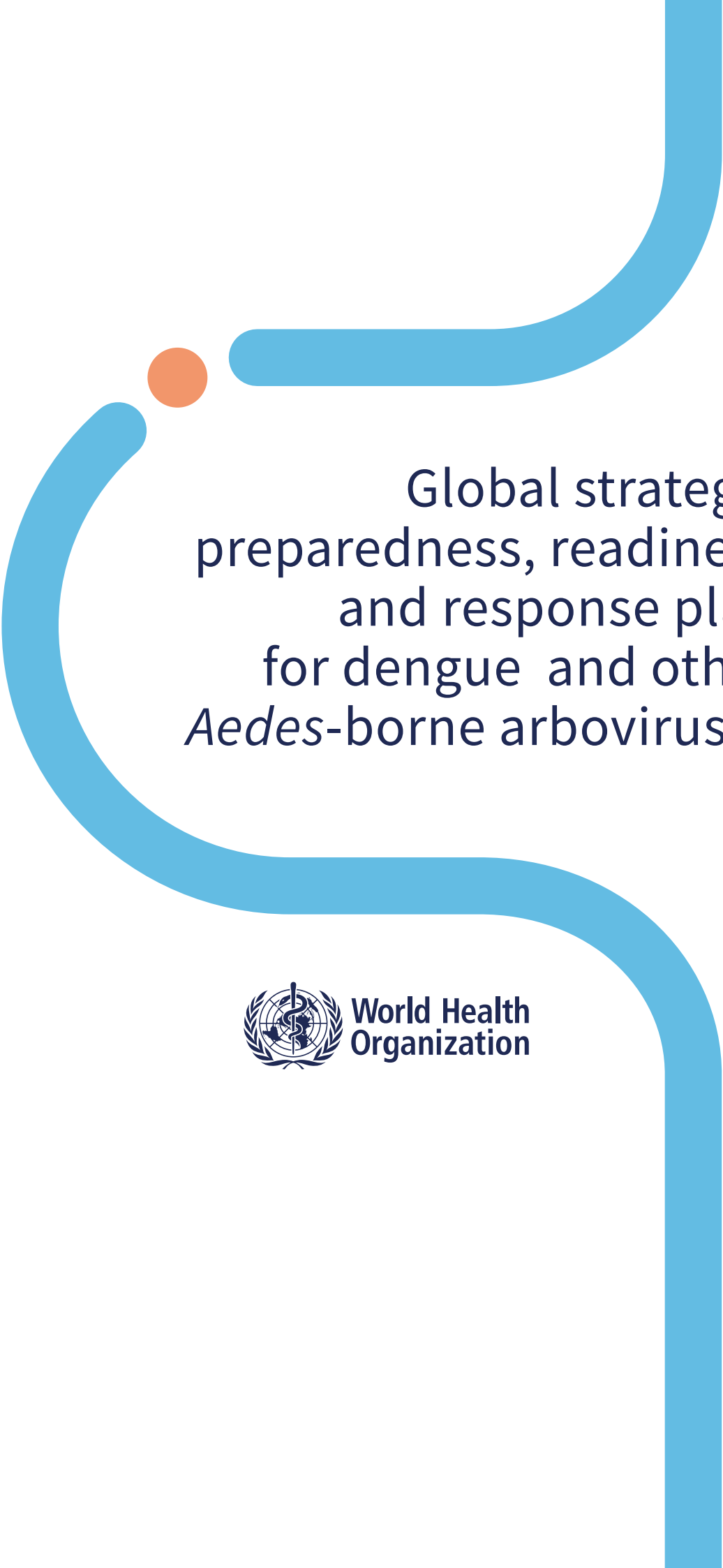




Global strategic
preparedness, readiness
and response plan
for dengue and other
Aedes-borne arboviruses

A decorative graphic element consisting of a thick blue line that starts at the top right, curves left, then down, then left, then down, and finally right. A small orange circle is positioned at the top of the first curve.

Global strategic
preparedness, readiness
and response plan
for dengue and other
Aedes-borne arboviruses



World Health
Organization

Global strategic preparedness, readiness and response plan for dengue and other *Aedes*-borne arboviruses

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Suggested citation. Strategic Preparedness, Readiness and Response Plan: Dengue and other *Aedes*-borne arboviruses.

Cataloguing-in-Publication (CIP) data. CIP data are available at <http://apps.who.int/iris>.

