries should be considered only indicative of their capacity for specific activities.

The list of answer options for most of the questions facilitated comprehension and guided participants in choosing the appropriate one(s). However, the "Yes" or "No" option did not incite participants to provide clarifications or justifications even when they were required, and the details behind the binary answers were not available. The "don't know" option, which was scored "0", did not reflect the actual situation of the indicator in the country, which could have been positive or negative. The "don't know" answers could have affected the scores in a specific domain as well as a country's total score.

The study was conducted during the first semester of 2021, a difficult period for all public health systems and health professionals due to the COVID-19 pandemic. This might have affected the results, as many national resource professionals were deployed to COVID-19-related concerns. This might also explain some of the "don't know" answers.

Conclusions

This situation analysis of country capacity for epidemiological and entomological surveillance and control of arboviral diseases indicates the existing strengths in the WHO African Region that could be used to build capacity in the relevant domains and also unveils weaknesses to be overcome. The Region could use its capacity for malaria control to reorient or support work on arboviral diseases. These diseases should receive more attention at country level in order to benefit from institutional resources, such as research centres, universities and university hospitals involved in entomological and epidemiological studies and malaria vector control. Other sources of support are nongovernmental organizations engaged in various activities at community level, regional and pan-Africa bodies such as the Western Africa Health Organization, the Economic Community of West African States, the West African Economic and Monetary Union, the Pan-African Mosquito Control Association and SEGA, and also technical and financial support from United Nations agencies such as WHO, TDR, the United Nations Development Programme and the United Nations Children's Fund and international institutions (e.g. US Centers for Disease Control and Prevention, United States Agency for International Development, World Bank).

Besides leveraging existing capacity, most countries must address three recurrent gaps: training and advocacy of all types of staff involved in arboviral diseases surveillance and control activities; inadequate finance and sustainable technical support and resources means; and community awareness of arboviral diseases. Other gaps must be addressed in each domain to ensure that countries' capacity is adequate to detect promptly the cases and their confirmation in the face of the growing threat of arboviral diseases. Another critical point is the coordination, monitoring and evaluation of activities, from the community to the highest level of the public health system. Leadership, responsibility and accountability should be established at all levels.

This survey in the WHO African Region shows what is missing and where it is missing, and it can be used to guide regional and national plans to address the gaps to make countries better prepared to overcome arboviral disease threats. The report might be considered a cornerstone for regional arboviral disease prevention and control. The next step should be to use the report to raise regional awareness about arboviral diseases, raise adequate funds according to need, help countries to build their capacity by training, provide short-term technical support and expertise and set up regional networks for sharing experience in the control of arboviral diseases. National and international research institutions might work with countries by addressing issues of surveillance and other concerns mentioned in the report. This report also helps to improve surveillance and control during the post-pandemic period utilising the lessons learnt during this time and enhancing the capacity to a sustainable level.

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Annex 1.
Questionnaire

This assessment of the current situation of countries related to the surveillance of arboviral diseases and the control of *Aedes* vectors in the WHO African Region is being performed in order to:

- identify strengths and weaknesses
- propose possible means for strengthening national and regional capacity
- serve to raise regional awareness of arboviral diseases and to encourage support

A. *Disease surveillance system*   (**Total score = 10**)

Code	No.	Item	Answers (provide references as appropriate)	Score	Rationale
DS01	1	Do you have any written arbovirus surveillance and control plan(s)/guideline(s) for your country?	☐ Yes, specifically for these diseases ☐ Yes, we use general surveillance guidelines that include arboviral diseases. If so, please specify guidelines:	1	It is considered that a country which has a written arbovirus surveillance and control plan(s)/guideline(s) that is(are) specifically for arboviral diseases or included in a general guideline will score 1 for this question.
			☐ No (if no, jump to question 2) ☐ Don't know	0	The other options will score 0.
	1b	For which of the following arboviruses do you have written surveillance and control plans for your country? Please choose all that apply:	☐ Chikungunya virus ☐ Dengue virus ☐ Yellow fever virus ☐ Zika virus ☐ Other, please specify:	NA	This will be described in the report but will not be scored.
	1c	If you answer "Yes" to question 1, please upload surveillance and control plan(s) or protocol(s), or guideline(s)	Kindly attach the aforementioned documents along with the survey	NA	This will be described in the report but will not be scored.
DS02	2	Is there a specific National Programme for arboviral diseases surveillance or is it integrated in another programme? Please select the appropriate answer:	☐ Specific programme ☐ Integrated in another programme If so, please specify:	1	It is considered that a country which has a specific National Programme for arboviral diseases surveillance or integrated in another programme will score 1.
			☐ No programme	0	The other options will score 0.
DS03	3	Is reporting arboviral disease cases mandatory in your country?	☐ Yes, for all major arboviral diseases	1	It is considered that a country for which it is mandatory to report the major arboviral disease cases (Dengue, YF, Chikungunya, Zika, RVF, WNV, O'Nyong-Nyong etc.) will score 1.
			☐ Yes, but only for some arboviral diseases If so, specify:	0.5	
			☐ No ☐ Don't know	0	If it is only for certain arboviral diseases, it will score 0.5 The other options will score 0.

Code	No.	Item	Answers (provide references as appropriate)	Score	Rationale
DS04	4	In the last 2 years, did your country conduct national epidemiological surveillance for arboviral disease in humans? Please choose one of the following:	☐ Yes	1	For this question 4 (i.e. 4, 4b, 4c and 4d) it is considered that if a country conducted a national epidemiological surveillance within the last 2 years, the country will score 1. The rest will be described in the report but not be scored.
			☐ No (If no, jump to next question) ☐ Don't know	0	
	4b	How often was the surveillance conducted? Please choose one of the following:	☐ Once a year ☐ Every trimester ☐ Every semester ☐ Others Please specify	NA	
	4c	If yes to question 4, what type of national epidemiological surveillance was conducted? Please choose one the following:	☐ Primarily active ☐ Primarily passive ☐ Combination of active and passive	NA	
	4d	If yes to question 4, please kindly upload the report on the surveillance	Please kindly upload the report on the surveillance	NA	
DS05	5	What are the tools used for recording cases data for surveillance purposes? Please select all that apply.	☐ Paper based, all levels of the health care system	1	It is considered that a surveillance system that is fully electronic or mixed method (paper & electronic) will score 1. A system that is paper-based will score 0.5. Other system will be scored: 0 if there is no tool for recording data on cases or if there is no recording of data on cases 0.5 if the tool used is paper-based, 1 if the tool used is electronic
			☐ Paper based, but only in specific levels of the health care system If so, specify which level: ☐ Electronic system, all levels ☐ Electronic system, but only in specific levels of the health care system If so, specify which level: ☐ Mixed method, all levels ☐ Mixed method, but only in specific levels of the health care system If so, specify which level:	1	
			☐ Other (Please specify)	0/1/ 0.5	
DS06	6	During the last 2 years, did your country conduct national epidemiological surveillance for arboviral disease **in animals (zoonotic reservoirs)**?	☐ Yes	1	It is considered that a country that conducted within the last 2 years a national epidemiological surveillance for arboviral disease in animals will score 1.
			☐ No ☐ Don't know	0	
	6b	If yes to question 6, how often was the surveillance conducted? Please choose one of the following:	☐ Once a year ☐ Every trimester ☐ Every semester ☐ Other (Please specify)	NA	This will be described in the report but will not be scored.
	6c	If yes to question 6, what type of national epidemiological surveillance was conducted **in animals (zoonotic reservoirs)**?	☐ Primarily active ☐ Primarily passive ☐ Combination of active and passive	NA	This will be described in the report but will not be scored.
	6d	If yes to question 6, please kindly upload a report on the surveillance	Please kindly upload a report on the surveillance	NA	This will be described in the report but will not be scored.

Code	No.	Item	Answers (provide references as appropriate)	Score	Rationale
DS07	7	Does your country (or local jurisdictions within the country) utilize sentinel animal surveillance or epizootic surveillance, e.g., in non-human primates, for yellow fever or for other arboviruses? Please choose only one of the following:	☐ Yes	1	A country (or local jurisdictions within the country) that utilizes sentinel animal surveillance or epizootic surveillance, e.g., non-human primates, for yellow fever or for other arboviruses will score 1. The other options will score 0.
			☐ No (Jump if No) ☐ Don't know	0	
	7b	If Yes to question 7, for which viruses? Please choose what apply:	☐ Rift Valley Fever ☐ Yellow Fever ☐ Oropouche ☐ Others (enter viruses in comment field)	NA	This will be described in the report but will not be scored.
	7c	If Yes to question 7, please kindly upload a report on the surveillance	Please kindly upload a report on the surveillance	NA	This will be described in the report but will not be scored.
DS08	8	Are arboviral outbreak risk factors routinely collected and analysed?	☐ Yes	1	A country that collected and analyzed arboviral disease outbreak risk factors routinely will score 1. The other options will score 0.
			☐ No ☐ Don't know	0	
	8b	If yes to question 8, which of the following risk factors are collected and analyzed?	☐ House Index ☐ Breteau Index ☐ Container Index ☐ Temperatures ☐ Rainfall ☐ Migration of a non-immune population ☐ Other: Please specify	NA	This will be described in the report but will not be scored.
DS09	9	For which level of the health structure are individual and aggregated data available? (select all relevant levels)	☐ Primary Health care level, ☐ Individual data ☐ Aggregated data ☐ District level ☐ Individual data ☐ Aggregated data ☐ Regional level ☐ Individual data ☐ Aggregated data ☐ National level ☐ Individual data ☐ Aggregated data	1	A country in which individual and aggregated data are available at all levels will score 1. A country in which only individual data are available at primary health care level, and aggregated data at all the other levels will score 1. A country in which individual and aggregated data are not available at any levels will score 0. A country in which individual and/or aggregated data are at least available at national level will score 0.5.
DS10	10	Which training has been provided to the Staff working on disease surveillance data?	☐ Basic training on Excel and Geographic Information System, only once ☐ Basic training on Excel and Geographic Information System, routinely (e.g. once a year)	0.5	A country that provided **advanced statistical software for data analysis (e.g. STATA, R, SAS, etc.) and geographic information system routinely or only once** to the staff working on the disease surveillance data will score 1. A country that provided **basic training on Excel and geographic information system routinely or only once** to the staff working on the disease surveillance data will score 0.5. The other options will score 0, 0.5 or 1 depending on the types and frequencies of the trainings.
			☐ Training on advanced statistical software for data analysis (e.g. STATA, R, SAS, etc.) and Geographic Information System, only once ☐ Training on advanced statistical software for data analysis (e.g. STATA, R, SAS, etc.) and Geographic Information System, routinely (e.g. once a year)	1	
			☐ Other types of training and frequency. If so, please specify:	0.5/1	
			☐ No training ☐ Don't know	0	
DS11	11	What is your personal perception of factors of a) success and b) barriers/challenges regarding arboviral diseases surveillance?	Please enter your answer here:	NA	This will be described in the report but will not be scored.

B. *Diagnosis and case notification* (Total score = 5)

Code	No.	Item	Answers (provide references as appropriate)	Score	Rationale
DCN01	12	Select the type of cases reported by the system?	☐ Suspected cases ☐ Confirmed cases	0.5	A country in which **both suspected and confirmed cases** are reported by the system will score 1
			☐ Both suspected and confirmed cases	1	A country in which **only suspected cases** are reported by the system will score 0.5
			☐ No report	0	A country in which **only confirmed cases** are reported by the system will score 0.5 The other options will score 0
	12b	If you answer reporting cases, please upload the reference used for these case definitions	Please kindly upload a reference	NA	This will be described in the report but will not be scored.
	12c	More precisely, select the type of cases reported for different arboviral diseases	☐ Chikungunya, suspected cases ☐ Chikungunya, confirmed cases ☐ Chikungunya, both cases ☐ Dengue, suspected cases ☐ Dengue, confirmed cases ☐ Dengue, both cases ☐ Yellow fever, suspected cases ☐ Yellow fever, confirmed cases ☐ Yellow fever, both cases ☐ Zika, suspected cases ☐ Zika, confirmed cases ☐ Zika, both cases ☐ Other If so, please specify the arboviral disease and type of reporting	NA	This will be described in the report but will not be scored.
DCN02	13	Is lab confirmation of suspected cases done?	☐ Yes	1	A country that performed a lab confirmation of suspected cases will score 1.
			☐ No ☐ Don't know	0	The other options will score 0
	13b	If yes to question 13, do you conduct it routinely or during outbreak?	☐ Yes, routinely ☐ Yes, during outbreak ☐ Both	NA	This will be described in the report but will not be scored.
	13c	Since you answered yes to question 13b, what is the average percentage of suspected cases your country gets lab-confirmed?	Please enter your answer here: ☐ Routinely: _____% in a year ☐ During outbreaks: _____% per identified cluster	NA	These will be described in the report but will not be scored.
DCN03	14	In the last two years, were the positive cases of arboviruses confirmed by a national reference laboratory?	☐ Yes, for all arboviral infections. Please specify them	1	A country in which the positive cases of major (Dengue, YF, Chikungunya, Zika, RVF, WNV, O'Nyong-Nyong etc.) arbovirus infections were confirmed by a national reference laboratory in the last 2 years will score 1.
			☐ Yes, but only for some arboviral infections. Please specify them	0.5	A country in which the positive cases of some arbovirus infections were confirmed by a national reference laboratory in the last 2 years will score 1.
			☐ No	0	Other options will score 0.
	14b	In the event, your country does not have capacities to type and serotype arboviruses, do you send samples for typing to other countries?	☐ Yes Please specify where: ☐ No	NA	These will be described in the report but will not be scored.

Code	No.	Item	Answers (provide references as appropriate)	Score	Rationale
DCN04	15	Overall, what testing capacity(ies) is(are) available in your country? Please tick the right box(es).	(see table below)	1	A country with capacities to conduct RT-PCR, other nucleic acid amplification tests, viral gene/genome sequencing, antibody/antigen testing, virus isolation will score 1. A country with capacities to conduct only RDTs will score 0.5 A country with no testing capacity will score 0.

Virus	Antigen testing	IgM antibody testing	IgG antibody testing	Neutralizing antibody testing	Virus isolation	RT-PCR or other nucleic acid amplification test	Viral gene/ Genome Sequencing
Chikungunya	☐	☐	☐	☐	☐	☐	☐
Dengue	☐	☐	☐	☐	☐	☐	☐
Zika	☐	☐	☐	☐	☐	☐	☐
Yellow fever	☐	☐	☐	☐	☐	☐	☐
Other:	☐	☐	☐	☐	☐	☐	☐
Specify:							

Code	No.	Item	Answers (provide references as appropriate)	Score	Rationale
	16	Which additional capacities would be most needed for your country to perform adequately the testing for arboviral diseases?	☐ Additional staff FTE (estimate number of FTE). Please specify: ☐ Additional staff training Please specify: ☐ Additional lab equipment, reagents, etc Please specify: ☐ Other capacity needs. Please specify	NA	This will be described in the report but will not be scored.
DCN05	17	Does your country provide **regular training sessions** for healthcare workers on notification of *Aedes*-borne arboviral diseases?	☐ Yes. If so, please specify: ☐ No ☐ Don't know	1 0	A country that provided regular training sessions for healthcare workers on notification of *Aedes*-borne arboviral diseases will score 1 if the training is specified and 0.5 if not specified. Other options will score 0.
	18	Personal perception of factors of a) success and b) barriers/challenges with respect to case notification	Please enter your answer here:	NA	This will be described in the report but will not be scored.

C. *Management of cases and severe cases* (Total score = 3)

Code	No.	Item	Answer (provide references as appropriate)	Score	Rationale
MCSC01	19	Does your country have clinical guidelines for healthcare workers on diagnosis and clinical management of cases and severe cases of *Aedes*-borne arboviral diseases?	☐ Yes ☐ No ☐ Don't know	1 0	A country that has clinical guidelines for healthcare workers on diagnosis and clinical management of cases and severe cases of *Aedes*-borne arboviral diseases will score 1. The other options will score 0.
	19b	If yes to question 19, please kindly upload the clinical guidelines for arboviral disease management, or provide electronic link(s).	Please, kindly upload the guidelines Please provide with the electronic link(s) here:	NA	This will be described in the report but will not be scored.
MCSC02	20	Are severe cases of arboviral diseases managed into a special area (part of an hospital, beds)?	☐ Yes ☐ No If so, where are severe patients sent to? ☐ Don't know	1 0	A country in which severe cases of arboviral diseases are managed into a special area (part of an hospital, beds) will score 1. The other options will score 0.
	21	How many beds are available per 100,000 population for in the event of a large disease outbreak?	Please enter your answer here:	NA	This will be described in the report but will not be scored.

Code	No.	Item	Answer (provide references as appropriate)	Score	Rationale
MCSC03	22	Does your country provide **regular training sessions** for healthcare workers on clinical diagnosis AND management of *Aedes*-borne arboviral diseases?	☐ Yes, specific training is provided If so, please specify	1	A country that provided regular training sessions for healthcare workers on clinical diagnosis AND management of *Aedes*-borne arboviral diseases will score 1 if the training is specified and 0.5 if not specified. Other options will score 0.
			☐ No		
			☐ Don't know	0	
	23	Personal perception of factors of a) success and b) barriers/challenges with respect to case management	Please enter your answer here:	NA	This will be described in the report but will not be scored.

D. *Virological surveillance*

(Total score = 2)

Code	No.	Item	Answer (provide references as appropriate)	Score	Rationale
	24	Which arboviruses are known to circulate in your country?	☐ Chikungunya virus ☐ Dengue viruses ☐ Yellow fever virus ☐ Zika virus ☐ Other (please specify)	NA	This will be described in the report but will not be scored.

VS01	25	Do you perform virological surveillance on humans?
		Please select all that apply
			☐ Yes, via virus isolation
			☐ Yes, via RT-PCR
			☐ Yes, via other acid nucleic testing
			  If so, please specify
			☐ Serological testing
			  If so, please specify
				1	A country that performs a virological surveillance regardless the testing method will score 1.
					A country that does not perform a virological surveillance will score 0.

			☐ No	0	
	25b	If yes to question 25, what type of samples do you use for virological surveillance?	☐ Samples from **suspected arboviral diseases** routinely notified ☐ Samples routinely reported via HMIS of **unidentified fevers** from any type of health care level. ☐ Other type of samples. Please specify	NA	This will be described in the report but will not be scored.
	26	If yes to question 25, for which viruses do you perform virological surveillance? (check all that apply)	☐ Chikungunya virus ☐ Dengue viruses ☐ Yellow fever virus ☐ Zika virus ☐ Other (please specify)	NA	This will be described in the report but will not be scored.
VS02	27	Does your country provide **regular training sessions** for healthcare workers on arboviruses virological surveillance?	☐ Yes	1	A country that provided regular training sessions for healthcare workers on arboviruses virological surveillance will score 1. The other options will score 0.
			☐ No ☐ Don't know	0	
	28	Personal perception of factors of a) success and b) barriers/challenges with respect to virological surveillance	Please enter your answer here:	NA	This will be described in the report but will not be scored.

E. *Routine vector surveillance and control* (Total score = 13)

Code	No.	Item	Answer (provide references as appropriate)	Score	Rationale
RVSC01	29	Is there an agency or service in charge of arbovirus vectors surveillance in your country?	☐ Yes. If so, please specify:	1	A country that has an agency or service in charge of the surveillance of arbovirus vectors will score 1.
			☐ No ☐ Don't know	0	The other options will score 0.
RVSC02	30	Is there a record of *Aedes aegypti* or *Aedes albopictus* being found in your country in the past 5 years? Please choose only one of the following	☐ Yes, only *Aedes aegypti* ☐ Yes, only *Aedes albopictus* ☐ Yes, both *Aedes aegypti* and *Aedes albopictus* ☐ None found in the country at this time	1	A country that has a record of *Aedes aegypti* or *Aedes albopictus* found in its territory in the last 5 years will score 1. A country in which there was no *Aedes aegypti* or *Aedes albopictus* found in the last 5 years will score 1.
			☐ Unknown within the country at this time ☐ Don't know	0	The other options will score 0.
RVSC03	31	For the last 2 years, did your country conduct **entomologic surveillance** for arboviral infections in mosquito vectors?	☐ Yes	1	A country that conduct entomological surveillance for arboviral infections in mosquito vectors during the last 2 years will score 1.
			☐ No ☐ Don't know	0	The other options will score 0.
	31b	If yes to question 31, kindly upload the report	Kindly upload the report	NA	This will be described in the report but will not be scored.
	31c	If yes to question 31, is it **country wide** programmes or restricted to specific locations?	☐ Country wide ☐ Restricted to specific locations Please specify where: ☐ Don't know	NA	This will be described in the report but will not be scored.
	31d	How many sentinel surveillance sites do you have?	Please enter your answer here:	NA	This will be described in the report but will not be scored.
	31e	How often was the surveillance conducted? Please choose one of the following:	☐ Once a year ☐ Every trimester ☐ Every semester ☐ Others (Please specify)	NA	This will be described in the report but will not be scored.
RVSC04	32	**Which institution/department** is in charge of reporting entomologic surveillance data to the national ministry of health/health department? (Check all that apply)	☐ State/provincial health agencies ☐ Other national agency ☐ City/country health departments ☐ Local mosquito control districts or similar organisations ☐ Universities or academic institutions ☐ Private companies ☐ Other Please specify	1	A country that has an institution/department in charge of reporting entomologic surveillance data to the national ministry of health/health department will score 1. A country that does not have such an institution/department will score 0.
RVSC05	33	Do you conduct **Adult** mosquito surveillance for species responsible for outbreak?	☐ Yes	1	A country that conducts adult mosquito surveillance for species responsible for outbreaks will score 1.
			☐ No ☐ Don't know	0	The other options will score 0.
RVSC06	34	Do you conduct **Larval/Pupal** mosquito surveillance for species responsible for outbreak?	☐ Yes	1	A country that conducts larval/pupal mosquito surveillance for species responsible for outbreaks will score 1.
			☐ No ☐ Don't know	0	The other options will score 0.
RVSC07	35	Are mosquitoes trapped **identified to species**?	☐ Yes	1	A country that conducts species identification on mosquitoes trapped will score 1.
			☐ No ☐ Don't know	0	The other options will score 0.

Code	No.	Item	Answer (provide references as appropriate)	Score	Rationale
RVSC08	36	Does your agency either calculate **minimum infection rates (MIR)** for at least Dengue/ Chikungunya/Zika/ Yellow Fever with your mosquito data or receive such data from other agencies? Please choose only one of the following:	☐ Yes, our agency makes the MIR estimations ☐ Yes, the MIR are estimated by another institution. If so, please specify	1	A country that calculates either minimum infection rates (MIR) for at least Dengue/ Chikungunya/Zika/Yellow fever with its mosquito data or receives such data from other agencies will score 1. The other options will score 0.
			☐ No ☐ Don't know	0	
RVSC09	37	**Which laboratories** perform testing for arboviruses on mosquito pools collected in your country in the last two years? (check all that apply)	☐ National public health laboratory		A country with a laboratory that performs testing for arboviruses on mosquito pools collected during the last two years will score 1.
			☐ State public health laboratory		
			☐ Local health department laboratory	1	
			☐ University or academic institution		A country that conducts mosquito surveillance without tests for arboviruses on mosquito pools collected during the last two years will score 0.5
			☐ Local MCD (if different from county health dep't)		
			☐ Mosquito surveillance done, but no testing done on mosquito pools	0.5	A country that does not conduct mosquito surveillance will score 0.
			☐ Not applicable (no mosquito surveillance done)	0	The option "Other" will score:
			☐ Other		**1** if there is a national institution that performed testing for arboviruses on mosquito pools collected during the last two years
				0.5/ 1	**0.5** if there is a national institution that conducted mosquito surveillance without tests for arboviruses on mosquito pools collected during the last two years
	38a	Please describe the potential **public health threat** from *Aedes aegypti* in your country. Please choose only one of the following:	☐ *Aedes aegypti* populations are abundant and arbovirus(es) is (are) circulating ☐ *Aedes aegypti* populations are spreading and pose a significant public health threat ☐ *Aedes aegypti* populations are restricted to few sites and do not yet pose a significant threat ☐ *Aedes aegypti* populations are stable in select areas and pose a significant threat ☐ *Aedes aegypti* mosquitoes are only occasionally found and do not pose a significant public health threat ☐ Other 　Please specify	NA	This will be described in the report but will not be scored.
	38b	Please describe the potential **public health threat** from *Aedes albopictus* in your country. Please choose only one of the following:	☐ *Aedes albopictus* populations are abundant and arbovirus(es) is (are) circulating ☐ *Aedes albopictus* populations are spreading and pose a significant public health threat ☐ *Aedes albopictus* populations are restricted to few sites and do not yet pose a significant threat ☐ *Aedes albopictus* populations are stable in select areas and pose a significant threat ☐ *Aedes albopictus* mosquitoes are only occasionally found and do not pose a significant public health threat ☐ Other 　Please specify	NA	This will be described in the report but will not be scored.

Code	No.	Item	Answer (provide references as appropriate)	Score	Rationale
RVSC10	39	For the last two years, did your country conduct **adulticiding and/or larviciding activities** in local jurisdictions (either using government staff and resources, or subcontracting to a different entity to do so)? Please choose only one of the following:	☐ Yes, adulticiding only ☐ Yes, adulticiding and larviciding ☐ Yes, larviciding only ☐ No, neither adulticiding nor larviciding ☐ Other Please specify	1	An endemic country for vector borne diseases (VBDs) that conducted at least adulticiding and/or larviciding during the last 2 years will score 1. An endemic country for VBDs that did not conduct at least adulticiding or larviciding during the last 2 years will score 0. The other options will score 1 if they relate to peri-focal treatments, larval source management, space spraying, house improvements. All personal protection measures (topical repellents, insecticide-treated clothes, spatial/ airborne repellents will not be scored as their public health values are not proved This scoring is not applicable for non-endemic countries for VBDs.
	39b	If no to question 39, would your country have conducted or financially supported adulticiding/larviciding or source reduction activities in the last two years **if sufficient funding were available?**	☐ Yes ☐ No ☐ Don't know	NA	This will be described in the report but will not be scored.
	39c	If yes to question 39, **which adulticides and/or larvicides** (brand and product name) were used?	Please enter your answer here:	NA	This will be described in the report but will not be scored.
RVSC11	40	Does your country provide **regular training sessions** for staff in charge of vector control and vector surveillance?	☐ Yes, for both	1	A country that provided regular training sessions for staff in charge of vector control and vector surveillance will score 1; 0.5 if only for vector surveillance; 0.5 if only for vector control. The other options will score 0.
			☐ Yes, only for vector surveillance ☐ Yes, only for vector control	0.5	
			☐ No ☐ Don't know	0	
RVSC12	41	For the last two years, did your country have a plan for mosquito-borne disease control that includes **a threshold** (e.g. level of vector mosquito abundance or minimum infection rate) that would result in a recommendation for mosquito adulticiding/other mosquito reduction measures?	☐ Yes	1	A country that has a plan for mosquito-borne disease control that includes a threshold (e.g. level of vector mosquito abundance or minimum infection rate) that would result in a recommendation for mosquito adulticiding/other mosquito reduction measures will score 1. A country that has a plan without any specific threshold will score 0.5. The other option will score 0.
			☐ No – have a plan but there is no specific threshold	0.5	
			☐ No – do not have a formal plan that includes adulticiding to control mosquito-borne diseases	0	
	41b	If you answer yes to question 41, which indicator(s) is(are) used as threshold(s)?	☐ Concurrent human cases ☐ Minimum infection rate ☐ Vector density ☐ Breteau Index ☐ House Index ☐ Container Index ☐ Other: Please specify	NA	This will be described in the report but will not be scored.
RVSC13	42	Is there a surveillance system in place for monitoring *Aedes* resistance to the insecticide(s) used?	☐ Yes	1	A country that has a surveillance system in place for monitoring *Aedes* resistance to the insecticide(s) will score 1. The other options will score 0.
			☐ No ☐ Don't know	0	
	43	Personal perception on factors of a) success and b) barriers/challenges with respect to vector surveillance and control in the country	Please enter your answer here:	NA	This will be described in the report but will not be scored.

F. *Community sensitization and participation during non-epidemic periods*

(Total score = 5)

Code	No.	Item	Answer (provide references as appropriate)	Score	Rationale
CSPEP01	44	What entity(ies) is(are) in charge of **the outreach program** in your country?	Please specify	1	A country with an outreach program will score 1. If not, it will score 0.
CSPEP02	45	Did your national arboviral disease program **issue notifications to the public** about local transmission risk and/or possible vector-control activities (e.g. larviciding, adulticiding, community mobilization and participation, etc.) as a prevention message for arboviral diseases in last 2 years? (Check all that apply)	☐ Yes, through national public health agency ☐ Yes, through state/local health agencies	1	A country in which there is a notification to the public about local transmission risk and/or possible vector-control activities (e.g. larviciding, adulticiding, community mobilization and participation, etc.) as a prevention message for arboviral diseases in last 2 years will score 1.
			☐ No	0	
			☐ No because no risk of transmission in last 2 years in our country	0.5	Those without notifications due to the absence of risk of transmission in the last 2 years will score 0.5. Those without notifications will score 0.
	46	If yes to question 45, **which means** does your program use for community sensitization, mobilisation and acceptance of interventions in your country? (Check all that apply)	☐ Press releases to electronic and printed media ☐ Public service announcements on television or radio ☐ Passive distribution of informational brochures ☐ Active distribution of informational brochures ☐ Town, community, or neighborhood meetings ☐ Posting information on the home page of your agency's website ☐ Social media outlets (Facebook, Twitter, etc) ☐ Door-to-door outreach in selected locations ☐ Participation in community clean-ups ☐ Translation of messages into all local languages ☐ Other 　Please specify	NA	This will be described in the report but will not be scored.
CSPEP03	47	Does your country provide **regular training sessions** for staff in charge of community sensitization, mobilisation and acceptance of interventions dedicated to control arbovirus diseases?	☐ Yes 　If yes, please specify:	1	A country that provided regular training sessions for staff in charge of community sensitization, mobilisation and acceptance of interventions dedicated to control arbovirus diseases will score 1 if the training is specified; 0.5 if not specified. Other options will score 0.
			☐ No ☐ Don't know	0	
CSPEP04	48	What is the **geographical coverage** of the outreach program in your country?	☐ Countrywide ☐ Only selected areas. 　Please specify where:	1	A country in which the outreach program is countrywide or in selected areas will score 1. 0 if no outreach program.
			☐ No outreach programme	0	
CSPEP05	49	Is the community outreach/social mobilization program sufficiently **funded to cover staff** time, prevention and outreach activities as needed?	☐ Yes	1	A country in which the community outreach/social mobilization program is sufficiently **funded to cover staff** time, prevention and outreach activities as needed will score 1. The other options will score 0.
			☐ No ☐ Don't know	0	
	50	Which resources would help ensure adequate capacity?	☐ Educational materials for the public ☐ Educational and reference materials for providers ☐ Educational and reference materials for local health departments ☐ Additional staff ☐ Staff training ☐ Additional resources (Please specify:)	NA	This will be described in the report but will not be scored.
	51	Personal perception on factors of a) success and b) barriers/challenges with respect to community participation	Please enter your answer here:	NA	This will be described in the report but will not be scored.

G. *Preparedness for arboviral disease outbreaks and epidemics* (Total score = 7)

Code	No.	Item	Answer (provide references as appropriate)	Score	Rationale
PA001	52	Is there a **surveillance and Outbreak response Committee** in your country? Or Steering committee	☐ Yes	1	A country with a surveillance and outbreak response Committee will score 1.
			☐ No ☐ Don't know	0	The other options will score 0.
PA002	53	Does your country have a **contingency plan** to organize healthcare services during an outbreak (including outbreaks of *arboviral diseases*)?	☐ Yes	1	A country with a contingency plan to organize healthcare services during an outbreak will score 1.
			☐ No ☐ Don't know	0	The other options will score 0.
	53b	If yes to question 53, please upload the contingency plan.	Please upload the contingency plan	NA	This will be described in the report but will not be scored.
PA003	54	Are there **defined or established criteria for declaring outbreak** for Dengue, Zika, Chikungunya or any other arboviral disease outbreak in your country?	☐ Yes. If so, please provide them one by one:	1	A country that has defined or established criteria for declaring outbreak for Dengue, Zika, Chikungunya or any other arboviral disease outbreak will score 1.
			☐ No ☐ Don't know	0	The other options will score 0.
PA004	55	Do you have already established **collaborations with national/regional research institutions**/international agencies that are planned to be activated in case of arboviral outbreak?	☐ Yes. If so, please specify institution(s)/agency(ies):	1	A country that has established collaborations with national/regional research institutions/international agencies to be activated in case of arboviral disease outbreak will score 1 if it is specified; 0.5 if not specified.
			☐ No ☐ Don't know	0	The other options will score 0.
PA005	56	What **vector control interventions** are deployed in case of an emergency?	Please enter your answer here	1	A country that deploys specified vector control interventions in case of emergency will score 1. A country that does not deploy specified vector control interventions in case of emergency will score 0.
PA006	57	For the last 2 years, did your country have an **emergency fund** or a specified emergency funding mechanism for arbovirus outbreak response?	☐ Yes	1	A country with an emergency fund or a specified emergency funding mechanism for arboviral disease outbreak response during the last 2 years will score 1 regardless the origin of that funding.
			☐ No	0	A country without such a funding during the last 2 years will score 0.
			☐ Local funding	1	
PA007	58	Does your country provide **regular training sessions** for staff/committee in charge of preparedness for arboviral outbreaks/epidemics?	☐ Yes	1	A country that provided regular training sessions for staff/committee in charge of preparedness for arboviral disease outbreaks/epidemics will score 1.
			☐ No ☐ Don't know	0	Other options will score 0.
	59	Personal perception on factors of a) success and b) barriers/challenges with respect to preparedness of arboviral diseases epidemics in your country	Please enter your answer here:	NA	This will be described in the report but will not be scored.

H. *Available data on dengue, chikungunya and Zika from 2015 onwards or any year as available at the national health information system.*

60. Please provide total number of confirmed cases and deaths for the following arboviral diseases from 2015 to 2019 (if available). **Not scored**

Disease	2015		2016		2017		2018		2019	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Dengue										
Chikungunya										
Zika										
Rift Valley fever										
Yellow fever										
West Nile virus										
Other arboviral diseases. Please specify										

61. Please provide case numbers of mosquito-transmitted locally acquired *Aedes*-borne arbovirus infections for 2019. **Not scored**

Virus	Suspect cases	Probable cases	Confirmed cases	Deaths
Chikungunya				
Dengue				
Yellow fever				
Zika				
Other:				

I. *Surveillance staffing* (not scored)

Definitions of terms:

Surveillance staff: include those who are involved in human disease surveillance, mosquito (entomological) surveillance, and animal surveillance, e.g., monitoring of non-human primates for yellow fever.

Full time equivalent (FTE): Equivalent of the work that would be done at full-time capacity by a single individual. For example, a staff member employed in full time work position but only devoting 50% of their time to arbovirus surveillance would be a 0.5 FTE.

62. During 2019 (prior to the COVID-19 pandemic), indicate below the number of arbovirus surveillance staff at the national level. Surveillance staff include those who are responsible for human disease surveillance, mosquito (entomological) surveillance, and animal surveillance, e.g., monitoring of non-human primates for yellow fever in endemic regions. As the categories below are mutually exclusive, please place each staff person in only one column.

	Clinicians	Epidemiologists	Laboratorians	Entomologists/ vector control specialists	Support staff (administration; logistics; other)
Number of full-time equivalents (FTE)					

63. Indicate below how many total FTE staff persons are needed at the national level in your country to achieve full epidemiology and laboratory capacity* to conduct arbovirus surveillance.

*Full epidemiology and laboratory capacity are defined as:

i) ability to complete a standard case report form on every suspect arboviral disease case with laboratory criteria that meets the case definition and report it to the national health authority/ministry of health through appropriate mechanisms;

ii) regularly reporting timely surveillance data to local stakeholders;

iii) ability to test by IgM/other? for all locally transmitted and likely to be introduced Aedes-borne arboviruses on any serum specimen submitted to national or subnational lab on a suspected case of arboviral disease; and

iv) having an environmental surveillance system that includes Aedes mosquito surveillance to monitor vector activity when appropriate in all parts of the country in which there is the potential for human outbreaks of arboviral disease based on past experience.

	Clinicians	Epidemiologists	Laboratorians	Entomologists/ vector control specialists	Support staff (administration; logistics; other)
Percentage of full-time equivalents (FTE)					

64. Optional comments to explain responses to questions 62 and 63 above.

No.	Item	Answer (provide references as appropriate)
65	The national health authority/ministry of health has access to expertise in clinical management of arboviruses (Check all that apply)	☐ within the ministry of health (e.g., public health medical officers, clinicians in state hospitals) ☐ through other national agency with regulatory authority ☐ through academic institution(s) ☐ private hospitals ☐ does not have access ☐ Other:
66	The national health authority/ministry of health has access to expertise in arbovirus epidemiology (Check all that apply)	☐ within the ministry of health ☐ through other national agency with regulatory authority ☐ through academic institution(s) ☐ does not have access ☐ Other:
67	The national health authority/ministry of health has access to expertise in arbovirus laboratory diagnosis (Check all that apply)	☐ within the ministry of health (e.g. public health laboratory scientists) ☐ through other national agency with regulatory authority ☐ through academic institution(s) ☐ does not have access ☐ Others:
68	The national health authority/ministry of health has access to expertise in entomology (Check all that apply)	☐ within the ministry of health ☐ through other national agency with regulatory authority ☐ through academic institution(s) ☐ does not have access ☐ Others

69. Optional comments to explain responses to any of questions 65–68.

Annex 2.
Details of the country, subregional and regional scores for each domain

Disease surveillance

	Percentage (%)
African Region	53
West Africa	62.9
Central Africa	49
East–Southern Africa	47
Senegal	85
Niger	85
Algeria	85
Mali	80
Guinea	80
Comoros	80
South Sudan	75
South Africa	75
Mauritius	75
Côte d'Ivoire	75
United Republic of Tanzania	70
Cabo Verde	70
Madagascar	65
Democratic Republic of the Congo	65
Benin	65
Seychelles	60
Mauritania	60
Gabon	60
Equatorial Guinea	60
Burkina Faso	60
Rwanda	55
Liberia	55
Gambia	55
Eritrea	55
Angola	55
Zambia	50
Togo	50
Sierra Leone	50
Sao Tome and Principe	50
Ghana	50
Ethiopia	50
Congo	50
Chad	50
Cameroon	50
Zimbabwe	45
Nigeria	45
Namibia	40
Kenya	40
Lesotho	30
Eswatini	30
Burundi	30
Uganda	20
Guinea–Bissau	20
Central African Republic	20
Malawi	15
Mozambique	10
Botswana	0

Diagnosis and case notification

Region/Country	Percentage (%)
African Region	52.4
West Africa	64.7
Central Africa	49
East–Southern Africa	43.5
Algeria	100
South Sudan	90
Guinea	90
Niger	80
Madagascar	80
Liberia	80
Cabo Verde	80
Benin	80
Angola	80
Mauritius	70
Mauritania	70
Kenya	70
Gabon	70
Ethiopia	70
Democratic Republic of the Congo	70
Côte d'Ivoire	70
Congo	70
Chad	70
Cameroon	70
United Republic of Tanzania	60
South Africa	60
Senegal	60
Rwanda	60
Mali	60
Lesotho	60
Ghana	60
Gambia	60
Burkina Faso	60
Zambia	50
Togo	50
Sierra Leone	50
Seychelles	50
Nigeria	50
Namibia	50
Eritrea	40
Comoros	40
Burundi	30
Zimbabwe	20
Central African Republic	20
Equatorial Guinea	10
Uganda	0
Sao Tome and Principe	0
Mozambique	0
Malawi	0
Guinea–Bissau	0
Eswatini	0
Botswana	0

Percentage (%)

Management of cases and severe cases

	Percentage (%)
African Region	33.8
West Africa	43.1
Central Africa	30
East–Southern Africa	28.3
South Sudan	100
Senegal	100
Mauritius	100
Congo	100
Cabo Verde	100
Algeria	100
Rwanda	66.7
Mauritania	66.7
Mali	66.7
Guinea	66.7
Ghana	66.7
Eritrea	66.7
Democratic Republic of the Congo	66.7
Côte d'Ivoire	66.7
Angola	66.7
United Republic of Tanzania	33.3
South Africa	33.3
Seychelles	33.3
Niger	33.3
Namibia	33.3
Madagascar	33.3
Lesotho	33.3
Kenya	33.3
Gabon	33.3
Equatorial Guinea	33.3
Burkina Faso	33.3
Benin	33.3
Zimbabwe	0
Zambia	0
Uganda	0
Togo	0
Sierra Leone	0
Sao Tome and Principe	0
Nigeria	0
Mozambique	0
Malawi	0
Liberia	0
Guinea–Bissau	0
Gambia	0
Ethiopia	0
Eswatini	0
Comoros	0
Chad	0
Central African Republic	0
Cameroon	0
Burundi	0
Botswana	0

Virological surveillance

	Percentage (%)
African Region	39.9
West Africa	47.1
Central Africa	45
East–Southern Africa	27.5
Mauritius	100
Kenya	100
Democratic Republic of the Congo	100
Cabo Verde	100
Angola	100
Algeria	100
United Republic of Tanzania	50
Togo	50
South Sudan	50
South Africa	50
Sierra Leone	50
Senegal	50
Rwanda	50
Niger	50
Mauritania	50
Mali	50
Madagascar	50
Liberia	50
Guinea	50
Ghana	50
Gabon	50
Ethiopia	50
Equatorial Guinea	50
Côte d'Ivoire	50
Comoros	50
Chad	50
Central African Republic	50
Cameroon	50
Burkina Faso	50
Benin	50
Zimbabwe	0
Zambia	0
Uganda	0
Seychelles	0
Sao Tome and Principe	0
Nigeria	0
Namibia	0
Mozambique	0
Malawi	0
Lesotho	0
Guinea–Bissau	0
Gambia	0
Eswatini	0
Eritrea	0
Congo	0
Burundi	0
Botswana	0

Routine vector surveillance and control

Region/Country	Percentage (%)
African Region	45.8
East–Southern Africa	48.8
West Africa	47.5
Central Africa	41.2
Algeria	100
Côte d'Ivoire	92.3
Mauritius	84.6
Angola	80.8
Kenya	76.9
Democratic Republic of the Congo	76.9
Cabo Verde	76.9
Benin	76.9
South Sudan	73.1
Ethiopia	73.1
Eritrea	73.1
Comoros	73.1
Senegal	69.2
Sierra Leone	65.4
Seychelles	65.4
Zimbabwe	61.5
South Africa	53.8
Ghana	53.8
Burundi	53.8
United Republic of Tanzania	50
Sao Tome and Principe	50
Mozambique	50
Chad	50
Mali	46.2
Gambia	46.2
Eswatini	46.2
Zambia	42.3
Rwanda	38.5
Niger	38.5
Central African Republic	38.5
Madagascar	30.8
Lesotho	30.8
Equatorial Guinea	30.8
Burkina Faso	30.8
Mauritania	26.9
Togo	23.1
Namibia	23.1
Guinea	23.1
Malawi	15.4
Liberia	15.4
Guinea–Bissau	15.4
Gabon	15.4
Uganda	7.7
Nigeria	7.7
Congo	7.7
Cameroon	7.7
Botswana	7.7

Percentage (%)

Community sensitization and participation during non-epidemic periods

Country	Percentage (%)
African Region	42.7
West Africa	47.6
East–Southern Africa	42.5
Central Africa	38
Algeria	100
Uganda	80
Sierra Leone	80
Guinea	80
Democratic Republic of the Congo	80
Cabo Verde	80
Lesotho	70
South Africa	60
Seychelles	60
Mauritius	60
Mali	60
Madagascar	60
Gabon	60
Eritrea	60
Côte d'Ivoire	60
Chad	60
Benin	60
Angola	60
Zimbabwe	50
Gambia	50
United Republic of Tanzania	40
South Sudan	40
Senegal	40
Rwanda	40
Niger	40
Namibia	40
Mozambique	40
Kenya	40
Ghana	40
Equatorial Guinea	40
Burkina Faso	40
Togo	30
Mauritania	30
Eswatini	30
Zambia	20
Sao Tome and Principe	20
Nigeria	20
Malawi	20
Ethiopia	20
Comoros	20
Central African Republic	20
Cameroon	20
Burundi	20
Liberia	0
Guinea–Bissau	0
Congo	0
Botswana	0

Percentage (%)

Preparedness for arboviral disease outbreaks and epidemics

Region/Country	Percentage (%)
African Region	57.8
West Africa	64.7
Central Africa	57.9
East–Southern Africa	50.7
Cabo Verde	100
Seychelles	85.7
Mauritania	85.7
Mali	85.7
Ghana	85.7
Congo	85.7
Algeria	85.7
United Republic of Tanzania	71.4
South Sudan	71.4
Sierra Leone	71.4
Senegal	71.4
Rwanda	71.4
Mauritius	71.4
Madagascar	71.4
Liberia	71.4
Ethiopia	71.4
Democratic Republic of the Congo	71.4
Côte d'Ivoire	71.4
Comoros	71.4
Chad	71.4
Burkina Faso	71.4
Angola	71.4
Zimbabwe	57.1
Zambia	57.1
Uganda	57.1
South Africa	57.1
Guinea	57.1
Gabon	57.1
Eritrea	57.1
Equatorial Guinea	57.1
Burundi	57.1
Benin	57.1
Sao Tome and Principe	50
Togo	42.9
Nigeria	42.9
Niger	42.9
Lesotho	42.9
Kenya	42.9
Guinea–Bissau	28.6
Gambia	28.6
Central African Republic	28.6
Cameroon	28.6
Namibia	14.3
Mozambique	14.3
Eswatini	14.3
Botswana	14.3
Malawi	0

Percentage (%)

Total scores for the seven domains by country and region

Region/Country	Percentage (%)
African Region	46.5
West Africa	54
Central Africa	44.3
East–Southern Africa	41.2
Algeria	95.8
Cabo Verde	86.7
Mauritius	80.1
Democratic Republic of the Congo	75.7
Angola	73.4
South Sudan	71.4
Côte d'Ivoire	69.3
Senegal	68
Mali	64.1
Guinea	63.8
Benin	60.3
Ghana	58
Kenya	57.6
Madagascar	55.8
South Africa	55.6
Mauritania	55.6
Rwanda	54.5
United Republic of Tanzania	53.5
Niger	52.8
Sierra Leone	52.4
Seychelles	50.6
Eritrea	50.3
Chad	50.2
Gabon	49.4
Burkina Faso	49.4
Ethiopia	47.8
Comoros	47.8
Congo	44.8
Equatorial Guinea	40.2
Liberia	38.8
Lesotho	38.1
Togo	35.1
Gambia	34.2
Zimbabwe	33.4
Cameroon	32.3
Zambia	31.4
Namibia	28.7
Burundi	27.3
Central African Republic	25.3
Sao Tome and Principe	24.3
Nigeria	23.6
Uganda	23.5
Eswatini	17.2
Mozambique	16.3
Guinea–Bissau	9.1
Malawi	7.2
Botswana	3

Percentage (%)

Annex 3.
Current transmission and burden of arboviral diseases in the 47 countries

The following mock-ups summarize the current situation in the 47 countries with regard to the transmission and burden of arboviral diseases. The mock-ups include the presence or absence of *Aedes aegypti* and *Ae. albopictus*, the circulating arboviruses, national epidemiological data on the numbers of cases and deaths from the major arboviral diseases between 2015 to 2019, graphs showing estimated capacity for surveillance and control of arboviral diseases, the country's strengths and possible ways forward.