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Cover photo: In Brazil, community health workers visit local residents to help find and destroy mosquito breeding sites. © WHO / Karina Zambrana

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Foreword from the Director-General

Dengue has afflicted humanity for centuries, and possibly longer, with the first report of a clinically-compatible case of dengue recorded in a Chinese medical encyclopaedia in 992. In the past 20 years, however, dengue has spread rapidly around the world, spurred by increased global travel and the effects of climate change. From 2000 to 2019, WHO documented a ten-fold surge in reported cases, from 500,000 to 5.2 million. Since then, dengue incidence has surged, with over 12.3 million cases as of the end of August this year – almost double the 6.5 million cases reported in all of 2023.

The global prevalence and impact of dengue and other arboviruses such as Zika and chikungunya are a significant threat to public health, particularly in tropical areas where the diseases are endemic. As these diseases thrive primarily in urban settings, crossing borders easily and quickly, the fight against dengue and other arboviruses demands a concerted, strategic and informed response, which is what this Strategic Preparedness, Response, and Resilience Plan (SPRP) aims to achieve.

The SPRP is a comprehensive plan that outlines strategies and priority actions to control *Aedes*-borne arbovirus transmission in affected countries. Our multifaceted approach emphasizes integrated surveillance, laboratory diagnosis, vector control, community engagement, clinical management, and research and development. By tackling these diseases from multiple angles, we aim to reduce the disease burden, save lives and minimize the socioeconomic impact of dengue and other *Aedes*-borne arboviruses. The SPRP also includes measures for safe programming to ensure our interventions are secure and do not exacerbate the risk for those already vulnerable to severe disease from dengue and other arboviruses, or those involved in responding to the crisis.

We call for safe and effective arbovirus preparedness, prevention and control measures with a whole-of-society and regional approach through sustained collaboration and partnerships among countries, communities, and financial and technical partners. Dengue prevention and control is a shared responsibility, and everyone has a role to play, from maintaining clean environments to supporting vector control initiatives and seeking timely medical care.

This document serves as a roadmap to tackle the threat of dengue and other *Aedes*-borne arboviruses. Together, we can turn the tide against this disease, protect vulnerable populations and pave the way for a healthier future.

A handwritten signature in blue ink, which appears to be 'Tedros Adhanom Ghebreyesus'.

Dr Tedros Adhanom Ghebreyesus
Director-General, World Health Organization

Acronyms

CFR	case fatality rate
DALY	disability-adjusted life year
ECDC	European Centre for Disease Prevention and Control
ERF	emergency response framework
GVCR	global vector control response
HEPR	health emergency preparedness, response and resilience
IHR	International Health Regulations
INFORM	Index for Risk Management
IPC	infection prevention and control
KPI	key performance indicator
NGO	nongovernmental organization
NTDs	neglected tropical diseases
OSL	operation support and logistics
PRSEAH	preventing and responding to sexual exploitation, abuse and harassment
PoE	point of entry
PPE	personal protective equipment
RCCE-IM	risk communication, community engagement and infodemic management
RDT	rapid diagnostic test
RT-PCR	reverse transcription polymerase chain reaction
SEAH	sexual exploitation, abuse and harassment
SPRP	Strategic Preparedness, Response and Resilience Plan
TIRS	targeted indoor residual spraying
ULV	ultra low volume
WASH	water, sanitation and hygiene
WHO	World Health Organization