Information on the presence of *Ae. aegypti*, *Ae. albopictus* and the major circulating arboviruses was completed from scientific publications for countries that did not provide those data. Eswatini and Lesotho might consider the situation in South Africa with respect to *Aedes* and arboviruses pending further information.

The section on possible ways forward should be considered as providing suggestions based on the data reported by countries. Thus, countries should locally adapt and prioritize those suggestions.

Algeria

Transmission and burden of arboviral diseases

Vectors and arboviruses

- *Aedes albopictus* is reported to be spreading and posing significant public health threats in Algeria.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
					+		Toscana virus

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses

Arboviral disease cases & deaths reported from 2015 to 2019

	2015		2016		2017	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
Dengue			2			
Chikungunya						
Zika						
RVF						
YF						
WNVF	26				1	

RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus fever. S: Suspected cases, P: Probable cases, C: confirmed cases. No data reported for blank cells.

No cases or deaths reported for 2018, and 2019.

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and West Africa sub-region

Capacities and domains

Domain	Percentage (%)
African Region	46.5
West Africa	54
Algeria	95.8
PAO	85.7
CSPEP	100
RVSC	100
VS	100
MCSC	100
DCN	100
DS	85

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance.

Strengths

- Existence of capacities for disease surveillance including arboviral diseases (AVDs)
- Existence of capacities for the diagnostic and case notification including cases of AVDs
- Existence of capacities for the management of cases & severe cases of AVDs
- Arbovirus surveillance system in place
- Entomological *Aedes* surveillance & control system in place
- Community awareness of AVDs and their implication in control activities.
- Existence of a national surveillance & outbreak response committee
- Existence of emergency funds to respond to AVDs outbreaks

Possible ways forward

- Consider the development of a national contingency plan on possible AVDs outbreaks

Angola

Transmission and burden of arboviral diseases

Vectors and arboviruses

- *Aedes aegypti* are reported to be abundant and transmitting arboviruses in Angola.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+				+			O'nyong-nyong virus

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses

Arboviral disease cases & deaths reported from 2015 to 2019.

No cases nor deaths reported

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and Central Africa sub-region

Capacities and domains

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Strengths

- Existence of a national programme on arboviral diseases (AVDs) surveillance & control, and analysis of outbreak risk factors.
- Laboratory testing capacities for arboviruses detection and confirmation of cases
- Regular training provided to staff working on the diagnosis & notification of AVDs cases, their management and the virological surveillance
- Arboviruses surveillance system in place
- Entomological *Aedes* surveillance & control system in place
- Existence of outreach programmes covering large geographical areas
- Existence of a national surveillance & outbreak response committee and a contingency plan

Possible ways forward

- Consider the development of a national guideline on arbovirus surveillance & control
- Consider AVDs surveillance in animals
- Provide training to staff working on *Aedes* surveillance & control, and to community health workers for the sensitization on AVDs at lower levels
- Consider the monitoring of insecticide resistance in *Aedes* vectors

Benin

Transmission and burden of arboviral diseases

Vectors and arboviruses

- *Aedes aegypti* are reported to be abundant and transmitting arboviruses while *Aedes albopictus* are restricted to few sites and do not pose significant Public Health threats in Benin.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+	+			+			

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019

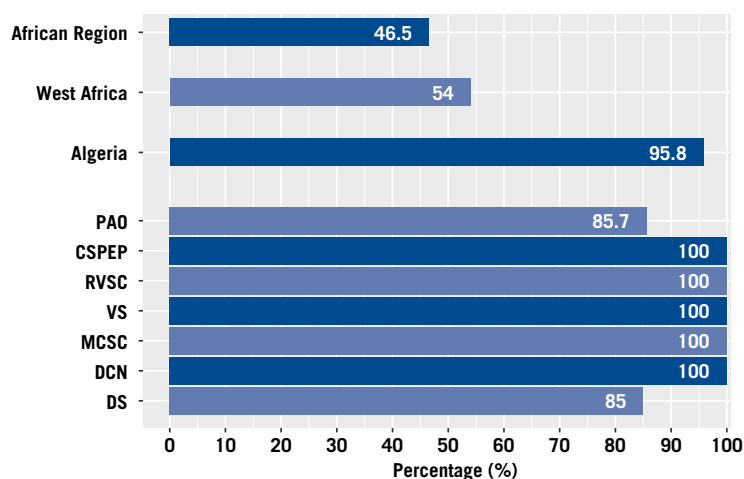|	2019				
	Cases				Deaths
	S	P	C	Total	
Dengue	20	0	20	40	2
Chikungunya	98	0	25	123	0
Zika					
RVF					
YF	187			187	
WNVF					

RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus fever. S: Suspected cases, P: Probable cases, C: confirmed cases. No data reported for blank cells.

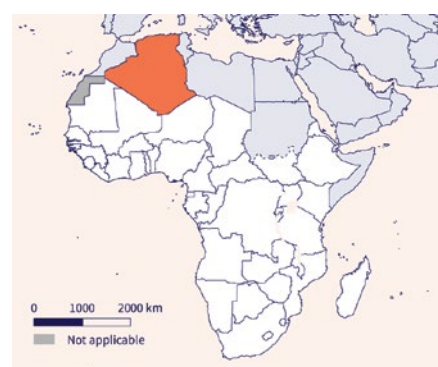No cases/deaths reported for 2015, 2016, 2017, 2018.

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and West Africa sub-region

Capacities and domains

Domain	Percentage (%)
African Region	46.5
West Africa	54
Benin	60.3
PAO	57.1
CSPEP	60
RVSC	76.9
VS	50
MCSC	33.3
DCN	80
DS	65

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Strengths

- Existence of a national programme and guidelines on arboviral diseases (AVDs) surveillance & control.
- Laboratory testing capacities for arboviruses detection and confirmation of cases
- Mandatory notification of major AVDs cases
- Existence of a national guideline to manage cases & severe cases of AVDs
- Arbovirus surveillance system in place
- Entomological *Aedes* surveillance & control system in place
- Existence of community outreach programmes on AVDs; community awareness on AVDs and implication in control activities.
- Existence of a national surveillance & outbreak response committee and a contingency plan

Possible ways forward

- Consider AVDs surveillance in animals and the collection & analysis of outbreak risk factors
- Consider the development of health facilities for the management of severe cases of AVDs
- Consider the monitoring of insecticide resistance in *Aedes* vectors
- Provide regular training for staff working in the 7 domains assessed
- Consider the development of regional/international cooperation for support in outbreak situations

Surveillance and control of arboviral diseases in the WHO African Region

Botswana

Transmission and burden of arboviral diseases

Vectors and arboviruses

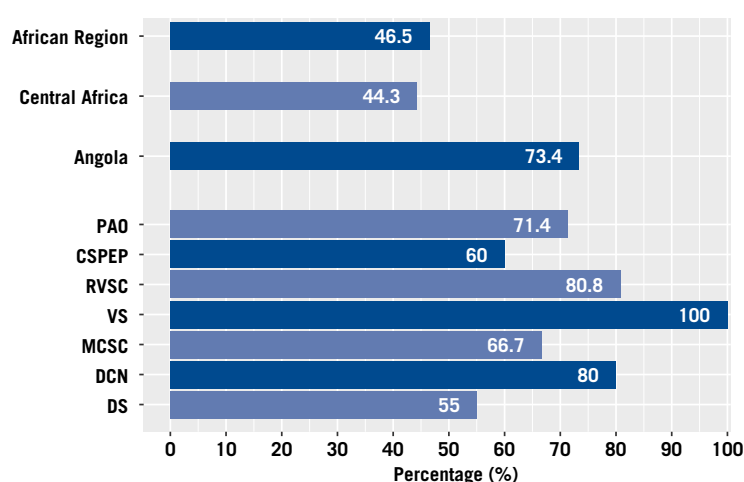- ***Aedes aegypti*** is present in the country according to the scientific literature[1].
- Major arboviruses detected in the country according to the scientific literature[1]

Dengue virus	Chikungunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
			+				

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019

No cases nor deaths reported

Strengths

- Existence of a national surveillance of outbreaks and response committee

Possible ways forward

- Consider the filling of gaps to meet with the indicators in the 7 domains assessed.

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and East-Southern Africa sub-region

Capacities and domains

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

[1]   Braack L, Gouveia de Almeida AP, Cornel AJ, Swanepoel R, de Jager C. Mosquito-borne arboviruses of African origin: review of key viruses and vectors. Parasit Vectors. 2018;11:29

Burkina Faso

Transmission and burden of arboviral diseases

Vectors and arboviruses

- *Aedes aegypti* are reported spreading and posing significant public health threats. *Aedes albopictus* are occasionally found and do not pose significant public health threats.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+				+			

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019

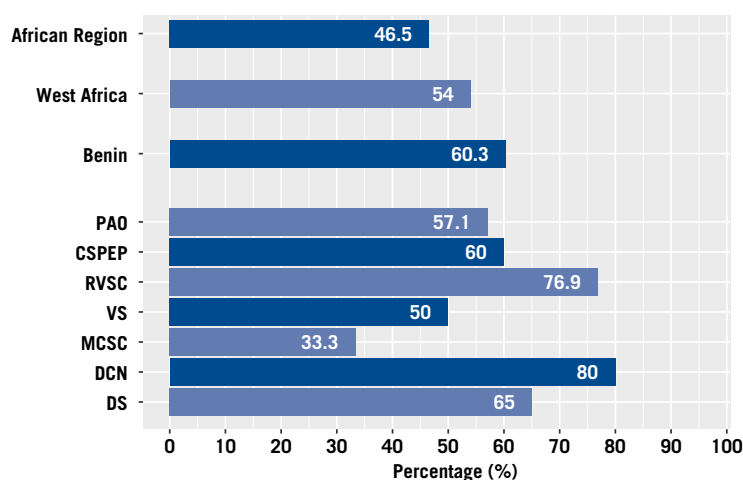|	2016		2017		2019				
	Cases	Deaths	Cases	Deaths	Cases				Deaths
					S	P	C	Total	
Dengue	59		257						
Chikungunya							5278	5278	0
Zika									
RVF									
YF									
WNVF									

RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile Virus fever. S: Suspected cases, P: Probable cases, C: Confirmed cases. No data reported for blank cells.

No cases/deaths reported for 2015 and 2018.

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and West Africa sub-region

Capacities and domains

African Region: 46.5
West Africa: 54
Burkina Faso: 49.4
PAO: 71.4
CSPEP: 40
RVSC: 30.8
VS: 50
MCSC: 33.3
DCN: 60
DS: 60

Percentage (%)

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Strengths

- Existence of a national programme and guidelines on arboviral diseases (AVDs) surveillance & control.
- Laboratory testing capacities for arboviruses detection and confirmation of cases
- Existence of a national guideline to manage cases & severe cases of AVDs
- Existence of arbovirus surveillance system in *Aedes;* implementation of core vector control approaches
- Existence of community outreach programmes on AVDs covering large geographical areas
- Existence of a national surveillance of outbreaks and response committee

Possible ways forward

- Consider AVDs surveillance in animals and the collection & analysis of outbreak risk factors
- Provide regular training for staff working in the 7 domains assessed
- Consider the development of health facilities for the management of severe cases of AVDs
- Ensure the notification of cases of major AVDs
- Consider the entomological surveillance in *Aedes*
- Consider the community engagement on activities related to AVDs control
- Consider the development of a national contingency plan including outbreaks of AVDs

Burundi

Transmission and burden of arboviral diseases

Vectors and arboviruses

- **Aedes aegypti** are reported to be occasionally found and do not pose significant public health threats in the country.
- Major arboviruses detected in the country according to the scientific literature[1]

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
	+	+		+			

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths from 2015 to 2019

No cases nor deaths reported

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and Central Africa sub-region

Capacities and domains

	Percentage (%)
African Region	46.5
Central Africa	44.3
Burundi	27.3
PAO	57.1
CSPEP	20
RVSC	53.8
VS	0
MCSC	0
DCN	30
DS	30

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

1   Braack L, Gouveia de Almeida AP, Cornel AJ, Swanepoel R, de Jager C. Mosquito-borne arboviruses of African origin: review of key viruses and vectors. Parasit Vectors. 2018;11:29

Strengths

- Mandatory notification of cases of major arboviral diseases (AVD)
- Existence of laboratory capacities for the detection of arboviruses
- Existence of national institutions for arbovirus vector surveillance
- Existence of community outreach programmes on AVDs
- Existence of a national surveillance of outbreaks & response committee
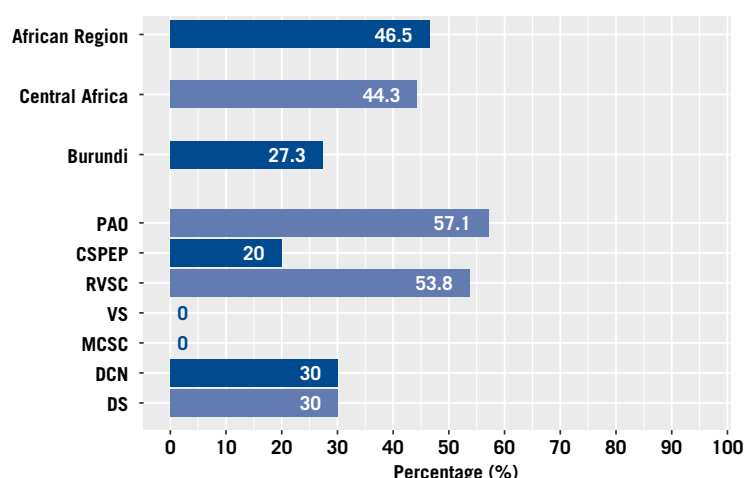
Possible ways forward

- Consider the implementation of a national disease surveillance system including AVDs
- Provide regular training for staff working in the 7 domains assessed
- Consider the strengthening of capacities for the management of cases & severe cases of AVDs including guidelines and adequate health facilities
- Consider the strengthening of laboratory capacities for the confirmation of suspected cases
- Consider an effective entomological surveillance in *Aedes*
- Consider the effective run of the outreach programmes on AVDs including the community engagement on activities related to AVDs control

Cabo Verde

Transmission and burden of arboviral diseases

Vectors and arboviruses

- *Aedes aegypti* are reported to be spreading and posing significant public health threats while *Aedes albopictus* are absent for now in the country.
- Major arboviruses detected in the country according to the scientific literature[1]

Dengue virus	Chiku- ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+							

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019

	2015		2016		2017		2019				
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases				Deaths
							S	P	C	Total	
Dengue	15	0	4	0	32	0					
Chikungunya									2	2	0
Zika	6743	0			764	0	2			2	0
RVF											
YF											
WNVF											

RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus fever. S: Suspected cases, P: Probable cases, C: Confirmed cases. No data reported for blank cells.

No cases nor deaths reported for 2018.

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and West Africa sub-region

Capacities and domains

Domain	Percentage (%)
African Region	46.5
West Africa	54
Cabo Verde	86.7
PAO	100
CSPEP	80
RVSC	76.9
VS	100
MCSC	100
DCN	80
DS	70

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

[1] Braack L, Gouveia de Almeida AP, Cornel AJ, Swanepoel R, de Jager C. Mosquito-borne arboviruses of African origin: review of key viruses and vectors. Parasit Vectors. 2018;11:29

Strengths

- Existence of capacities for disease surveillance including arboviral diseases (AVDs)
- Existence of capacities for the diagnostic and case notification including cases of AVDs
- Existence of capacities for the management of cases & severe cases of AVDs
- Arbovirus surveillance system in place
- *Aedes* surveillance & control system in place
- Existence of community outreach programmes on AVDs; community awareness on AVDs and implication in control activities.
- Existence of capacities for the preparedness for AVDs outbreaks/epidemics

Possible ways forward

- Consider AVDs surveillance in animals
- Consider the strengthening of the entomological surveillance of vectors of arboviruses
- Provide regular training for staff on the use of disease surveillance tools, and for healthcare workers on the notification of cases of major AVDs

Cameroon

Transmission and burden of arboviral diseases

Vectors and arboviruses

- *Aedes aegypti* are reported to be abundant and transmitting arboviruses in the country.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
				+			

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019

	2019	
	Cases	Deaths
Dengue		
Chikungunya		
Zika		
RVF		
YF	12	0
WNVF		

RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile Virus fever. No data reported for blank cells.

No data reported for 2015, 2016, 2017 and 2018.
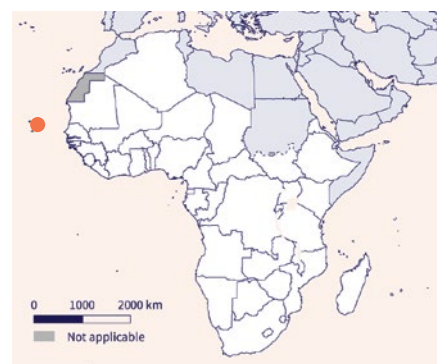
Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and Central Africa sub-region

Capacities and domains

Domain	Percentage (%)
African Region	46.5
Central Africa	44.3
Cameroon	32.3
PAO	28.6
CSPEP	20
RVSC	7.7
VS	50
MCSC	0
DCN	70
DS	50

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Not applicable

Strengths

- Existence of a national guideline on arboviral diseases (AVDs) surveillance & control.
- Laboratory testing capacities for the detection of arboviruses and confirmation of cases
- Existence of a system for arbovirus surveillance
- Existence of community outreach programmes on AVDs
- Existence of a national surveillance of outbreaks & response committee

Possible ways forward

- Consider the collection and analysis of AVDs outbreak risk factors
- Consider the strengthening of capacities for the management of cases & severe cases of AVDs including guidelines and adequate health facilities
- Consider an effective entomological surveillance and control of *Aedes* including the monitoring of insecticide resistance
- Consider the effective run of the outreach programmes on AVDs including the community engagement on activities related to the control of AVDs
- Consider the development of a national contingency plan including outbreaks of AVDs
- Provide regular training for staff working in the 7 domains assessed

Central African Republic

Transmission and burden of arboviral diseases

Vectors and arboviruses

- *Aedes aegypti* and *Aedes albopictus* are reported to be spreading and posing significant public health threats in the country.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+	+	+	+	+	+		O'nyong-nyong virus

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths from 2015 to 2019

No cases nor deaths reported

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and Central Africa sub-region

Capacities and domains

	Percentage (%)
African Region	46.5
Central Africa	44.3
Central African Republic	25.3
PAO	28.6
CSPEP	20
RVSC	38.5
VS	50
MCSC	0
DCN	20
DS	20

PAO: Preparedness for Arboviral Disease Outbreaks/ Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Strengths

- Existence of a national programme on arboviral diseases (AVDs) surveillance & control.
- Mandatory notification of cases of major AVDs
- Laboratory testing capacity for the detection of arboviruses
- Arbovirus surveillance system in place
- Entomological *Aedes* surveillance & control system in place
- Existence of community outreach programmes on AVDs
- Existence of a national surveillance of outbreaks & response committee

Possible ways forward

- Consider the development of a national guideline on AVDs surveillance and control
- Consider AVDs surveillance including animals, and the collection & analysis of outbreak risk factors
- Strengthening laboratory capacities for the confirmation of suspected cases and the positive cases of AVDs.
- Consider the strengthening of capacities for the management of cases & severe cases of AVDs including guidelines and adequate health facilities
- Consider strengthening the entomological surveillance in *Aedes* including the monitoring of insecticide resistance
- Consider the development of a national contingency plan including outbreaks of AVDs
- Provide regular training for staff working in the 7 domains assessed

Chad

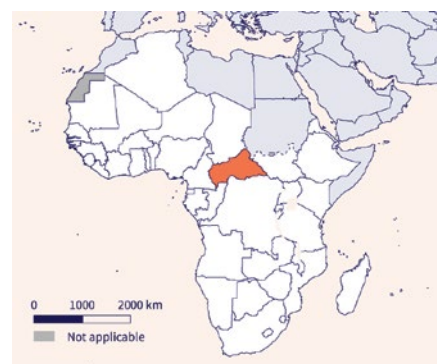## *Transmission and burden of arboviral diseases*

Vectors and arboviruses

- ***Aedes aegypti*** are present in the country according to the scientific literature[1]
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
	+			+			

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019

	2015		2016		2017		2018		2019	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Dengue										
Chikungunya										
Zika										
RVF										
YF	428	7	420	8	607	3	544			9
WNVF										

RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile Virus fever. S: Suspected cases, P: Probable cases, C: Confirmed cases. No data reported for blank cells.