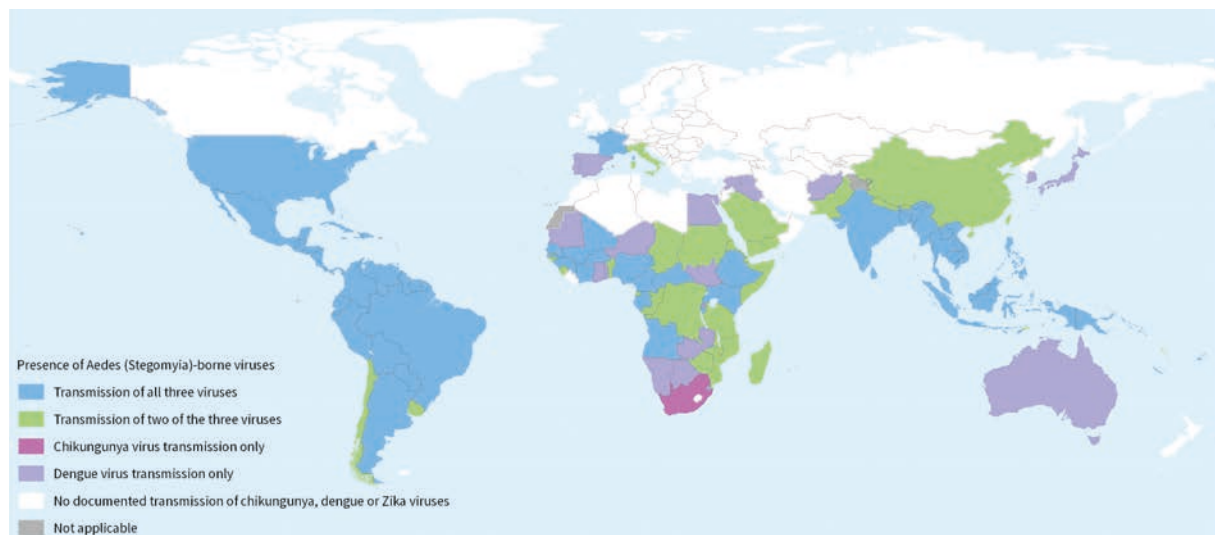
Part I. Overview and Objectives

Introduction

Dengue, characterized by its rapid spread and significant impact on public health, remains a challenge across all six WHO regions (Africa, the Americas, the Eastern Mediterranean, Europe, South-East Asia and the Western Pacific). Its incidence has increased dramatically around the world in recent decades, and the disease is now endemic in more than 100 countries. The movement of people and conveyances, unplanned urbanization and the effects of climate change fuel mosquito-breeding and the spread of dengue and other *Aedes*-borne arboviruses such as Zika and chikungunya. As a result, more than four billion people are at risk worldwide (Fig. 1). The persistence and escalation of dengue outbreaks in the last two years underscores the need for a robust and dynamic strategy to mitigate risks and safeguard populations.

Fig. 1. Presence of *Aedes*-borne arbovirus worldwide

Countries and territories with current or previous transmission of chikungunya, dengue or Zika viruses
(as of 30 April 2024)



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Data Source: World Health Organization
Map Production: WHO Health Emergencies Programme
Map Date: 29 May 2024

0 1,500 3,000 km



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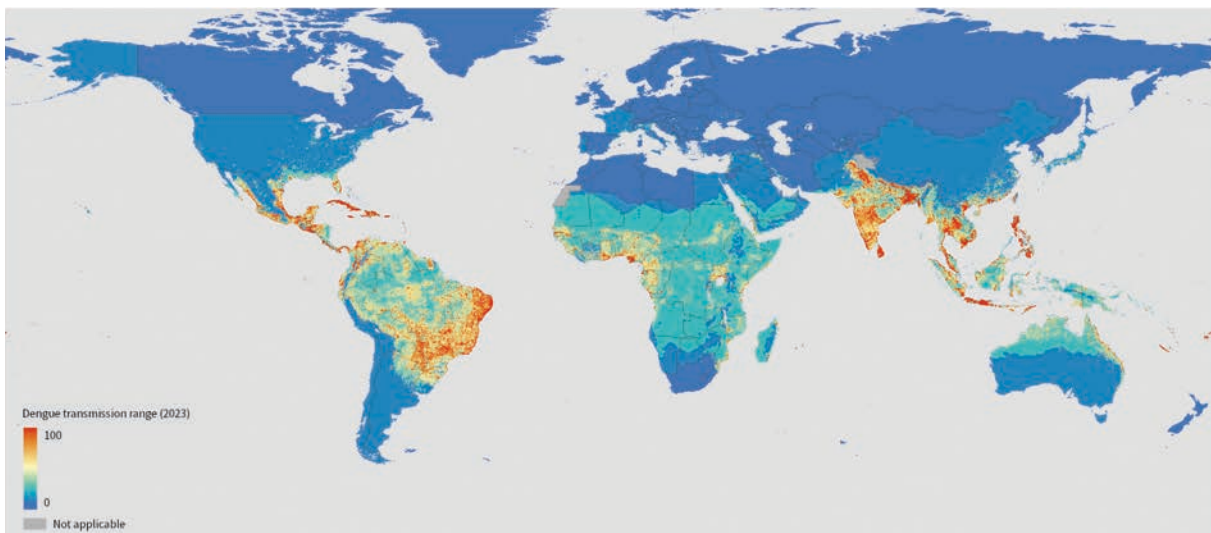
Our strategy aims to understand better dengue's current global epidemiological landscape to guide preparedness and response activities. In 2023, the world witnessed increased dengue cases in endemic and non-endemic regions. On 1 December 2023, WHO graded the dengue epidemic as grade 3, the highest level of emergency under the WHO's Emergency Response Framework (ERF). As of end June 2024, more than 10.9 million cases and over 6500 deaths have been reported to WHO globally. Since the global surveillance system is still developing, the actual number of cases is likely to be higher, although verified transmission has occurred in 99 countries or territories, reflecting the situation's urgency.