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and Central Africa sub-region

Capacities and domains

Domain	Percentage (%)
African Region	46.5
Central Africa	44.3
Chad	50.2
PAO	71.4
CSPEP	60
RVSC	50
VS	50
MCSC	0
DCN	70
DS	50

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

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[1] Braack L, Gouveia de Almeida AP, Cornel AJ, Swanepoel R, de Jager C. Mosquito-borne arboviruses of African origin: review of key viruses and vectors. Parasit Vectors. 2018;11:29
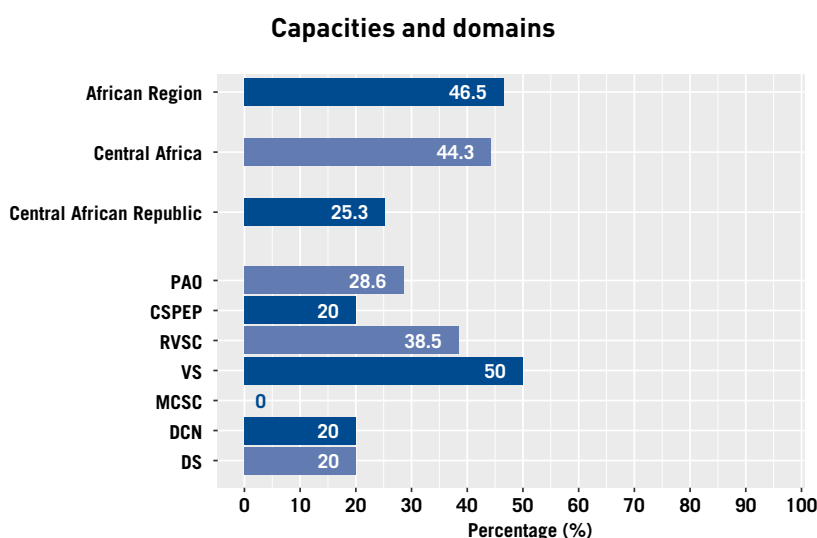
Strengths

- Existence of a national programme on arboviral diseases (AVDs) surveillance & control.
- Laboratory testing capacities for the detection of arboviruses and confirmation of cases
- Arbovirus surveillance system in place
- Entomological *Aedes* surveillance & control system in place
- Existence of community outreach programmes on AVDs; community awareness on AVDs and implication in control activities.
- Existence of capacities for the preparedness for AVDs outbreaks/epidemics

Possible ways forward

- Consider the use of guidelines on AVDs surveillance and control
- Consider AVDs surveillance in animals
- Consider the strengthening of capacities for the management of cases & severe cases of AVDs including guidelines and adequate health facilities
- Consider an effective entomological surveillance in *Aedes* including the monitoring of insecticide resistance
- Provide regular training for staff working in the 7 domains assessed

Comoros

Transmission and burden of arboviral diseases

Vectors and arboviruses

- ***Aedes aegypti*** are reported to be spreading and posing significant public health threats (PHT); ***Aedes albopictus*** are stable in select areas and posing significant PHT
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chikungunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+	+	+					

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.
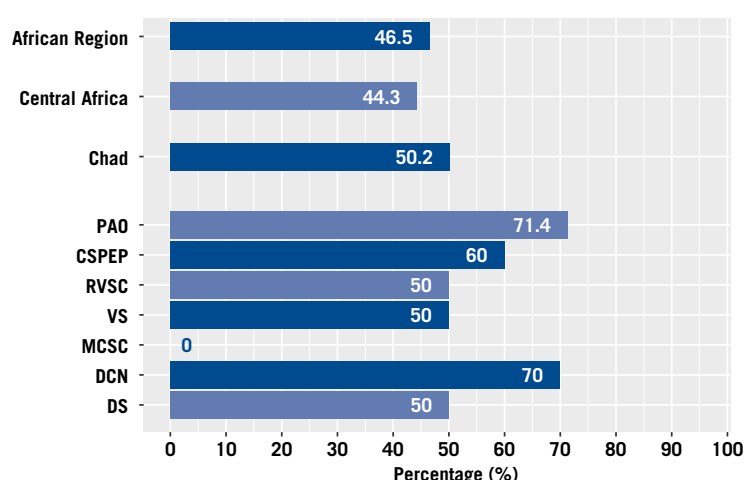
Arboviral disease cases & deaths reported for last 5 years

	2015		2019				
	Cases	Deaths	Cases				Deaths
			S	P	C	Total	
Dengue					132	132	0
Chikungunya			1000		1000	2000	0
Zika							
RVF	3						
YF							
WNVF							

RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus fever. S: Suspected cases, P: Probable cases, C: Confirmed cases. No data reported for blank cells.
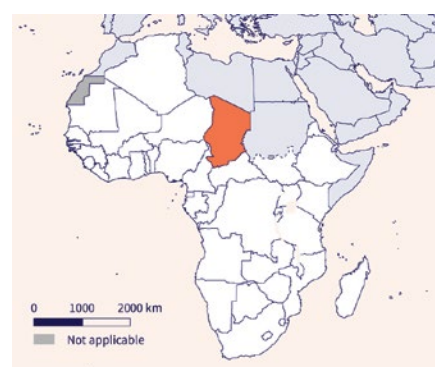
No cases nor deaths reported for 2016, 2017 and 2018.

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and East-Southern Africa sub-region

Capacities and domains

	Percentage (%)
African Region	46.5
East-Southern Africa	41.2
Comoros	47.8
PAO	71.4
CSPEP	20
RVSC	73.1
VS	50
MCSC	0
DCN	40
DS	80

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Strengths

- Existence of capacities for disease surveillance including arboviral diseases (AVDs)
- Mandatory notification of major AVDs cases
- Existence of some laboratory testing capacities for the detection of arboviruses
- Arbovirus surveillance system in place
- Entomological *Aedes* surveillance & control system in place
- Existence of a national entity in charge of community outreach programmes on AVDs
- Existence of a national surveillance of outbreaks & response committee and a contingency plan

Possible ways forward

- Consider the collection & analysis of outbreak risk factors
- Strengthening laboratory capacities for the confirmation of suspected cases and the positive cases of AVDs.
- Consider the strengthening of capacities for the management of cases & severe cases of AVDs including guidelines and adequate health facilities
- Consider the monitoring of insecticide resistance in *Aedes* vectors
- Consider the effective run of the outreach programmes on AVDs including the community engagement on activities related to the control of AVDs
- Provide regular training for staff working in the 7 domains assessed

Congo

Transmission and burden of arboviral diseases

Vectors and arboviruses

- ***Aedes aegypti*** and ***Aedes albopictus*** are reported to be spreading and posing significant public health threats in the country.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chikungunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+	+			+			

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019.

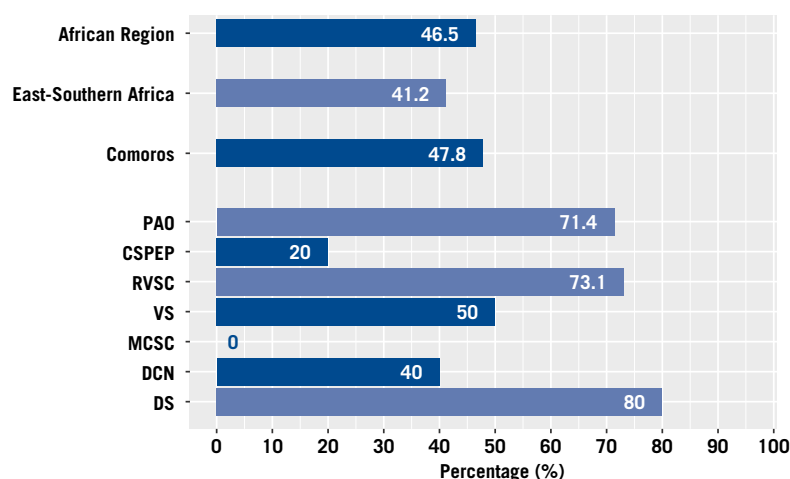|	2018	
	Cases	Deaths
Dengue	1	0
Chikungunya		
Zika		
RVF		
YF	1	0
WNVF		

RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus fever. S: Suspected cases, P: Probable cases, C: Confirmed cases. No data reported for blank cells.

No cases nor deaths reported for 2015, 2016, 2017 and 2019.

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and Central Africa sub-region

Capacities and domains

	Percentage (%)
African Region	46.5
Central Africa	44.3
Congo	44.8
PAO	85.7
CSPEP	0
RVSC	7.7
VS	0
MCSC	100
DCN	70
DS	50

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Strengths

- Existence of national guidelines on arboviral diseases (AVDs) surveillance & control.
- Mandatory notification of major AVDs cases
- Laboratory testing capacities for the detection of arboviruses and confirmation of cases
- Existence of capacities for the management of cases & severe cases of AVDs
- Existence of capacities for the preparedness for AVDs outbreaks/epidemics

Possible ways forward

- Consider AVDs surveillance in animals and the collection & analysis of outbreak risk factors
- Consider capacity building for virological surveillance
- Consider capacity building for the entomological surveillance and control of *Aedes* including the monitoring of insecticide resistance
- Consider capacity building for the community sensitization and participation to activities related to AVDs control
- Provide regular training for staff working in the 7 domains assessed

Côte d'Ivoire

Transmission and burden of arboviral diseases

Vectors and arboviruses

- *Aedes aegypti* are reported to be abundant and transmitting arboviruses; *Aedes albopictus* are occasionally found and do not pose significant public health threats.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+				+			

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019.

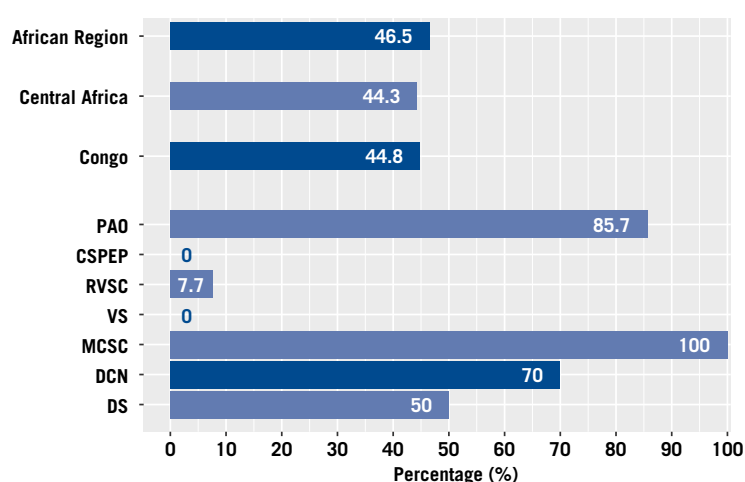|	2015		2016		2017		2018		2019	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Dengue	2				217		2		291	
Chikungunya										
Zika										
RVF										
YF	16		2		24		10		89	
WNVF										

RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus fever. S: Suspected cases, P: Probable cases, C: Confirmed cases. No data reported for blank cells.

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and West Africa sub-region

Capacities and domains

Domain	Percentage (%)
African Region	46.5
West Africa	54
Côte d'Ivoire	69.3
PAO	71.4
CSPEP	60
RVSC	92.3
VS	50
MCSC	66.7
DCN	70
DS	75

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Strengths

- Existence of capacities for disease surveillance including arboviral diseases (AVDs)
- Existence of capacities for the diagnostic and case notification including cases of AVDs
- Existence of capacities for the management of cases & severe cases of AVDs
- Arbovirus surveillance system in place
- Entomological *Aedes* surveillance & control system in place
- Existence of community outreach programmes on AVDs; community awareness on AVDs and implication in control activities.
- Existence of a national surveillance of outbreaks & response committee and a contingency plan

Possible ways forward

- Consider the AVDs surveillance in animals
- Consider the confirmation of positive cases of AVDs.
- Provide regular training for staff working in the 7 domains assessed

Democratic Republic of the Congo

Transmission and burden of arboviral diseases

Vectors and arboviruses

- *Aedes aegypti* and *Aedes albopictus* are reported to be spreading and posing significant public health threats in the country.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
	+			+			

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths from 2015 to 2019.

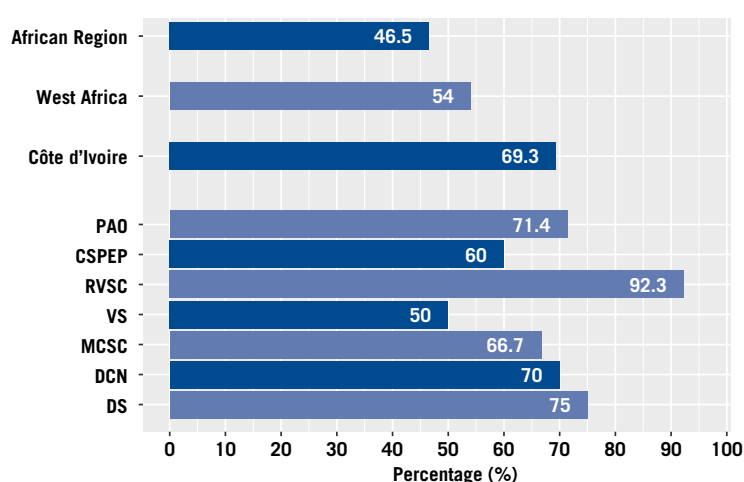No cases nor deaths reported

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and Central Africa sub-region

Capacities and domains

DR Congo: Democratic Republic of the Congo. PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods- RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Strengths

- Existence of a national programme and guidelines on arboviral diseases (AVDs) surveillance & control.
- Laboratory testing capacities for the detection of arboviruses and confirmation of cases
- Existence of a national guideline to manage cases & severe cases of AVDs
- Arbovirus surveillance system in place
- Entomological *Aedes* surveillance & control system in place
- Existence of community outreach programmes on AVDs; community awareness on AVDs and implication in control activities.
- Existence of a national surveillance of outbreaks & response committee and a contingency plan

Possible ways forward

- Consider the surveillance of AVDs in animals
- Consider the strengthening of health facilities for the management of severe cases of AVDs
- Consider the monitoring of insecticide resistance in *Aedes* vectors
- Provide regular training for staff working in the 7 domains assessed

Equatorial Guinea

Transmission and burden of arboviral diseases

Vectors and arboviruses

- *Aedes aegypti* are found in the country according to the scientific literature[1]
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
				+			

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths from 2015 to 2019.

No cases nor deaths reported

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and Central Africa sub-region

Capacities and domains

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

1   Braack L, Gouveia de Almeida AP, Cornel AJ, Swanepoel R, de Jager C. Mosquito-borne arboviruses of African origin: review of key viruses and vectors. Parasit Vectors. 2018;11:29

Strengths

- Existence of national guidelines on arboviral diseases (AVDs) surveillance & control.
- Mandatory notification of major AVDs cases
- Arbovirus surveillance and system in place
- Entomological *Aedes* surveillance & control system in place
- Existence of community outreach programmes on AVDs
- Existence of a national surveillance of AVDs outbreaks & response committee

Possible ways forward

- Consider the surveillance of AVDs in animals and the collection & analysis of outbreak risk factors
- Consider the strengthening of laboratory capacities for the detection of arboviruses and the confirmation of suspected cases and the positive cases of AVDs
- Consider the strengthening of capacities for the management of cases & severe cases of AVDs including guidelines and adequate health facilities
- Consider the strengthening of the entomological surveillance in *Aedes* including the monitoring of insecticide resistance
- Consider the effective run of the outreach programmes on AVDs including the community engagement on activities related to the control of AVDs
- Consider the development of a national contingency plan including outbreaks of AVDs
- Provide regular training for staff working in the 7 domains assessed

Eritrea
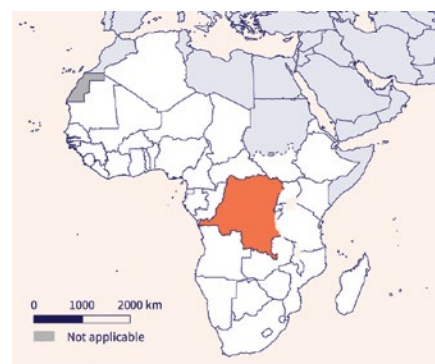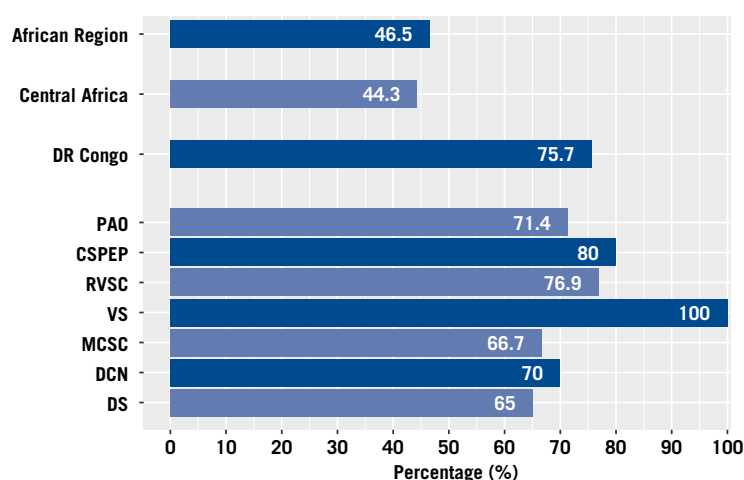
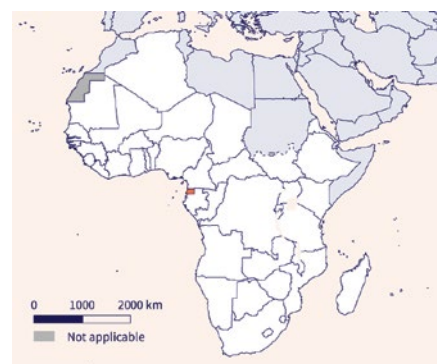## *Transmission and burden of arboviral diseases*

Vectors and arboviruses

- *Aedes aegypti* are reported to be spreading and posing significant public health threats in the country.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+	+						

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

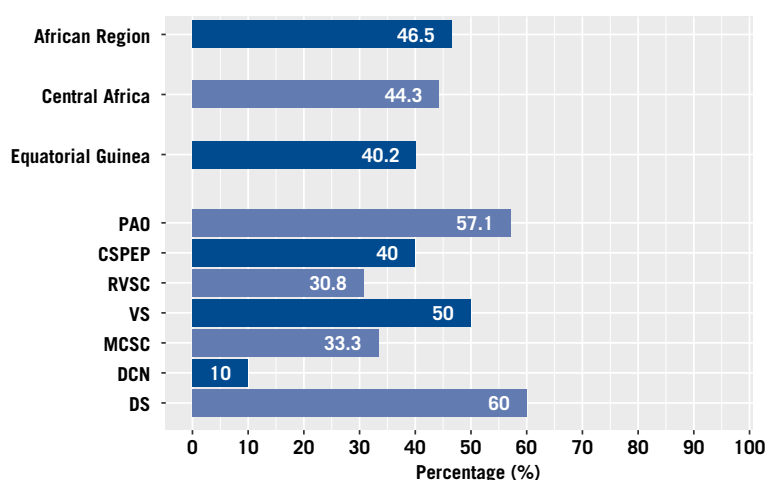**Arboviral disease cases & deaths reported from 2015 to 2019.**

No cases nor deaths reported

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and East-Southern Africa sub-region

Capacities and domains

African Region	46.5
East-Southern Africa	41.2
Eritrea	50.3
PAO	57.1
CSPEP	60
RVSC	73.1
VS	0
MCSC	66.7
DCN	40
DS	55

Percentage (%)

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Strengths

- Existence of a national programme and guidelines on arboviral diseases (AVDs) surveillance & control.
- Mandatory notification of major AVDs cases
- Existence of a national guideline to manage cases & severe cases of AVDs
- *Aedes* surveillance & control system in place
- Existence of community outreach programmes on AVDs
- Existence of a national surveillance of AVDs out- breaks & response committee

Possible ways forward

- Consider the surveillance of AVDs in humans, animals, and the collection & analysis of AVDs outbreak risk factors
- Consider the strengthening of laboratory capacities for the detection of arboviruses and the confirmation of suspected cases and the positive cases of AVDs
- Consider the strengthening of health facilities for the management of severe cases of AVDs
- Consider capacity building for virological surveillance
- Consider the strengthening of the entomological surveillance of *Aedes* including the monitoring of insecticide resistance
- Consider the community engagement on activities related to AVDs control
- Consider the development of a national contingency plan including outbreaks of AVDs

Eswatini

Transmission and burden of arboviral diseases

Vectors and arboviruses

- Presence or absence of *Aedes* in the country: no data yet (South Africa's situation may be considered)
- Major arboviruses circulating in the country: no data yet (South Africa's situation may be considered)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019.

No cases nor deaths reported

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and East-Southern Africa sub-region

Capacities and domains

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Strengths

- Existence of partial capacities for *Aedes* surveillance and control
- Existence of community outreach programmes on AVDs

Possible ways forward

- Consider capacity building for the arboviral disease surveillance
- Consider the strengthening of laboratory capacities for the detection of arboviruses and the confirmation of suspected cases and the positive cases of AVDs
- Consider the strengthening of capacities for the management of cases & severe cases of AVDs including guidelines and adequate health facilities
- Consider capacity building for virological surveillance
- Consider capacity building for the entomological surveillance and control of *Aedes* including the monitoring of insecticide resistance
- Consider the effective run of the outreach programmes on AVDs including the community engagement on activities related to the control of AVDs
- Existence of a national surveillance of AVDs out- breaks & response committee
- Consider the development of a national contingency plan including outbreaks of AVDs
- Provide regular training for staff working in the 7 domains assessed
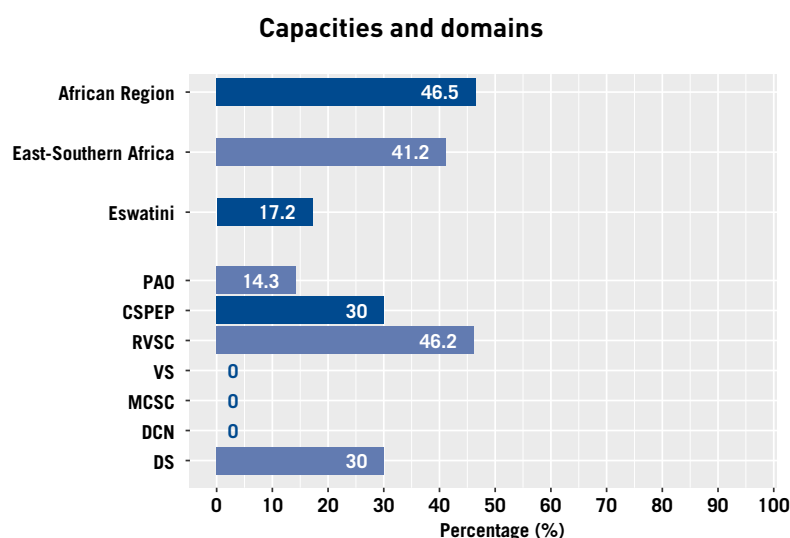
Ethiopia

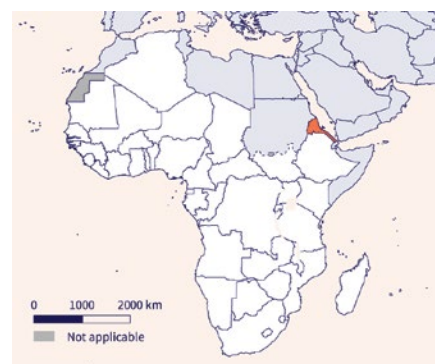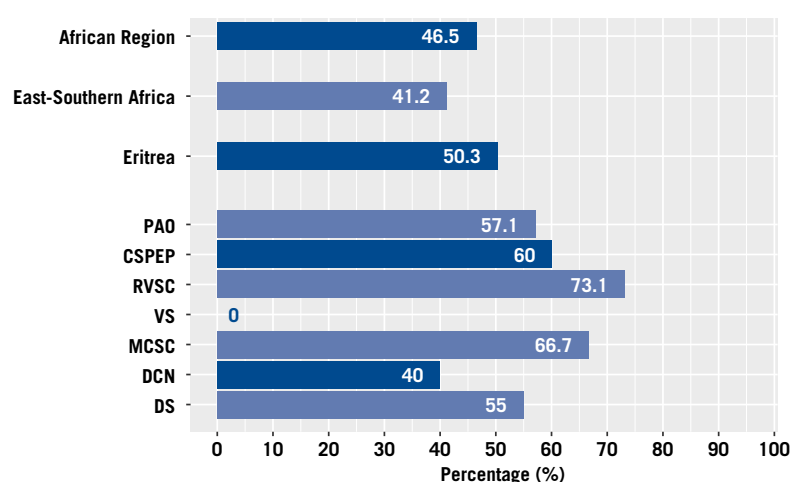## *Transmission and burden of arboviral diseases*

Vectors and arboviruses

- ***Aedes aegypti*** and ***Aedes albopictus*** are reported to be spreading and posing significant public health threats in Ethiopia.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+	+	+	+	+	+	+	Sand fly virus

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019.