The effects of climate change partially explain the increase of dengue and other *Aedes*-borne infections in some areas: high rainfall, humidity and increasing temperatures favour the expansion and establishment of mosquito vector populations. Mosquitoes rapidly spread into new areas where they reproduce and transmit viruses such as dengue, Zika and chikungunya. However, other transmission drivers include social factors such as unplanned urbanization, population growth and other globalization-related dynamics. For these reasons, a multisectoral approach needs to be implemented to prevent and respond to outbreaks caused by dengue and other targeted *Aedes*-borne arboviruses.

Since 2022, following the launch of the Global Arbovirus Initiative, WHO has collaborated with multiple partners to update global suitability maps for *Aedes*-borne diseases¹ (Fig. 2), showing the predicted probability that these diseases will be present in a given location in 2023. Probability of disease presence is not the same as incidence and may in fact not be correlated. Areas with a high probability of disease presence reflect model-estimated ideal conditions for the transmission of dengue and other arboviruses: the model may estimate a high probability of presence even if areas are remote from known data points.

Fig. 2. Suitability map for *Aedes*-borne disease estimates in 2023

Global dengue transmission range estimates (as of 2023)



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Data Source: LSHTM and WHO
Map Production: WHO Health Emergencies Programme
Map Date: 04 June 2024