	2017		2018		2019				
	Cases	Deaths	Cases	Deaths	Cases				Deaths
					S	P	C	Total	
Dengue					974	0	25	999	0
Chikungunya					57268	0	19	57287	0
Zika									
RVF									
YF	10	35							
WNVF									

RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus fever. S: Suspected cases, P: Probable cases, C: Confirmed cases. No data reported for blank cells.

No cases nor deaths reported for 2015 and 2016 .

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and East-Southern Africa sub-region

Capacities and domains

	Percentage (%)
African Region	46.5
East-Southern Africa	41.2
Ethiopia	47.8
PAO	71.4
CSPEP	20
RVSC	73.1
VS	50
MCSC	0
DCN	70
DS	50

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Strengths

- Existence of a national programme and guidelines on arboviral diseases (AVDs) surveillance & control
- Laboratory testing capacities for the detection of arboviruses and confirmation of cases and the positive cases of AVDs
- Arbovirus surveillance system in place
- Entomological *Aedes* surveillance & control system in place
- Existence of community outreach programmes on AVDs
- Existence of a national surveillance of AVDs outbreaks & response committee

Possible ways forward

- Consider the surveillance of AVDs in animals and the collection & analysis of AVDs outbreak risk factors
- Consider the strengthening of capacities for the management of cases & severe cases of AVDs including guidelines and adequate health facilities
- Consider the monitoring of insecticide resistance in *Aedes* vectors
- Consider the effective run of the outreach programmes on AVDs including the community engagement on activities related to the control of AVDs
- Consider the development of a national contingency plan including outbreaks of AVDs
- Provide regular training for staff working in the 7 domains assessed

Gabon

Transmission and burden of arboviral diseases

Vectors and arboviruses

- *Aedes aegypti* and *Aedes albopictus* are found in the country according to the scientific literature[1]
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+	+	+		+			

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019.
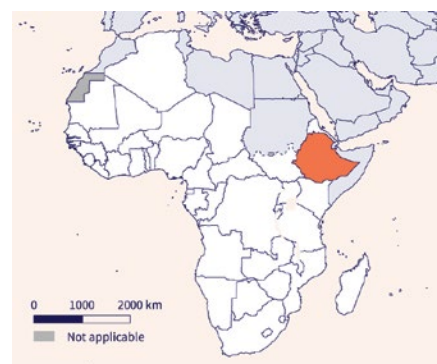
No cases nor deaths reported

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and Central Africa sub-region

Capacities and domains

Domain	Percentage (%)
African Region	46.5
Central Africa	44.3
Gabon	49.4
PAO	57.1
CSPEP	60
RVSC	15.4
VS	50
MCSC	33.3
DCN	70
DS	60

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

[1] Jiolle D, Moltini-Conclois I, Obame-Nkoghe J, Yangari P, Porciani A, Scheid B, et al. Experimental infections with Zika virus strains reveal high vector competence of Aedes albopictus and Aedes aegypti popu- lations from Gabon (Central Africa) for the African virus lineage. Emerg Microbes Infect. 2021;10:1244–53.

Strengths

- Existence of a national programme and guidelines on arboviral diseases (AVDs) surveillance & control
- Mandatory notification of major AVDs cases
- Laboratory testing capacities for the detection of arboviruses and confirmation of cases and the positive cases of AVDs.
- Existence of a national guideline to manage cases & severe cases of AVDs
- Arbovirus surveillance system in place
- Existence of community outreach programmes on AVDs; community awareness on AVDs and implication in control activities.
- Existence of a national surveillance of AVDs outbreaks & response committee

Possible ways forward

- Consider the surveillance of AVDs in animals and the collection & analysis of AVDs outbreak risk factors
- Consider the strengthening of health facilities for the management of severe cases of AVDs
- Consider capacity building for the entomological surveillance and control of *Aedes* including the monitoring of insecticide resistance
- Consider the development of a national contingency plan including outbreaks of AVDs
- Provide regular training for staff working in the 7 domains assessed

Gambia

Transmission and burden of arboviral diseases

Vectors and arboviruses

- ***Aedes aegypti*** and ***Aedes albopictus*** are reported to be restricted to few sites and do not pose significant public health threats in the country.
- Major arboviruses found in the country according to the scientific literature[1]

Dengue virus	Chikungunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
			+	+			

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

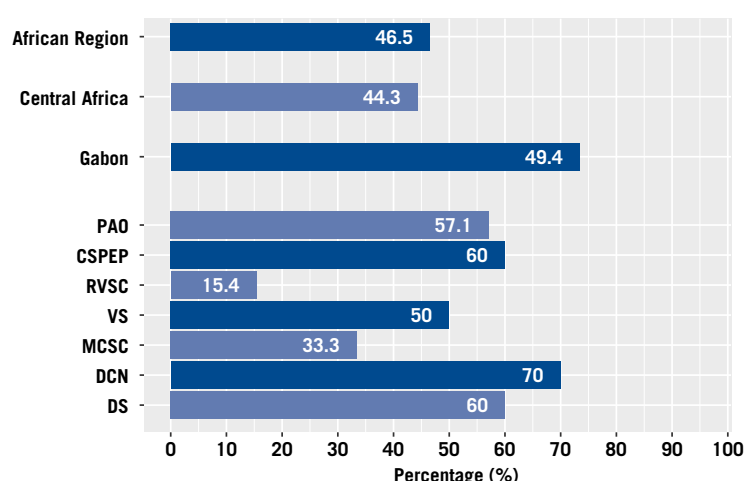### Arboviral disease cases & deaths reported from 2015 to 2019.

	2018	
	Cases	Deaths
Dengue		
Chikungunya		
Zika		
RVF	1	
YF		
WNVF		

RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus fever. S: Suspected cases, P: Probable cases, C: Confirmed cases. No data reported for blank cells.

No cases nor deaths reported for 2015, 2016, 2017 and 2019.

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and West Africa sub-region

Capacities and domains

	Percentage (%)
African Region	46.5
West Africa	54
Gambia	34.2
PAO	28.6
CSPEP	50
RVSC	46.2
VS	0
MCSC	0
DCN	60
DS	55

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

[1] Braack L, Gouveia de Almeida AP, Cornel AJ, Swanepoel R, de Jager C. Mosquito-borne arboviruses of African origin: review of key viruses and vectors. Parasit Vectors. 2018;11:29

Strengths

- Existence of a national programme on arboviral diseases (AVDs) surveillance & control
- Laboratory testing capacities for the detection of arboviruses and confirmation of AVDs cases
- Entomological *Aedes* surveillance & control system in place
- Existence of community outreach programmes on AVDs
- Existence of a national surveillance of AVDs outbreaks & response committee and a contingency plan

Possible ways forward

- Consider the surveillance of AVDs in animals
- Consider the strengthening of capacities for the management of cases & severe cases of AVDs including guidelines and adequate health facilities
- Consider capacity building for virological surveillance
- Consider an effective entomological surveillance in *Aedes* including the monitoring of insecticide resistance
- Consider the development of regional/international cooperation for support in outbreak situations
- Provide regular training for staff working in the 7 domains assessed

Ghana

Transmission and burden of arboviral diseases

Vectors and arboviruses

- ***Aedes aegypti*** and ***Aedes albopictus*** are present in the country according to the scientific literature [1,2]
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+				+			

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths from 2015 to 2019.
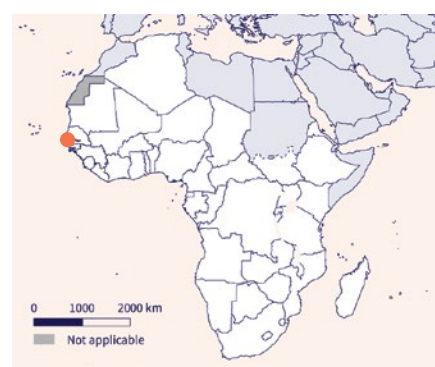
No cases nor deaths reported

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and West Africa sub-region

Capacities and domains

	Percentage (%)
African Region	46.5
West Africa	54
Ghana	58
PAO	85.7
CSPEP	40
RVSC	53.8
VS	50
MCSC	66.7
DCN	60
DS	50

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Strengths

- Existence of a national programme and guidelines on arboviral diseases (AVDs) surveillance & control
- Laboratory testing capacities for the detection of arboviruses and confirmation of AVDs cases
- Existence of capacities for the management of cases & severe cases of AVDs
- Arbovirus surveillance system in place
- Entomological *Aedes* surveillance & control system in place
- Existence of community outreach programmes on AVDs
- Existence of capacities for the preparedness for AVDs outbreaks/epidemics

Possible ways forward

- Consider the surveillance of AVDs in humans, animals and the collection & analysis of AVDs outbreak risk factors
- Consider the monitoring of insecticide resistance in *Aedes* vectors
- Consider the effective run of the outreach programmes on AVDs including the community engagement on activities related to the control of AVDs
- Provide regular training for staff working in the 7 domains assessed

1   Joannides J, Dzodzomenyo M, Azerigyik F, Agbosu EE, Pratt D, Nyarko Osei JH, et al. Species composition and risk of transmission of some Aedes-borne arboviruses in some sites in Northern Ghana. PLoS One. 2021;16:e0234675.

2   Suzuki T, Osei JH, Sasaki A, Adimazoya M, Appawu M, Boakye D, et al. Risk of transmission of viral haemorrhagic fevers and the insecti- cide susceptibilitystatus of aedes aegypti (linnaeus) in some sites in Accra, Ghana. Ghana Med J. 2016;50:136–41.

Guinea

Transmission and burden of arboviral diseases

Vectors and arboviruses

- *Aedes aegypti* and *Aedes albopictus* are reported to be spreading and posing significant public health threats in the country.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku- ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+	+	+	+	+			

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported for last 5 years

	2015		2016		2017		2019				
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases				Deaths
							S	P	C	Total	
Dengue											
Chikung unya											
Zika											
RVF											
YF	4		3		6		109	4	0	113	6
WNVF											

RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus fever. S: Suspected cases, P: Probable cases, C: Confirmed cases. No data reported for blank cells.

No cases nor deaths reported for 2018.

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and West Africa sub-region

Capacities and domains

	Percentage (%)
African Region	46.5
West Africa	54
Guinea	63.8
PAO	57.1
CSPEP	80
RVSC	23.1
VS	50
MCSC	66.7
DCN	90
DS	80

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

0   1000   2000 km

Not applicable

Strengths

- Existence of capacities for disease surveillance including arboviral diseases (AVDs)
- Existence of capacities for the diagnostic and case notification including the AVDs cases
- Existence of capacities for the management of cases & severe cases of AVDs
- Arbovirus surveillance system in place
- Existence of community outreach programmes on AVDs; community awareness on AVDs and implication in control activities.
- Existence of a national surveillance of AVDs outbreaks & response committee and a contingency plan
- Existence of emergency funds to respond to AVDs outbreaks

Possible ways forward

- Consider capacity building for the entomological surveillance and control of *Aedes* including the monitoring of insecticide resistance
- Consider the development of regional/international cooperation for support in outbreak situations
- Provide regular training for staff working in the 7 domains assessed

Guinea-Bissau

Transmission and burden of arboviral diseases

Vectors and arboviruses

- ***Aedes aegypti*** are reported to be spreading and posing significant public health threats in the country.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
	+	+					

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019.
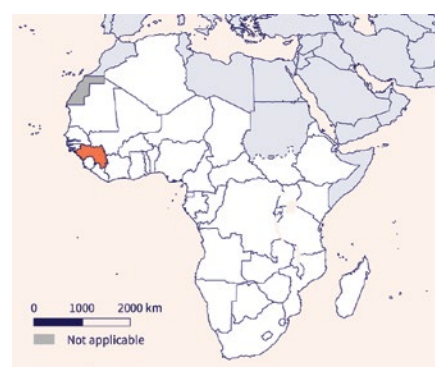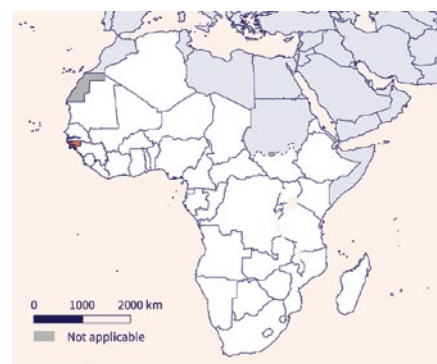
No cases nor deaths reported

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and West Africa sub-region

Capacities and domains

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Strengths

- Mandatory notification of major arboviral diseases (AVDs) cases
- Existence of cooperation agreements in outbreak situation
- Existence of emergency funds to respond to AVDs outbreaks

Possible ways forward

- Consider capacity building for the AVDs surveillance
- Consider the strengthening of laboratory capacities for the detection of arboviruses and the confirmation of suspected cases and the positive cases of AVDs
- Consider the strengthening of capacities for the management of cases & severe cases of AVDs including guidelines and adequate health facilities
- Consider capacity building for virological surveillance
- Consider capacity building for the entomological surveillance and control of *Aedes* including the monitoring of insecticide resistance
- Consider capacity building for the community sensitization and participation to activities related to the control of AVDs
- Provide regular training for staff working in the 7 domains assessed

Kenya

Transmission and burden of arboviral diseases

Vectors and arboviruses

- *Aedes aegypti* are reported to be abundant and transmitting arboviruses in the country.
- Major arboviruses reported as circulating in the country (see table below).

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+	+	+	+	+	+	+	O'nyong-nyong virus

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths from 2015 to 2019.

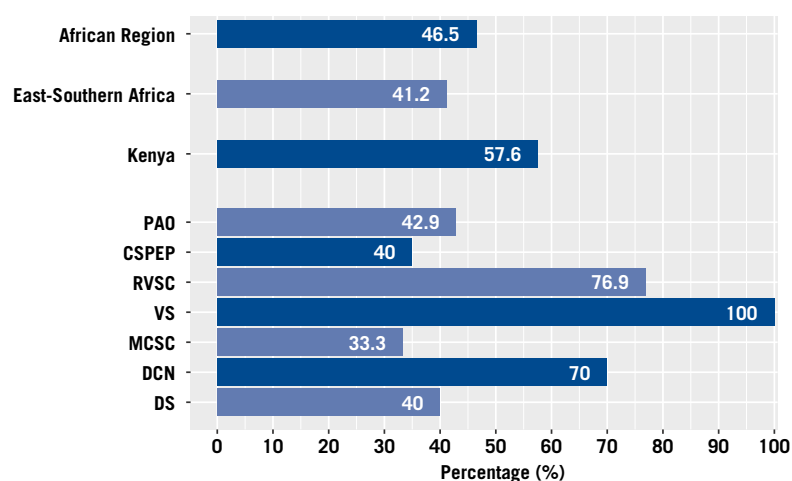|	2016		2017		2018		2019				
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases				Deaths
							S	P	C	Total	
Dengue	1874	32	1537		35		616	616	268	1500	0
Chikungunya	123				1210						
Zika			5								
RVF					103				169	169	0
YF											
WNVF											

RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus fever. S: Suspected cases, P: Probable cases, C: Confirmed cases. No data reported for blank cells.

No cases nor deaths reported for 2015.

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and East-Southern Africa sub-region

Capacities and domains

Domain	Percentage (%)
African Region	46.5
East-Southern Africa	41.2
Kenya	57.6
PAO	42.9
CSPEP	40
RVSC	76.9
VS	100
MCSC	33.3
DCN	70
DS	40

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Strengths

- Existence of a national programme on arboviral diseases (AVDs) surveillance & control
- Laboratory testing capacities for the detection of arboviruses and confirmation of AVDs cases.
- Existence of health facilities for the management of cases & severe cases of AVDs
- Arbovirus surveillance system in place
- Entomological *Aedes* surveillance & control system in place
- Existence of community outreach programmes on AVDs; community awareness on AVDs and implication in control activities
- Existence of a national surveillance of AVDs outbreaks & response committee
- Existence of cooperation agreements in outbreak situations

Possible ways forward

- Consider the use of guidelines on AVDs surveillance and control
- Consider the surveillance of AVDs in humans, animals and the collection & analysis of AVDs outbreak risk factors
- Consider the use of guidelines for the management of cases and severe cases of AVDs
- Consider the monitoring of insecticide resistance in *Aedes* vectors
- Consider the development of a national contingency plan including outbreaks of AVDs
- Provide regular training for staff working in the 7 domains assessed

Lesotho

Transmission and burden of arboviral diseases

Vectors and arboviruses

- Presence or absence of *Aedes* in the country: no data yet (South Africa's situation may be considered)
- Major arboviruses circulating in the country: no data yet (South Africa's situation may be considered)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019.
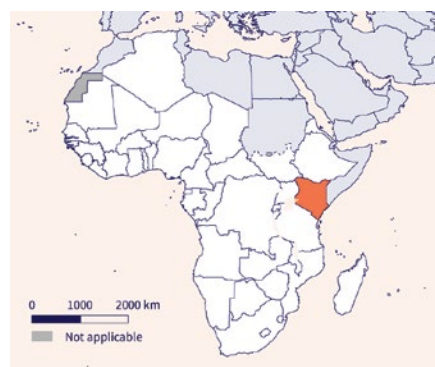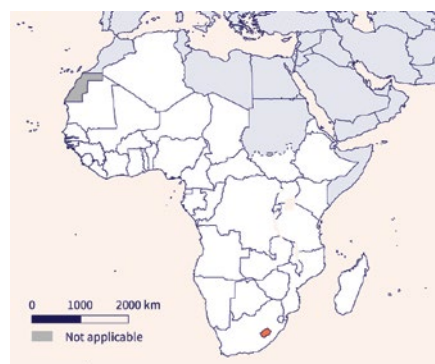
No cases nor deaths reported

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and East-Southern Africa sub-region

Capacities and domains

	Percentage (%)
African Region	46.5
East-Southern Africa	41.2
Lesotho	38.1
PAO	42.9
CSPEP	70
RVSC	30.8
VS	0
MCSC	33.3
DCN	60
DS	30

PAO: Preparedness for Arboviral Disease utbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

0   1000   2000 km

Not applicable

Strengths

- Laboratory testing capacities for the confirmation of the cases of arboviral diseases (AVDs) and the notification of the major ones
- Existence of health facilities to manage cases & severe cases of AVDs
- Existence of community outreach programmes on AVDs; community awareness on AVDs and implication in control activities
- Existence of a national surveillance of AVDs outbreaks & response committee

Possible ways forward

- Consider capacity building for the arboviral diseases (AVDs) surveillance
- Strengthening laboratory capacities for the detection of arboviruses and the confirmation of positive cases of AVDs
- Consider the use of guidelines for the management of cases and severe cases of AVDs
- Consider capacity building for virological surveillance
- Consider capacity building for the entomological surveillance and control of *Aedes* including the monitoring of insecticide resistance
- Consider the development of a national contingency plan including outbreaks of AVDs
- Provide regular training for staff working in the 7 domains assessed

Liberia

Transmission and burden of arboviral diseases

Vectors and arboviruses

- *Aedes aegypti* are reported to be abundant and transmitting arboviruses.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+	+			+			

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths from 2015 to 2019

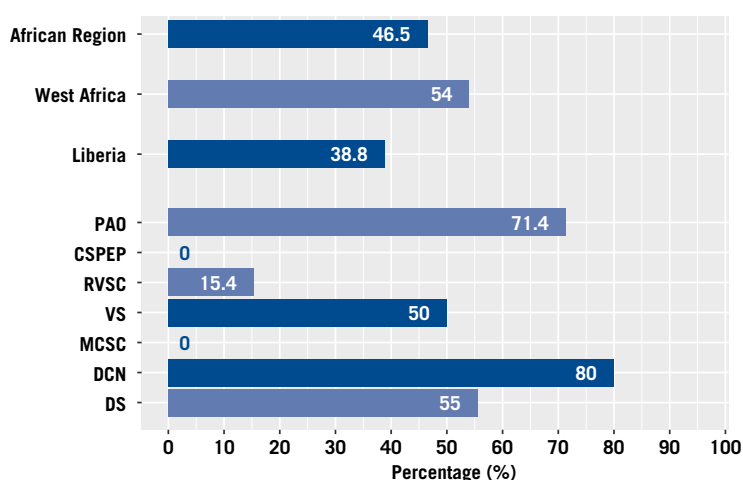|	2017		2018		2019				
	Cases	Deaths	Cases	Deaths	Cases				Deaths
					S	P	C	Total	
Dengue									
Chikungunya									
Zika									
RVF									
YF	163	2	121		120			120	4
WNVF									

RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus fever. S: Suspected cases, P: Probable cases, C: Confirmed cases. No data reported for blank cells.

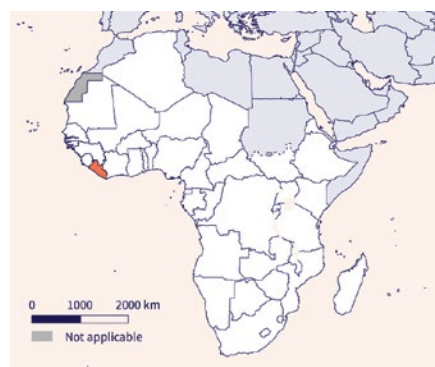No cases nor deaths reported for 2015 and 2016.

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and West Africa sub-region

Capacities and domains

	Percentage (%)
African Region	46.5
West Africa	54
Liberia	38.8
PAO	71.4
CSPEP	0
RVSC	15.4
VS	50
MCSC	0
DCN	80
DS	55

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Strengths

- Existence of a national programme and guidelines on arboviral diseases (AVDs) surveillance & control.
- Mandatory notification of major AVDs cases
- Laboratory testing capacities for the detection of arboviruses and confirmation of cases and the positive cases of AVDs.
- Arbovirus surveillance system in place
- Existence of capacities for the preparedness for AVDs outbreaks/epidemics

Possible ways forward

- Consider the surveillance of AVDs in humans, and the collection & analysis of AVDs outbreak risk factors
- Consider the strengthening of capacities for the management of cases & severe cases of AVDs including guidelines and adequate health facilities
- Consider capacity building for the entomological surveillance and control of *Aedes* including the monitoring of insecticide resistance
- Consider capacity building for the community sensitization and participation to activities related to the control of AVDs
- Provide regular training for staff working in the 7 domains assessed

Madagascar

Transmission and burden of arboviral diseases

Vectors and arboviruses

- ***Aedes aegypti*** are reported to be stable in select areas and posing significant public health threats (PHT) while ***Aedes albopictus*** are restricted to few sites and do not pose significant PHT.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+	+	+					

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths from 2015 to 2019.

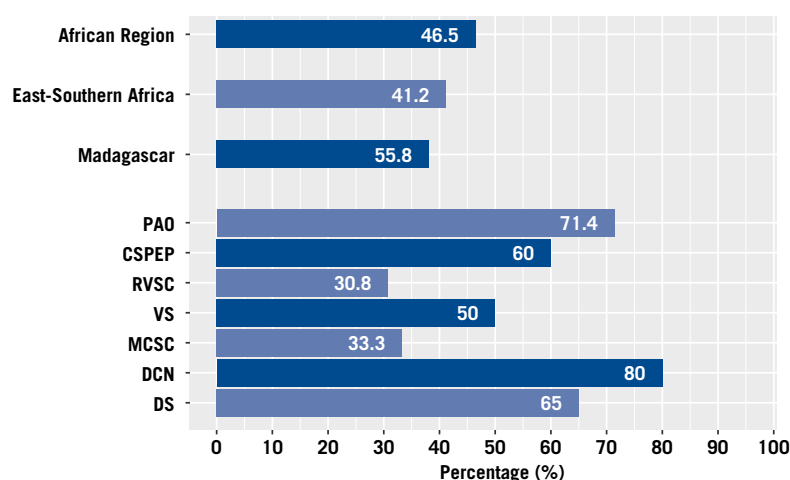|	2018		2019				
	Cases	Deaths	Cases				Deaths
			S	P	C	Total	
Dengue					73	73	
Chikungunya	511		2500		258	2758	
Zika							
RVF							
YF							
WNVF							

RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus fever S: Suspected cases, P: Probable cases, C: Confirmed cases. No data reported for blank cells.

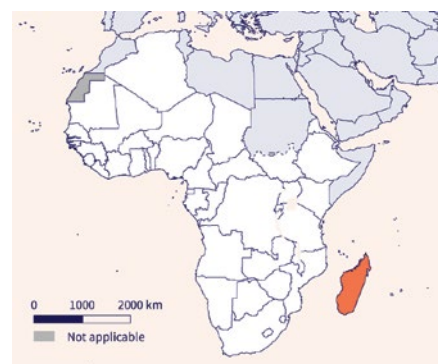No cases nor deaths reported for 2015, 2016 and 2017.

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and East-Southern Africa sub-region

Capacities and domains

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Strengths

- Existence of a national programme and guidelines on arboviral diseases (AVDs) surveillance & control
- Laboratory testing capacities for the detection of arboviruses and confirmation of cases and the positive cases of AVDs.
- Existence of health facilities to manage cases & severe cases of AVDs
- Arbovirus surveillance system in place
- Existence of community outreach programmes on AVDs; community awareness on AVDs and implication in control activities
- Existence of a national surveillance of AVDs outbreaks & response committee and a contingency plan
- Existence of cooperation agreements in outbreak situations

Possible ways forward

- Consider the collection & analysis of AVDs outbreak risk factors
- Consider the use of guidelines for the management of cases and severe cases of AVDs
- Consider capacity building for the entomological surveillance and control of *Aedes* including the monitoring of insecticide resistance
- Provide regular training for staff working in the 7 domains assessed

Surveillance and control of arboviral diseases in the WHO African Region

Malawi

Transmission and burden of arboviral diseases
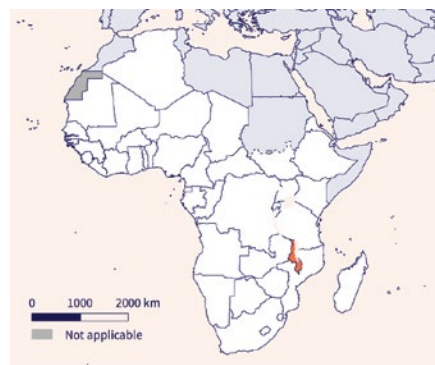
Vectors and arboviruses

- *Aedes aegypti* and *Aedes albopictus* are found in the country according to the scientific literature[1].
- Major arboviruses found in the country according to the scientific literature[1]

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
	+						

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019.

No cases nor deaths reported

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and East-Southern Africa sub-region

Capacities and domains

	Percentage (%)
African Region	46.5
East-Southern Africa	41.2
Malawi	7.2
PAO	0
CSPEP	20
RVSC	15.4
VS	0
MCSC	0
DCN	0
DS	15

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

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[1] Braack L, Gouveia de Almeida AP, Cornel AJ, Swanepoel R, de Jager C. Mosquito-borne arboviruses of African origin: review of key viruses and vectors. Parasit Vectors. 2018;11:29

Strengths

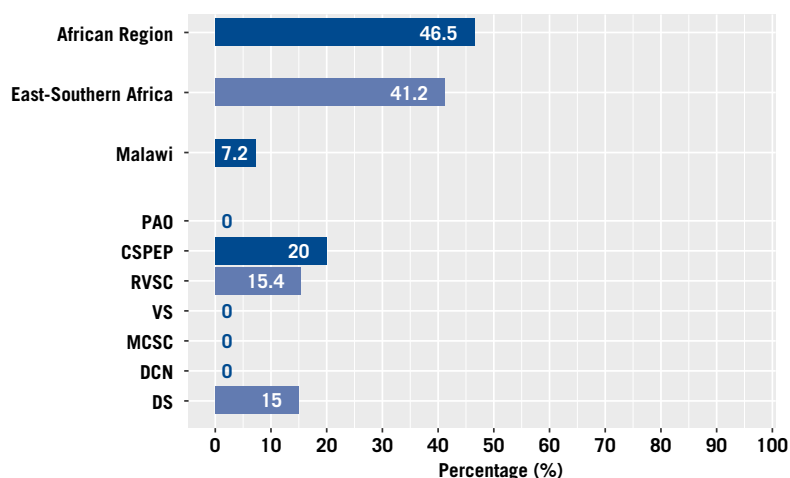- Existence of a national committee on the surveillance of arboviral diseases (AVDs) outbreaks & response

Possible ways forward

- Consider capacity building for the AVDs surveillance
- Consider the strengthening of laboratory capacities for the detection of arboviruses and the confirmation of suspected cases and the positive cases of AVDs.
- Consider the strengthening of capacities for the management of cases & severe cases of AVDs including guidelines and adequate health facilities
- Consider capacity building for virological surveillance
- Consider capacity building for the entomological surveillance and control of *Aedes* including the monitoring of insecticide resistance
- Consider capacity building for the community sensitization and participation to activities related to the control of AVDs
- Consider capacity building for the preparedness for AVDs outbreaks/epidemics

Mali

Transmission and burden of arboviral diseases

Vectors and arboviruses

- **Aedes aegypti** and **Aedes albopictus** are reported to be stable in select areas and posing significant public health threats in the country.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+			+	+		+	

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

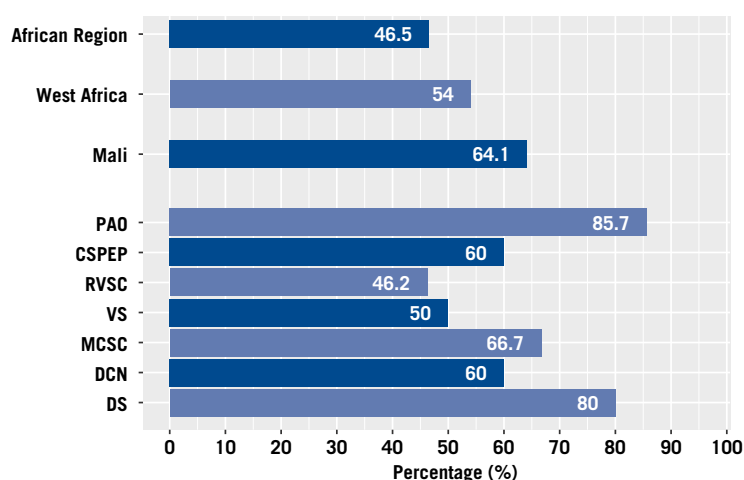### Arboviral disease cases & deaths from 2015 to 2019.

	2015		2016		2017		2018		2019				
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases				Deaths
									S	P	C	Total	
Dengue					15				20	0	9	29	0
Chikun-gunya													
Zika		2											
RVF	2		5		1								
YF	181	15	260	0	183	8	226		248	0	0	248	7
WNVF													

RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus fever. S: Suspected cases, P: Probable cases, C: Confirmed cases. No data reported for blank cells.
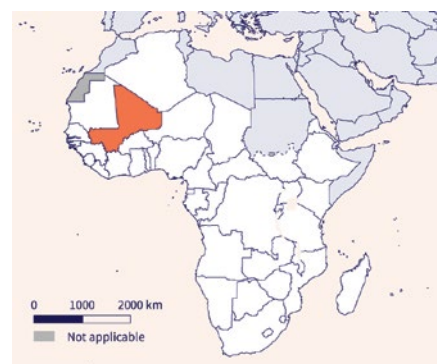
Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and West Africa sub-region

Capacities and domains

Domain	Percentage (%)
African Region	46.5
West Africa	54
Mali	64.1
PAO	85.7
CSPEP	60
RVSC	46.2
VS	50
MCSC	66.7
DCN	60
DS	80

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Strengths

- Existence of capacities for disease surveillance including arboviral diseases (AVDs)
- Laboratory testing capacities for the detection of arboviruses and confirmation of AVDs cases.
- Existence of capacities for the management of cases & severe cases of AVDs
- Arbovirus surveillance system in place
- Entomological Aedes surveillance & control system in place
- Existence of community outreach programmes on AVDs; community awareness on AVDs and implication in control activities.
- Existence of capacities for the preparedness for AVDs outbreaks/epidemics

Possible ways forward

- Consider the monitoring of insecticide resistance in *Aedes* vectors
- Provide regular training for staff working in the 7 domains assessed

Mauritania

Transmission and burden of arboviral diseases

Vectors and arboviruses

- *Aedes aegypti* are occasionally found and do not pose significant public health threats in the country.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+							

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths from 2015 to 2019.

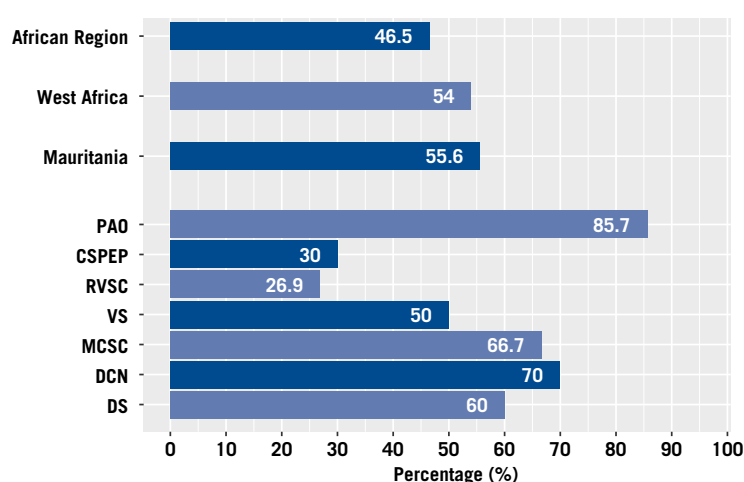|	2017		2018	
	Cases	Deaths	Cases	Deaths
Dengue	1	0	155	0
Chikungunya				
Zika				
RVF				
YF				
WNVF				

RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus fever. S: Suspected cases, P: Probable cases, C: Confirmed cases. No data reported for blank cells.
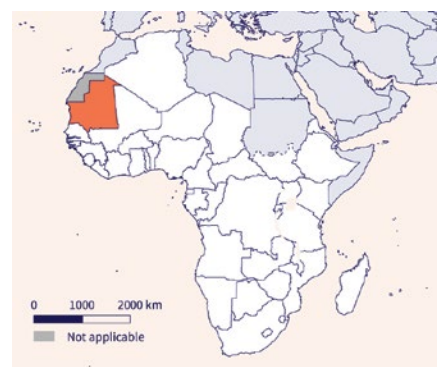
No cases nor deaths reported for 2015, 2016 and 2019.

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and West Africa sub-region

Capacities and domains

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Strengths

- Existence of a national programme and guidelines on arboviral diseases (AVDs) surveillance & control
- Mandatory notification of major AVDs cases
- Laboratory testing capacities for the detection of arboviruses and confirmation of AVDs cases.
- Existence of capacities for the management of cases & severe cases of AVDs
- Arbovirus surveillance system in place
- Existence of a national surveillance of AVDs outbreaks & response committee
- Existence of capacities for the preparedness for AVDs outbreaks/epidemics

Possible ways forward

- Consider the surveillance of AVDs in animals and the collection & analysis of AVDs outbreak risk factors
- Consider the strengthening of the entomological surveillance of *Aedes* including the monitoring of insecticide resistance
- Consider the effective run of the outreach programmes on AVDs including the community engagement on activities related to the control of AVDs
- Provide regular training for staff working in the 7 domains assessed

Mauritius

Transmission and burden of arboviral diseases

Vectors and arboviruses

- ***Aedes aegypti*** are reported to be absent while ***Aedes albopictus*** are spreading and posing significant public health threats in the country.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chikun-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+	+						

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

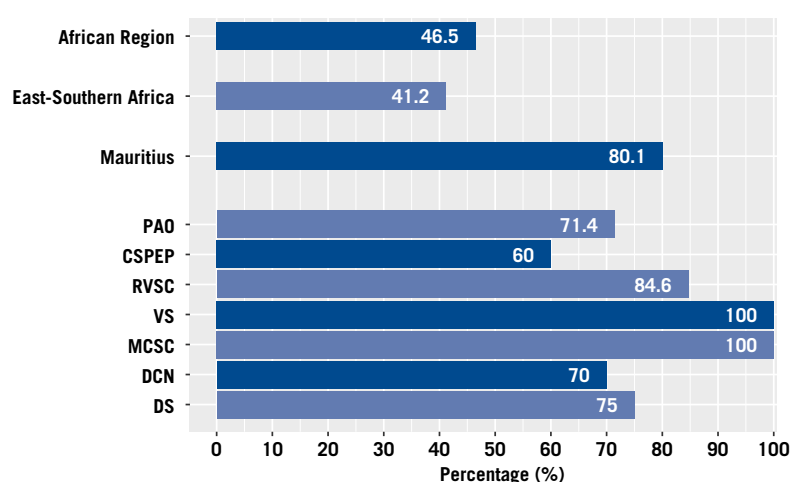### Arboviral disease cases & deaths from 2015 to 2019.

	2015		2016		2017		2018		2019				
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases				Deaths
									S	P	C	Total	
Dengue	86	0	26	0	11	0	1				152	152	0
Chikun-gunya					3	0	1				1	1	0
Zika													
RVF													
YF													
WNVF													

RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus fever. S: Suspected cases, P: Probable cases, C: Confirmed cases. No data reported for blank cells.
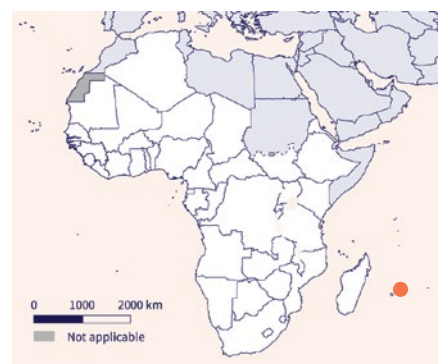
Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and East-Southern Africa sub-region

Capacities and domains

Domain	Percentage (%)
African Region	46.5
East-Southern Africa	41.2
Mauritius	80.1
PAO	71.4
CSPEP	60
RVSC	84.6
VS	100
MCSC	100
DCN	70
DS	75

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Strengths

- Existence of capacities for disease surveillance including arboviral diseases (AVDs)
- Laboratory testing capacities for the detection of arboviruses and confirmation of AVDs cases.
- Existence of capacities for the management of cases & severe cases of AVDs
- Arbovirus surveillance system in place
- Entomological *Aedes* surveillance & control system in place
- Existence of community outreach programmes on AVDs; community awareness on AVDs and implication in control activities
- Existence of capacities for the preparedness for AVDs outbreaks/epidemics

Possible ways forward

- Provide regular training for staff working in the 7 domains assessed

Mozambique

Transmission and burden of arboviral diseases

Vectors and arboviruses

- **Aedes aegypti** are reported to be abundant and transmitting arboviruses while **Aedes albopictus** are spreading and posing significant public health threats in the country.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+	+						

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths from 2015 to 2019.

No cases nor deaths reported

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and East-Southern Africa sub-region

Capacities and domains

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance
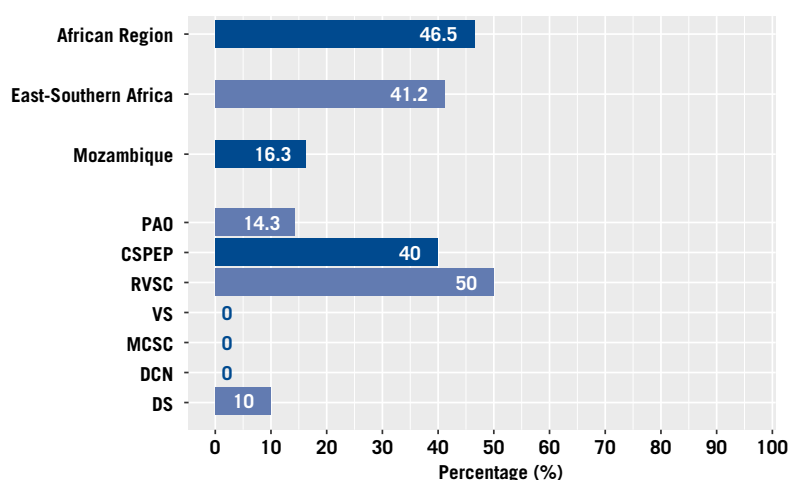
Strengths

- Existence of partial capacities for the entomological *Aedes* surveillance & control
- Existence of a national community outreach programme
- Existence of a national contingency plan including AVDs

Possible ways forward

- Consider capacity building for the AVDs surveillance
- Consider the strengthening of laboratory capacities for the detection of arboviruses and the confirmation of suspected cases and the positive cases of AVDs
- Consider capacity building for virological surveillance
- Consider the strengthening of capacities for the management of cases & severe cases of AVDs including guidelines and adequate health facilities
- Consider the strengthening of the entomological surveillance of *Aedes* including the monitoring of insecticide resistance
- Consider the effective run of the outreach programmes on AVDs including the community engagement on activities related to the control of AVDs
- Consider capacity building for the preparedness for AVDs outbreaks/epidemics
- Provide regular training for staff working in the 7 domains assessed

Namibia

Transmission and burden of arboviral diseases
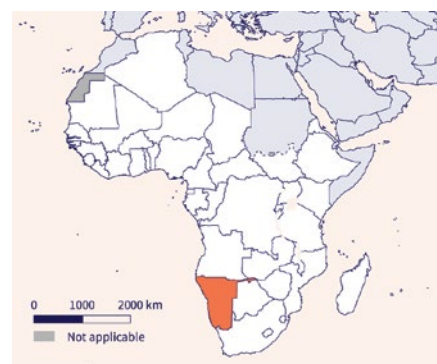
Vectors and arboviruses

- **Aedes aegypti** are found in the country according to the scientific literature[1,2]
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chikungunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+				+			

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019.

No cases nor deaths reported

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and East-Southern Africa sub-region

Capacities and domains

	Percentage (%)
African Region	46.5
East-Southern Africa	41.2
Namibia	28.7
PAO	14.3
CSPEP	40
RVSC	23.1
VS	0
MCSC	33.3
DCN	50
DS	40

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

1   Braack L, Gouveia de Almeida AP, Cornel AJ, Swanepoel R, de Jager C. Mosquito-borne arboviruses of African origin: review of key vi- ruses and vectors. Parasit Vectors. 2018;11:29

2   Noden BH, Musuuo M, Aku-Akai L, van der Colf B, Chipare I, Wilkin- son R. Risk assessment of flavivirus transmission in Namibia. Acta Tropica. 2014;137:123–9.
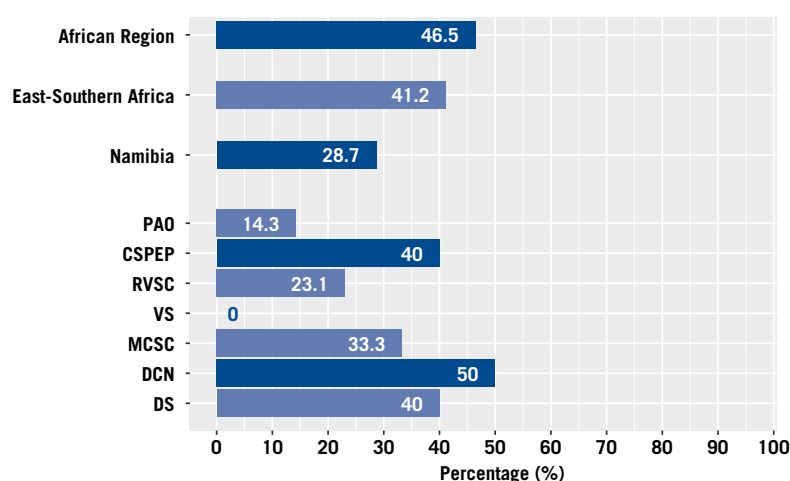
Strengths

- Existence of a national programme on arboviral diseases (AVDs) surveillance & control
- Mandatory notification of major AVDs cases
- Laboratory testing capacities for the confirmation of the AVDs cases and the notification of the major ones.
- Existence of health facilities to manage cases & severe cases of AVDs
- Existence of community outreach programmes on AVD

Possible ways forward

- Consider the use of the available guidelines on AVDs surveillance and control
- Consider the surveillance of AVDs in animals and the collection & analysis of AVDs outbreak risk factors
- Consider the use of available guidelines for the management of cases and severe cases of AVDs
- Consider capacity building for virological surveillance
- Consider the strengthening of the entomological surveillance of *Aedes* including the monitoring of insecticide resistance
- Consider the effective run of the outreach programmes on AVDs including the community engagement on activities related to the control of AVDs
- Consider capacity building for the preparedness for AVDs outbreaks/epidemics
- Provide regular training for staff working in the 7 domains assessed

Niger

Transmission and burden of arboviral diseases

Vectors and arboviruses

- *Aedes aegypti* and *Aedes albopictus* are reported to be occasionally found and do not pose significant public health threats in the country.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chikungunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+				+			

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019.