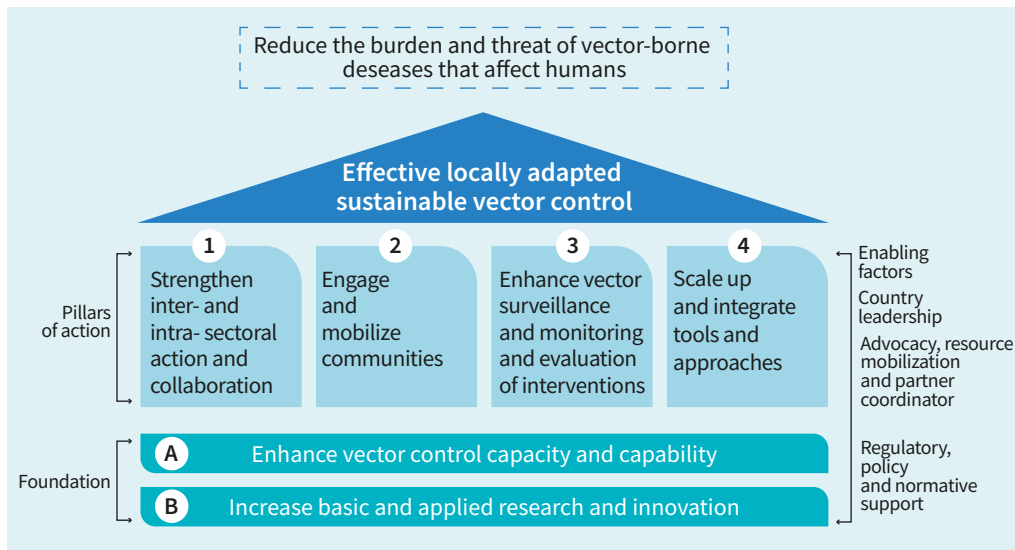
0 1,500 3,000 km



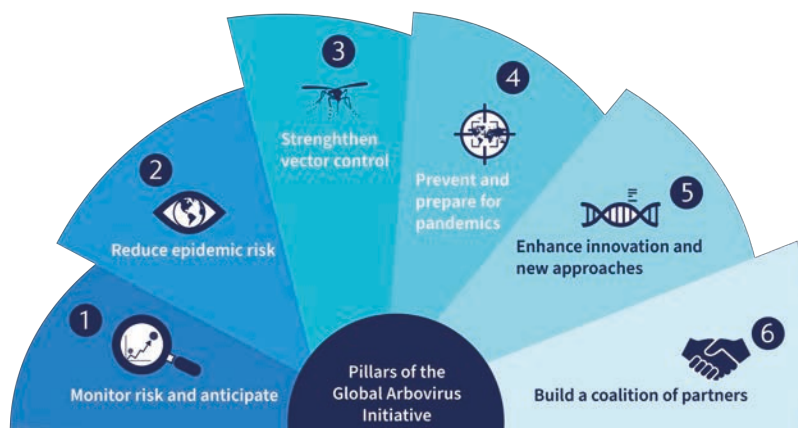
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In terms of NTDs and vector-borne disease initiatives, this SPRP falls under the umbrella of the Global Vector Control Response ([GVCR 2017–2030](#)) (Fig. 3). It also falls within the remit of the Global Arbovirus Initiative ([GLAI](#)) which was launched in 2022 to tackle mosquito-borne viruses with epidemic potential and better prepare the global community for these threats (Fig. 4), and [the road map to end neglected tropical diseases by 2030](#).

1. The overlapping global distribution of dengue, chikungunya, Zika and yellow fever O Brady, A Lim, F Shearer, K Sewalk, D Pigott, J Clarke, A Ghouse, C Judge, H Kang. 2024, researchsquare.com
https://assets-eu.researchsquare.com/files/rs-4686814/v1_covered_4851ab26-c3c1-4c25-8825-69057bf92606.pdf?c=1722601889

Fig. 3. Global vector control response framework

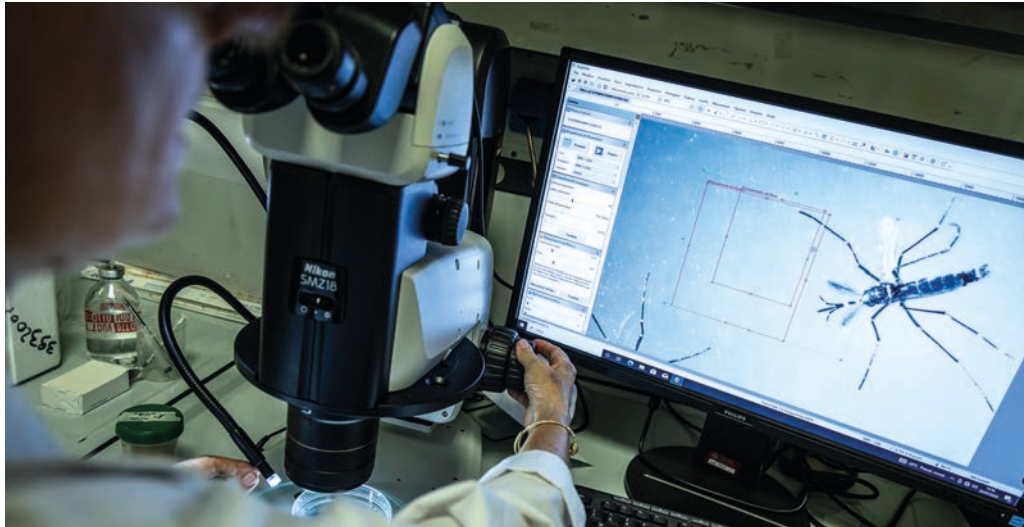
Based on an integrated WHO global risk assessment this SPRP was jointly developed with WHO's emergency and NTD programmes. This plan is part of our commitment to safeguarding public health and enhancing resilience against dengue outbreaks and other *Aedes*-borne arbovirus diseases. It synthesizes the latest best practices and lessons learned from COVID-19 and previous dengue, chikungunya and Zika outbreaks, offering a blueprint for action.

Fig. 4. Global arbovirus initiative pillars

GLOBAL ARBOVIRUS INITIATIVE

This SPRP is a call to action for all stakeholders, from government agencies and health care providers to communities and individuals, to join forces in the fight against dengue and other *Aedes*-borne arboviruses. Together we can achieve significant progress in reducing the burden of dengue through innovation, new technologies and improved approaches to vector control.

Researcher
in the Department
of Public Health
and Infectious
Diseases at Sapienza
University in Rome,
Italy.
© WHO / Halldorsson



Goal

- To reduce the burden of disease and deaths from dengue and other *Aedes*-borne arbovirus diseases in all affected WHO regions.

Strategic objective

- To accelerate progress in preventing and controlling dengue and other *Aedes*-borne arboviral disease outbreaks worldwide.