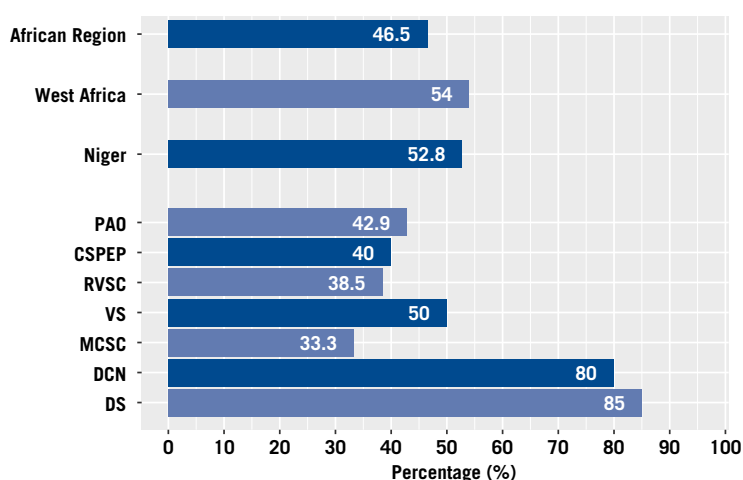|	2016		2019				
	Cases	Deaths	Cases				Deaths
			S	P	C	Total	
Dengue			1	0	1	2	0
Chikungunya							
Zika							
RVF	361						
YF			87	0	0	87	0
WNVF							

RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus fever. S: Suspected cases, P: Probable cases, C: Confirmed cases. No data reported for blank cells.
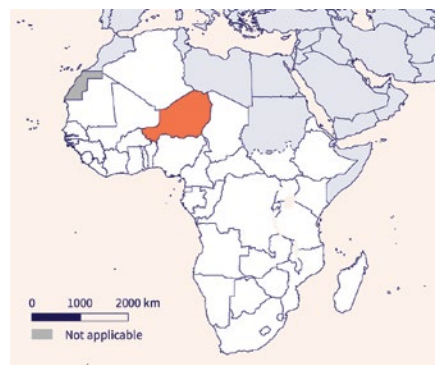
No cases nor deaths reported for 2015, 2017 and 2018.

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and West Africa sub-region

Capacities and domains

African Region	46.5
West Africa	54
Niger	52.8
PAO	42.9
CSPEP	40
RVSC	38.5
VS	50
MCSC	33.3
DCN	80
DS	85

Percentage (%)

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Strengths

- Existence of capacities for disease surveillance including arboviral diseases (AVDs)
- Laboratory testing capacities for the detection of arboviruses and confirmation of AVDs cases
- Existence of a national guideline to manage cases & severe cases of AVDs
- Arbovirus surveillance system in place
- Existence of community outreach programmes on AVDs; community awareness on AVDs and implication in control activities
- Existence of a national committee for the surveillance of AVDs outbreaks & response

Possible ways forward

- Consider the surveillance of AVDs in animals
- Consider the strengthening of health facilities for the management of severe cases of AVDs
- Consider the strengthening of the entomological surveillance of *Aedes* including the monitoring of insecticide resistance
- Consider the development of a national contingency plan including outbreaks of AVDs
- Provide regular training for staff working in the 7 domains assessed

Nigeria

Transmission and burden of arboviral diseases
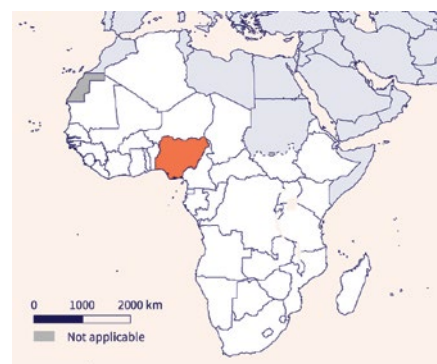
Vectors and arboviruses

- ***Aedes albopictus*** are reported to be restricted to few sites and do not pose significant public health threats in the country. ***Aedes aegypti*** are also present according to publications[1,2]
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+				+			

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019.

No cases nor deaths reported

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and West Africa sub-region

Capacities and domains

African Region	46.5
West Africa	54
Nigeria	23.6
PAO	42.9
CSPEP	20
RVSC	7.7
VS	0
MCSC	0
DCN	50
DS	45

Percentage (%)

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

1   Braack L, Gouveia de Almeida AP, Cornel AJ, Swanepoel R, de Jager C. Mosquito-borne arboviruses of African origin: review of key viruses and vectors. Parasit Vectors. 2018;11:29

2   Ayorinde A, Oboh B, Oduola A, Otubanjo O. The Insecticide Sus- ceptibility Status of Aedes aegypti (Diptera: Culicidae) in Farm and Nonfarm Sites of Lagos State, Nigeria. J Insect Sci. 2015;15:75.
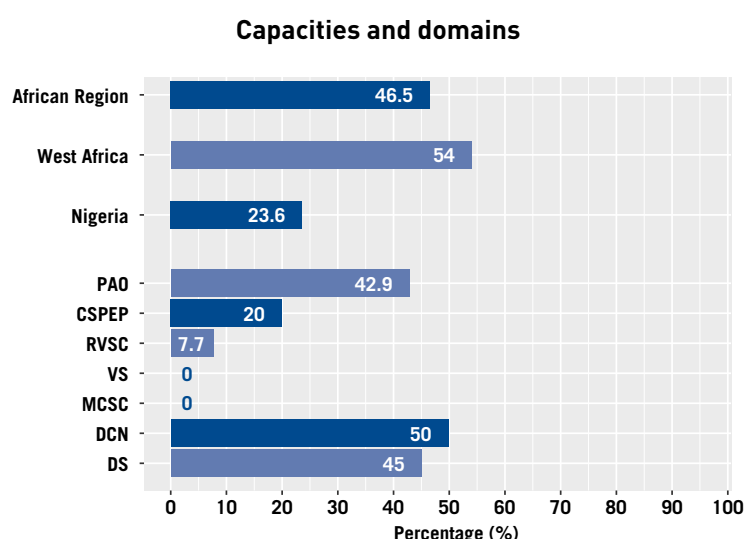
Strengths

- Existence of a national programme and guidelines on arboviral diseases (AVDs) surveillance & control
- Laboratory testing capacities for the detection of the major AVDs cases and their notification
- Existence of community outreach programmes on AVDs
- Existence of a national committee for the surveillance of AVDs outbreaks & response
- Existence of cooperation agreements in outbreak situations

Possible ways forward

- Consider the surveillance of AVDs in humans, animals and the collection & analysis of AVDs outbreak risk factors
- Strengthening laboratory capacities for the confirmation of suspected cases and the positive cases of AVDs
- Consider the strengthening of capacities for the management of cases & severe cases of AVDs including guidelines and adequate health facilities
- Consider capacity building for virological surveillance
- Consider capacity building for the entomological surveillance and control of Aedes including the monitoring of insecticide resistance
- Consider the effective run of the outreach programmes on AVDs including the community engagement on activities related to the control of AVDs
- Consider the development of a national contingency plan including outbreaks of AVDs

Rwanda

Transmission and burden of arboviral diseases

Vectors and arboviruses

- *Aedes aegypti* are found in the country according to publications[1,2].
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chikun- gunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
			+				

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.
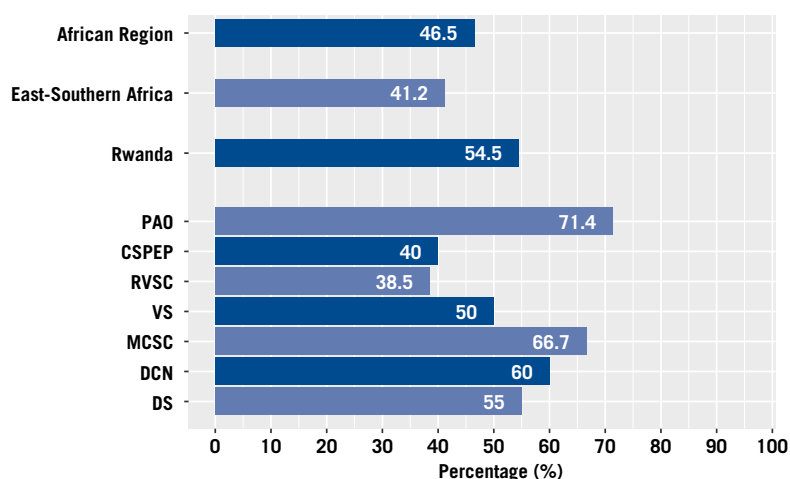
Arboviral disease cases & death reported for last 5 years

No cases nor deaths reported

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and East-Southern Africa sub-region

Capacities and domains

	Percentage (%)
African Region	46.5
East-Southern Africa	41.2
Rwanda	54.5
PAO	71.4
CSPEP	40
RVSC	38.5
VS	50
MCSC	66.7
DCN	60
DS	55

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

1   Demanou M, Nyatanyi T, Rusanganwa A, Olu O. Risk Assessment of Yellow Fever Virus Circulation in Rwanda [Internet]. Republic of Rwan- da; 2014 p. 24. Available from: https://rbc. gov.rw/IMG/pdf/ rwanda_yellow_fever_assessment_report.pdf

2   Umuhoza T, Berkvens D, Gafarasi I, Rukelibuga J, Mushonga B, Biryomumaisho S. Seroprevalence of Rift Valley fever in cattle along the Akagera–Nyabarongo rivers, Rwanda. J S Afr Vet Assoc. 2017;88:1379.
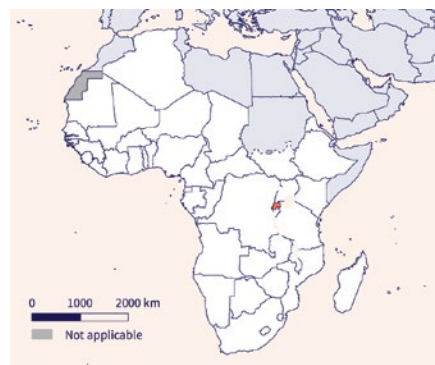
Strengths

- Existence of a national programme and guidelines on arboviral diseases (AVDs) surveillance & control
- Laboratory testing capacities for the detection and confirmation of the major AVDs cases and their notification
- Existence of a national guideline to manage cases & severe cases of AVDs
- Arbovirus surveillance system in place
- Existence of community outreach programmes on AVDs
- Existence of a national committee for the surveillance of AVDs outbreaks & response and a contingency plan

Possible ways forward

- Consider the surveillance of AVDs in humans, animals and the collection & analysis of AVDs outbreak risk factors
- Consider the strengthening of health facilities for the management of severe cases of AVDs
- Consider the strengthening of the entomological surveillance of *Aedes* including the monitoring of insecticide resistance
- Consider the effective run of the outreach programmes on AVDs including the community engagement on activities related to the control of AVDs
- Consider the development of regional/international cooperation for support in outbreak situations
- Provide regular training for staff working in the 7 domains assessed

Senegal

Transmission and burden of arboviral diseases

Vectors and arboviruses

- ***Aedes aegypti*** are reported to abundant and transmitting arboviruses in the country.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+	+	+	+	+	+	+	

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019.

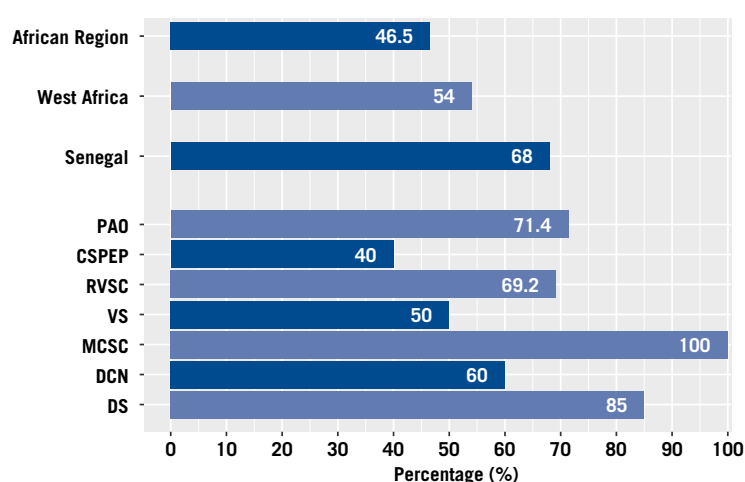|	2017		2018		2019	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
Dengue	138		342		20	1
Chikungunya						
Zika					2	
RVF					1	
YF					1	
WNVF						

RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus fever. S: Suspected cases, P: Probable cases, C: Confirmed cases. No data reported for blank cells.

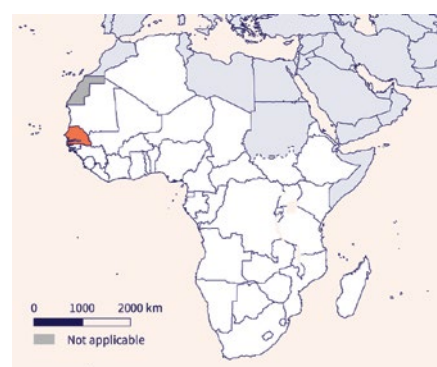No cases nor deaths reported for 2015 and 2016.

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and West Africa sub-region

Capacities and domains

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Strengths

- Existence of capacities for disease surveillance including arboviral diseases (AVDs)
- Laboratory testing capacities for the detection and confirmation of the cases for major AVDs and their notification
- Existence of capacities for the management of cases & severe cases of AVDs
- Arbovirus surveillance system in place
- Entomological *Aedes* surveillance & control system in place
- Existence of community outreach programmes on AVDs
- Existence of capacities for the preparedness for AVDs outbreaks/epidemics

Possible ways forward

- Consider the monitoring of insecticide resistance in *Aedes* vectors
- Consider the effective run of the outreach programmes on AVDs including the community engagement on activities related to the control of AVDs
- Provide regular training for staff working in the 7 domains assessed

Seychelles

Transmission and burden of arboviral diseases
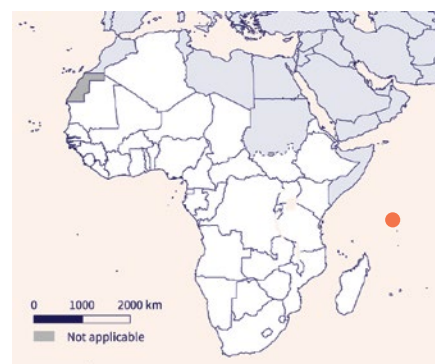
Vectors and arboviruses

- *Aedes aegypti* are reported to be absent in the country while *Aedes albopictus* are abundant and transmitting arboviruses.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+	+						

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019.

No cases nor deaths reported

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and East-Southern Africa sub-region

Capacities and domains

African Region: 46.5
East-Southern Africa: 41.2
Seychelles: 50.6
PAO: 85.7
CSPEP: 60
RVSC: 65.4
VS: 0
MCSC: 33.3
DCN: 50
DS: 60

Percentage (%)

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance
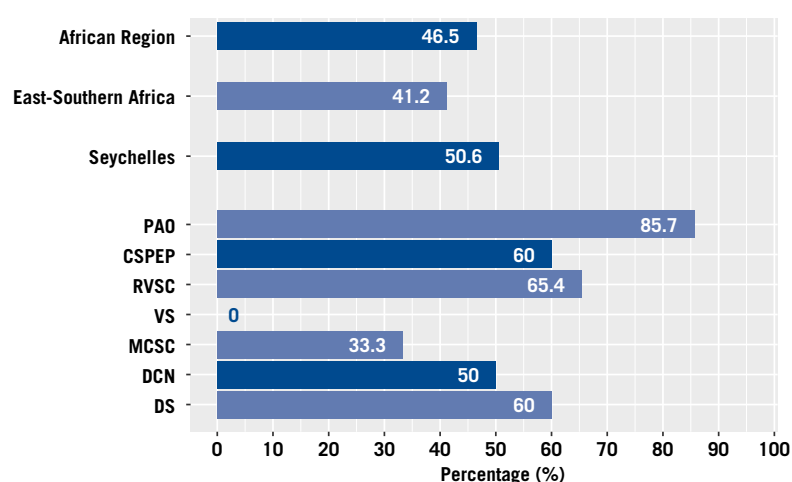
Strengths

- Existence of a national programme and guidelines on arboviral diseases (AVDs) surveillance & control
- Mandatory notification of major AVDs cases
- Laboratory testing capacities for the confirmation of AVDs cases and the notification of the major ones
- Existence of a national guideline to manage cases & severe cases of AVDs
- Entomological *Aedes* surveillance & control system in place
- Existence of community outreach programmes on AVDs; community awareness on AVDs and implication in control activities
- Existence of capacities for the preparedness for AVDs outbreaks/epidemics

Possible ways forward

- Consider the surveillance of AVDs in humans, animals and the collection & analysis of AVDs outbreak risk factors
- Consider the confirmation of positive cases of AVDs
- Consider the strengthening of health facilities for the management of severe cases of AVDs
- Consider capacity building for virological surveillance
- Consider an effective entomological surveillance in *Aedes* including the monitoring of insecticide resistance
- Provide regular training for staff working in the 7 domains assessed

Sierra Leone

Transmission and burden of arboviral diseases

Vectors and arboviruses

- ***Aedes aegypti*** and ***Aedes albopictus*** are reported to be abundant and transmitting arboviruses in the country.
- Major arboviruses found in the country according to publications[1,2] (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+	+			+			

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019.

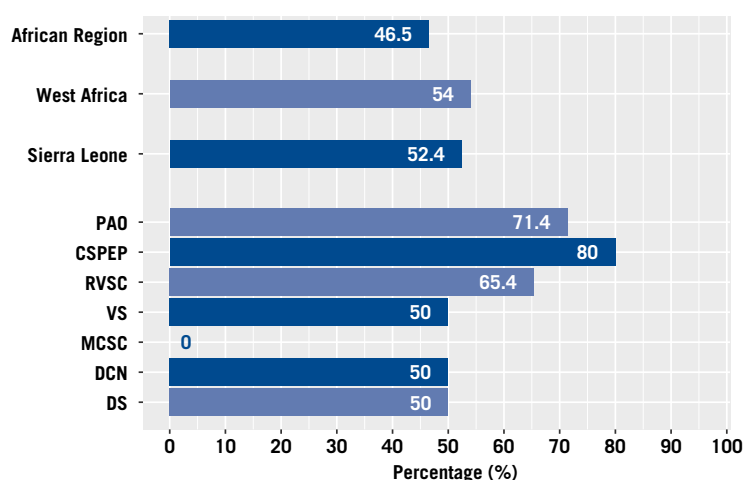|	2019				
	Cases				Deaths
	S	P	C	Total	
Dengue					
Chikungunya					
Zika					
RVF					
YF	76	0	0		0
WNVF					

RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus fever. S: Suspected cases, P: probable cases, C: Confirmed cases. No data reported for blank cells.

No cases nor deaths reported for 2015, 2016, 2017 and 2018.

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and West Africa sub-region

Capacities and domains

	Percentage (%)
African Region	46.5
West Africa	54
Sierra Leone	52.4
PAO	71.4
CSPEP	80
RVSC	65.4
VS	50
MCSC	0
DCN	50
DS	50

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

1   Braack L, Gouveia de Almeida AP, Cornel AJ, Swanepoel R, de Jager C. Mosquito-borne arboviruses of African origin: review of key viruses and vectors. Parasit Vectors. 2018;11:29

2   Dariano DF, Taitt CR, Jacobsen KH, Bangura U, Bockarie AS, Bockarie MJ, et al. Surveillance of Vector-Borne Infections (Chikungunya, Dengue, and Malaria) in Bo, Sierra Leone, 2012–2013. Am J Trop Med Hyg. 2017;97:1151–4.
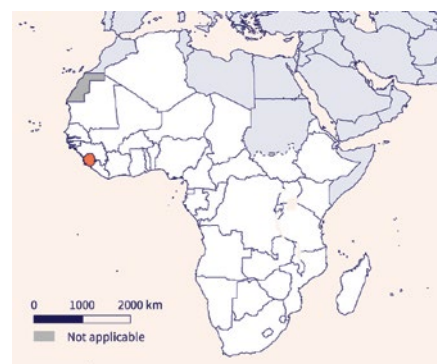
Strengths

- Existence of a national programme on arboviral diseases (AVDs) surveillance & control
- Mandatory notification of major AVDs cases
- Laboratory testing capacities for the detection and confirmation of cases for the major AVDs
- Arbovirus surveillance system in place
- Entomological *Aedes* surveillance & control system in place
- Existence of community outreach programmes on AVDs; community awareness on AVDs and implication in control activities
- Existence of a national committee for the surveillance of AVDs outbreaks & response
- Existence of cooperation agreements in outbreak situations

Possible ways forward

- Consider the surveillance of AVDs in animals and the collection & analysis of AVDs outbreak risk factors
- Consider the confirmation of positive cases of AVDs.
- Consider the strengthening of capacities for the management of cases & severe cases of AVDs including guidelines and adequate health facilities
- Consider the strengthening of the entomological surveillance of *Aedes* including the monitoring of insecticide resistance
- Consider the development of a national contingency plan including outbreaks of AVDs

South Africa
Strengths

- **Aedes aegypti** and **Aedes albopictus** are reported to be spreading and posing significant public health threats in the country.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chikungunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
	+		+		+		Sindbis virus

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.
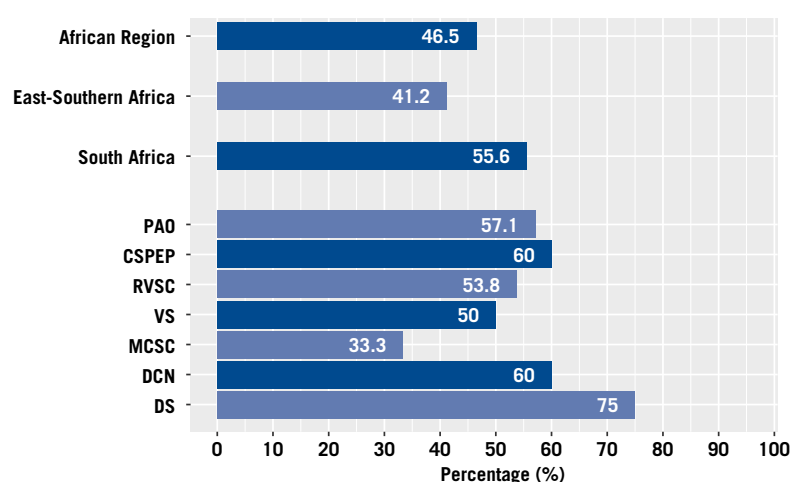
Arboviral disease cases & deaths from 2015 to 2019.

	2015		2016		2017		2018		2019				
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases				Deaths
									S	P	C	Total	
Dengue	19	0	15	0	13	0	15	0	13	16	29		0
Chikungunya	2	0	3	0	2	0	1	0	4		4		0
Zika			3	0									
RVF							8	0					
YF	5	0											
WNVF			8	0	13	0	7	0		2	2		0

RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus fever. S: Suspected cases, P: Probable cases, C: Confirmed cases. No data reported for blank cells.
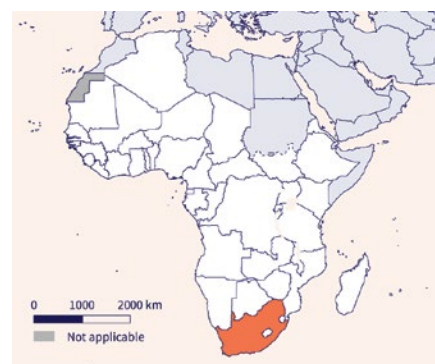
Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and East-Southern Africa sub-region

Capacities and domains

	Percentage (%)
African Region	46.5
East-Southern Africa	41.2
South Africa	55.6
PAO	57.1
CSPEP	60
RVSC	53.8
VS	50
MCSC	33.3
DCN	60
DS	75

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Strengths

- Existence of a national guideline on arboviral diseases (AVDs) surveillance & control
- Mandatory notification of major AVDs cases
- Laboratory testing capacities for the detection and confirmation of cases for the major AVDs
- Existence of health facilities to manage cases & severe cases of AVDs
- Arbovirus surveillance system in place
- Entomological *Aedes* surveillance & control system in place
- Existence of community outreach programmes on AVDs; community awareness on AVDs and implication in control activities
- Existence of a national committee for the surveillance of AVDs outbreaks & response and a contingency plan
- Existence of cooperation agreements in outbreak situations

Possible ways forward

- Consider the surveillance of AVDs in animals
- Consider the confirmation of positive cases of AVDs
- Consider the use of available guidelines for the management of cases and severe cases of AVDs
- Consider the strengthening of the entomological surveillance of *Aedes* including the monitoring of insecticide resistance
- Provide regular training for staff working in the 7 domains assessed

South Sudan

Transmission and burden of arboviral diseases

Vectors and arboviruses

- ***Aedes aegypti*** are reported to be spreading and posing significant public health threats in the country.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
				+			

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019.

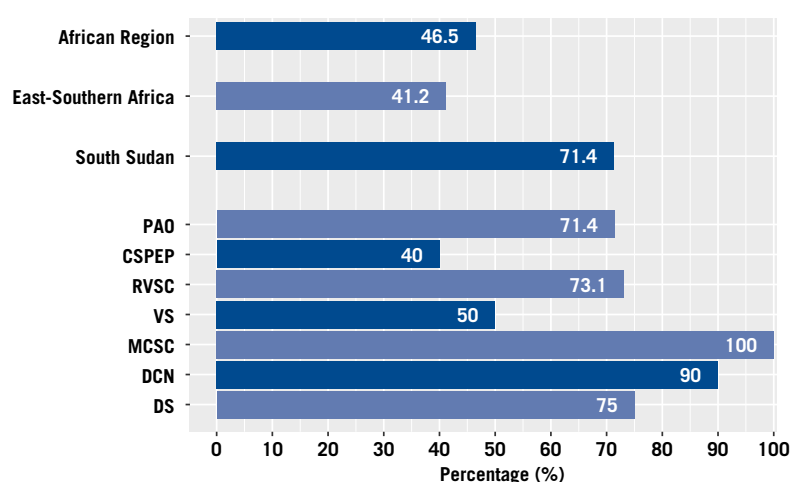|	2017		2018		2019				Deaths
	Cases	Deaths	Cases	Deaths	Cases				Deaths
					S	P	C	Total	
Dengue									
Chikungunya									
Zika		4							
RVF			5						
YF					39		3	42	0
WNVF									

RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus fever. S: Suspected cases, P: Probable cases, C: Confirmed cases. No data reported for blank cells.

No cases nor deaths reported for 2015 and 2016.

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and East-Southern Africa sub-region

Capacities and domains

Domain	Percentage (%)
African Region	46.5
East-Southern Africa	41.2
South Sudan	71.4
PAO	71.4
CSPEP	40
RVSC	73.1
VS	50
MCSC	100
DCN	90
DS	75

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Strengths

- Existence of capacities for disease surveillance including arboviral diseases (AVDs)
- Mandatory notification of major AVDs cases
- Existence of capacities for the diagnostic and case notification including the AVDs cases
- Existence of capacities for the management of cases & severe cases of AVDs
- Arbovirus surveillance system in place
- Entomological Aedes surveillance & control system in place
- Existence of community outreach programmes on AVDs; community awareness on AVDs and implication in control activities
- Existence of a national committee for the surveillance of AVDs outbreaks & response and a contingency plan
- Existence of cooperation agreements in outbreak situations

Possible ways forward

- Consider the surveillance of AVDs in animals
- Consider the monitoring of insecticide resistance in *Aedes* vectors
- Provide regular training for staff working in the 7 domains assessed

Sao Tome and Principe

Transmission and burden of arboviral diseases

Vectors and arboviruses

- ***Aedes aegypti*** are reported to be spreading and posing significant public health threats (PHT) while ***Aedes albopictus*** are restricted to few sites and do not pose significant PHT in the country.
- Major arboviruses found in the country according to publications[1,2] (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+							

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019.

No cases nor deaths reported

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and Central Africa sub-region

Capacities and domains

	Percentage (%)
African Region	46.5
Central Africa	44.3
Sao Tome and Principe	24.3
PAO	50
CSPEP	20
RVSC	50
VS	0
MCSC	0
DCN	0
DS	50

PAO: Preparedness for Arboviral Disease Outbreaks/ Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

1   Chauhan RP, Dessie ZG, Noreddin A, El Zowalaty ME. Systematic Review of Important Viral Diseases in Africa in Light of the 'One Health' Concept. Pathogens. 2020;9:301.

2   Yen T-Y, Trovoada dos Santos M de J, Tseng L-F, Chang S-F, Cheng C -F, Carvalho AV de A, et al. Seroprevalence of antibodies against dengue virus among pregnant women in the Democratic Republic of Sao Tome and Principe. Acta Tropica. 2016;155:58–62.
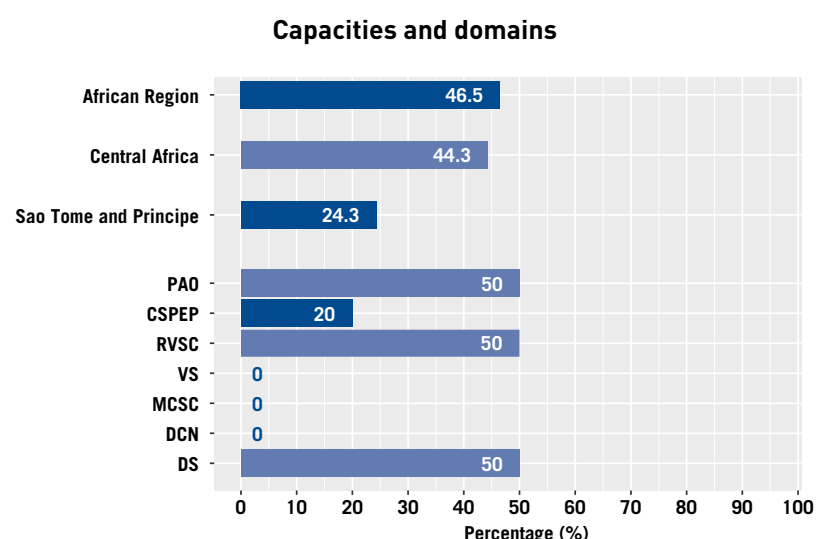
Strengths

- Existence of a national programme and guidelines on arboviral diseases (AVDs) surveillance & control
- Existence of partial capacities for the entomological *Aedes* surveillance & control
- Existence of community outreach programmes on AVDs; community awareness on AVDs
- Existence of a national committee for the surveillance of AVDs outbreaks & response and a contingency plan

Possible ways forward

- Consider the surveillance of AVDs in humans, animals and the collection & analysis of AVDs outbreak risk factors
- Consider the strengthening of laboratory capacities for the detection of arboviruses and the confirmation of suspected cases and the positive cases of AVDs
- Consider the strengthening of capacities for the management of cases & severe cases of AVDs including guidelines and adequate health facilities
- Consider capacity building for virological surveillance
- Consider the strengthening of the entomological surveillance of *Aedes* including the monitoring of insecticide resistance
- Consider the effective run of the outreach programmes on AVDs including the community engagement on activities related to the control of AVDs
- Consider the development of regional/international cooperation for support in outbreak situations
- Provide regular training for staff working in the 7 domains assessed

Togo

Transmission and burden of arboviral diseases

Vectors and arboviruses

- ***Aedes aegypti*** are reported to be spreading and posing significant public health threats in the country.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chikungunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+				+			

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

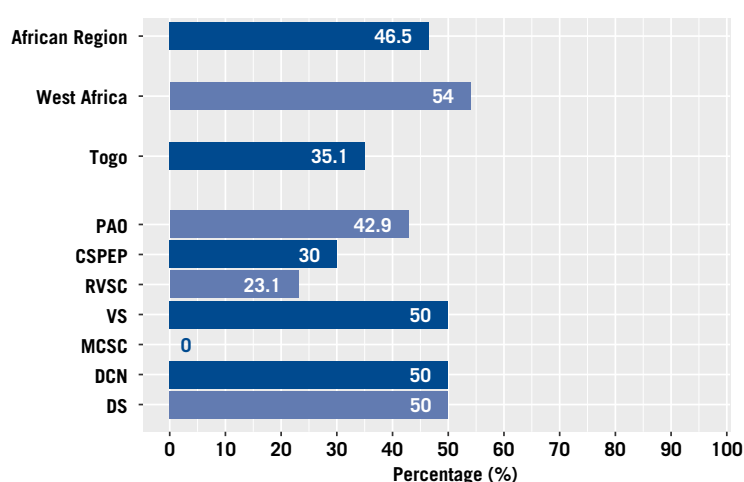### Arboviral disease cases & deaths reported from 2015 to 2019.

	2015		2016		2017		2018		2019				
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases				Deaths
									S	P	C	Total	
Dengue							18	0	2			2	0
Chikungunya													
Zika													
RVF													
YF	357	0	151		470		372		316			316	0
WNVF													

RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus fever. S: Suspected cases, P: Probable cases, C: Confirmed cases. No data reported for blank cells.
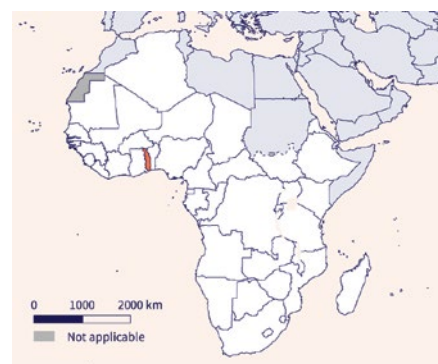
Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and West Africa sub-region

Capacities and domains

Domain	Percentage (%)
African Region	46.5
West Africa	54
Togo	35.1
PAO	42.9
CSPEP	30
RVSC	23.1
VS	50
MCSC	0
DCN	50
DS	50

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

Strengths

- Existence of national guidelines on arboviral diseases (AVDs) surveillance & control
- Mandatory notification of major AVDs cases
- Laboratory testing capacities for the detection and confirmation of cases for the major AVDs
- Consider capacity building for virological surveillance
- Existence of partial capacities for the entomological *Aedes* surveillance & control
- Existence of community outreach programmes on AVDs
- Existence of a national committee for the surveillance of AVDs outbreaks & response and a contingency plan
- Existence of cooperation agreements in outbreak situations

Possible ways forward

- Consider the surveillance of AVDs in humans, animals and the collection & analysis of AVDs outbreak risk factors
- Consider the confirmation of positive cases of AVDs.
- Consider the strengthening of capacities for the management of cases & severe cases of AVDs including guidelines and adequate health facilities
- Consider the strengthening of the entomological surveillance of *Aedes* including the monitoring of insecticide resistance
- Consider the effective run of the outreach programmes on AVDs including the community engagement on activities related to the control of AVDs
- Provide regular training for staff working in the 7 domains assessed

Uganda

Transmission and burden of arboviral diseases

Vectors and arboviruses

- ***Aedes aegypti*** and ***Aedes albopictus*** are found in the country according to publications[1]
- Major arboviruses found in the country according to publications[1] (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+	+			+			

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019.

No cases nor deaths reported

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and East-Southern Africa sub-region

Capacities and domains

	Percentage (%)
African Region	46.5
East-Southern Africa	41.2
Uganda	23.5
PAO	57.1
CSPEP	80
RVSC	7.7
VS	0
MCSC	0
DCN	0
DS	20

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

1   Braack L, Gouveia de Almeida AP, Cornel AJ, Swanepoel R, de Jager C. Mosquito-borne arboviruses of African origin: review of key vi- ruses and vectors. Parasit Vectors. 2018;11:29
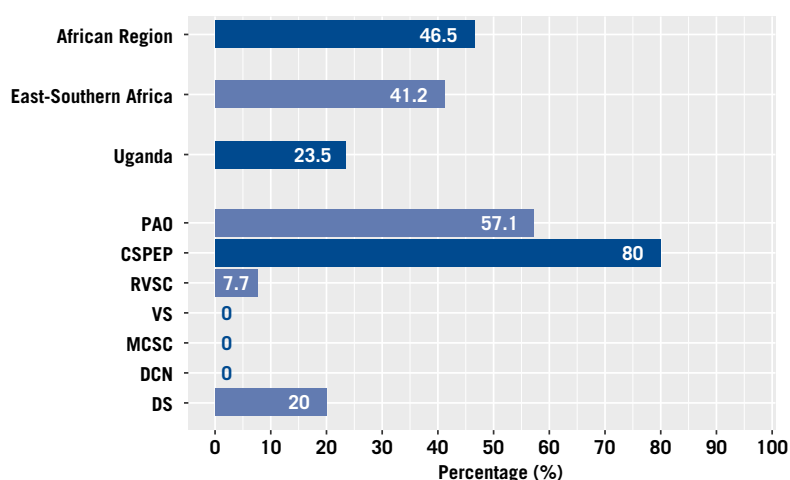

Strengths

- Existence of capacities for the community sensitization and participation to the activities related to the control of arboviral diseases (AVDs)
- Existence of capacities for the preparedness for AVDs outbreaks/epidemics

Possible ways forward

- Consider capacity building for the surveillance of AVDs
- Consider the strengthening of laboratory capacities for the detection of arboviruses and the confirmation of suspected cases and the positive cases of AVDs
- Consider the strengthening of capacities for the management of cases & severe cases of AVDs including guidelines and adequate health facilities
- Consider capacity building for virological surveillance
- Consider capacity building for the entomological surveillance and control of *Aedes* including the monitoring of insecticide resistance
- Provide regular training for staff working in the 7 domains assessed

United Republic of Tanzania

Transmission and burden of arboviral diseases
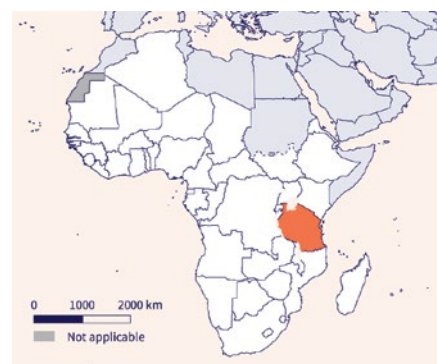
Vectors and arboviruses

- ***Aedes aegypti*** are reported to be spreading and posing significant public health threats (PHT) while ***Aedes albopictus*** are restricted to few sites and do no pose significant PHT.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+	+	+	+	+			

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019.

No cases nor deaths reported

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and East-Southern Africa sub-region

Capacities and domains

UR Tanzania: United Republic of Tanzania. PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance
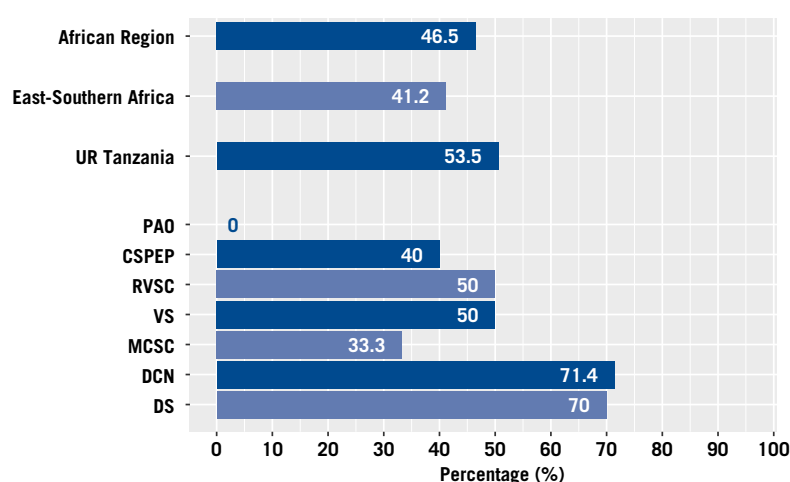
Strengths

- Existence of a national programme and guidelines on arboviral diseases (AVDs) surveillance & control
- Mandatory notification of major AVDs cases
- Laboratory testing capacities for the detection and confirmation of cases for major AVDs and their notification
- Existence of health facilities to manage cases & severe cases of AVDs
- Arbovirus surveillance system in place
- Entomological *Aedes* surveillance & control system in place
- Existence of community outreach programmes on AVDs; community awareness on AVDs
- Existence of a national committee for the surveillance of AVDs outbreaks & response and a contingency plan
- Existence of cooperation agreements in outbreak situations

Possible ways forward

- Consider the surveillance of AVDs in humans
- Consider the confirmation of positive cases of AVDs.
- Consider the use of available guidelines for the management of cases and severe cases of AVDs
- Consider the strengthening of the entomological surveillance of Aedes including the monitoring of insecticide resistance
- Consider the effective run of the outreach programmes on AVDs including the community engagement on activities related to the control of AVDs
- Provide regular training for staff working in the 7 domains assessed

Zambia

Transmission and burden of arboviral diseases

Vectors and arboviruses

- ***Aedes aegypti*** are reported to be occasionally found and do not pose significant public health threats in the country.
- Major arboviruses reported as circulating in the country (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
+	+	+		+			

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported from 2015 to 2019.

No cases nor deaths reported

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and East-Southern Africa sub-region

Capacities and domains

	Percentage (%)
African Region	46.5
East-Southern Africa	41.2
Zambia	31.4
PAO	57.1
CSPEP	20
RVSC	42.3
VS	0
MCSC	0
DCN	50
DS	50

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance
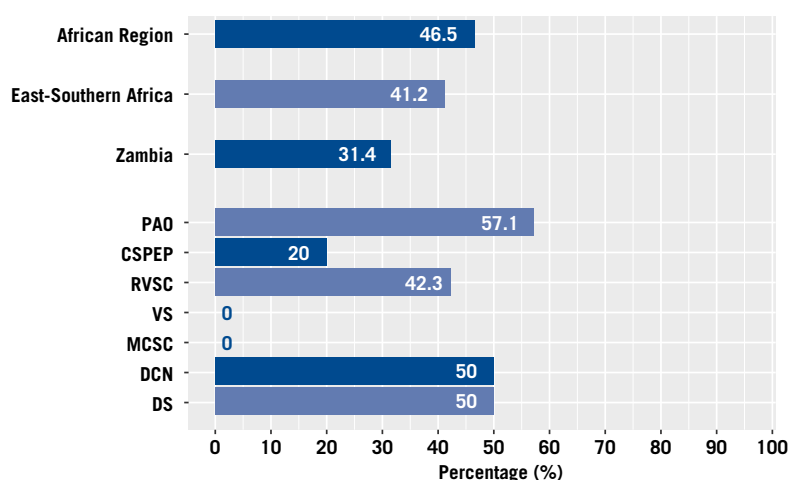
Strengths

- Existence of a national programme and guidelines on arboviral diseases (AVDs) surveillance & control
- Mandatory notification of major AVDs cases
- Laboratory testing capacities for the detection and confirmation of cases for major AVDs
- Entomological *Aedes* surveillance & control system in place
- Existence of community outreach programmes on AVDs
- Existence of a national committee for the surveillance of AVDs outbreaks & response and a contingency plan

Possible ways forward

- Consider the surveillance of AVDs in humans, animals and the collection & analysis of AVDs outbreak risk factors
- Consider the confirmation of positive cases of AVDs.
- Consider the strengthening of capacities for the management of cases & severe cases of AVDs including guidelines and adequate health facilities
- Consider capacity building for virological surveillance
- Consider the strengthening of the entomological surveillance of *Aedes* including the monitoring of insecticide resistance
- Consider the effective run of the outreach programmes on AVDs including the community engagement on activities related to the control of AVDs
- Consider the development of regional/international cooperation for support in outbreak situations
- Provide regular training for staff working in the 7 domains assessed

Zimbabwe

Transmission and burden of arboviral diseases

Vectors and arboviruses

- *Aedes aegypti* and *Aedes albopictus* are reported to be occasionally found and do not pose significant public health threats in the country.
- Major arboviruses found in the country according to publications[1] (see table below)

Dengue virus	Chiku-ngunya virus	Zika virus	RVF virus	YF virus	WNV	CCHFV	Others
	+		+				

+: circulation reported, RVF: Rift Valley fever, YF: Yellow fever, WNVF: West Nile virus, CCHFV: Crimean-Congo haemorrhagic fever virus. No data reported for blank cells, this does not exclude the presence of viruses.

Arboviral disease cases & deaths reported for last 5 years

No cases nor deaths reported

Capacity for surveillance and control

Find below the country capacities for the seven domains explored and those of the WHO African Region and East-Southern Africa sub-region

Capacities and domains

PAO: Preparedness for Arboviral Disease Outbreaks/Epidemics, CSPEP: Community Sensitization & Participation in non-Epidemic Periods, RVSC: Routine Vector Surveillance & Control, VS: Virological Surveillance, MCSC: Management of Cases & Severe Cases, DCN: Diagnostic & Case Notification, DS: Disease Surveillance

1 Braack L, Gouveia de Almeida AP, Cornel AJ, Swanepoel R, de Jager C. Mosquito-borne arboviruses of African origin: review of key viruses and vectors. Parasit Vectors. 2018;11:29
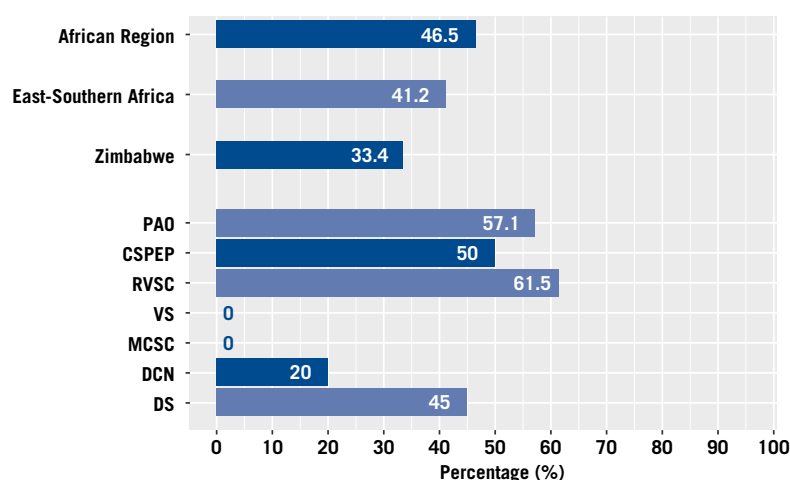
Strengths

- Existence of a national programme on arboviral diseases (AVDs) surveillance & control
- Entomological *Aedes* surveillance & control system in place
- Existence of community outreach programmes on AVDs
- Existence of a national committee for the surveillance of AVDs outbreaks & response and a contingency plan
- Existence of cooperation agreements in outbreak situations

Possible ways forward

- Consider the surveillance of AVDs in humans, animals and the collection & analysis of AVDs outbreak risk factors
- Consider the strengthening of laboratory capacities for the detection of arboviruses and the confirmation of suspected cases and the positive cases of AVDs
- Consider the strengthening of capacities for the management of cases & severe cases of AVDs including guidelines and adequate health facilities
- Consider capacity building for virological surveillance
- Consider the monitoring of insecticide resistance in *Aedes* vectors
- Consider the effective run of the outreach programmes on AVDs including the community engagement on activities related to the control of AVDs
- Provide regular training for staff working in the 7 domains assessed

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