Specific objectives

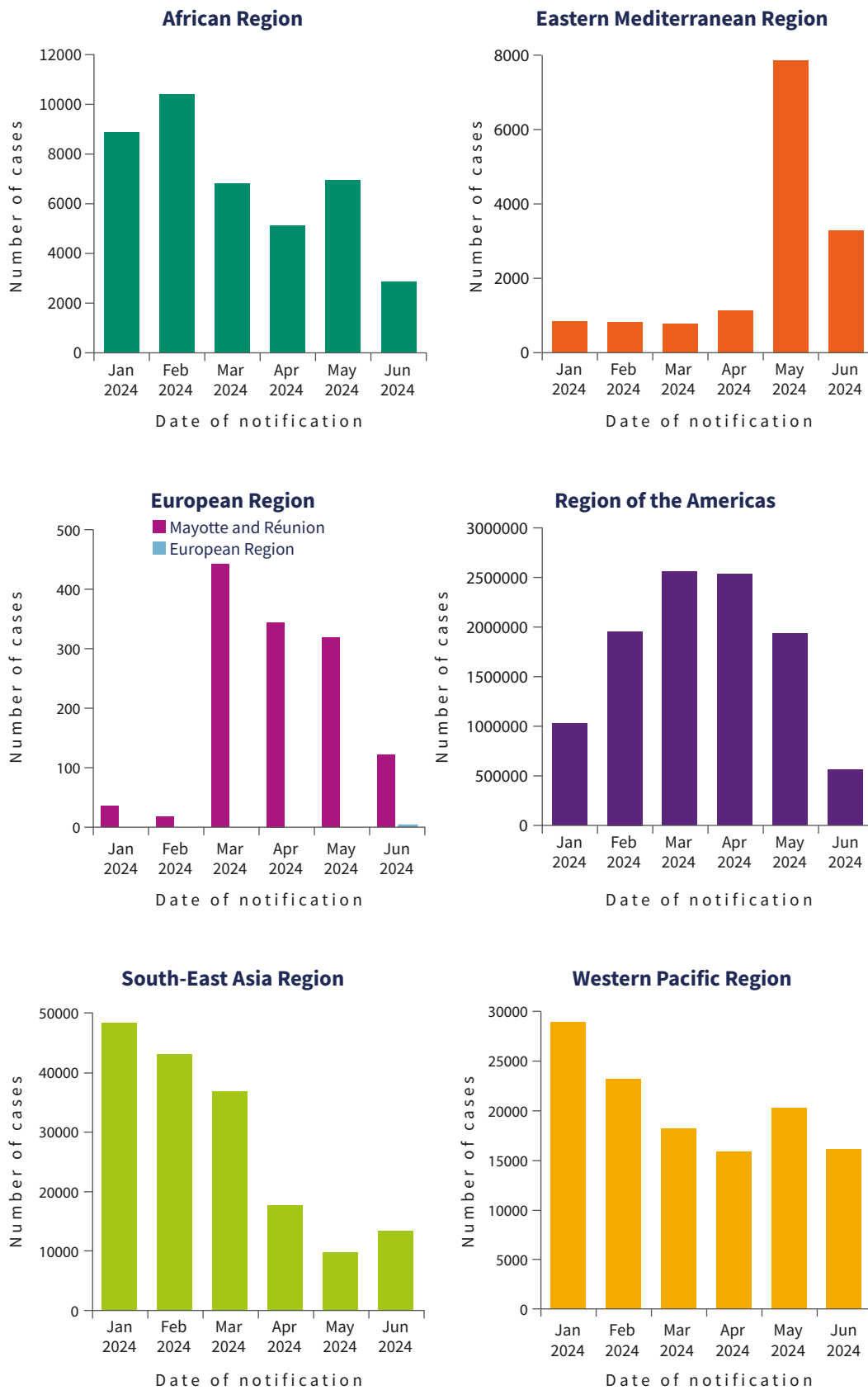
- To strengthen global multisectoral coordination and collaboration among stakeholders and partners in preparedness, response and resilience to dengue and other *Aedes*-borne arbovirus diseases.
- To enhance the capacity of Member States in early detection, reporting, confirmation and response to outbreaks of dengue and other *Aedes*-borne arboviruses.
- To strengthen the capacity of Member States to implement effective vaccination and integrated vector management strategies for mitigating the transmission of dengue and other *Aedes*-borne arboviruses.

Situation overview and risk mapping

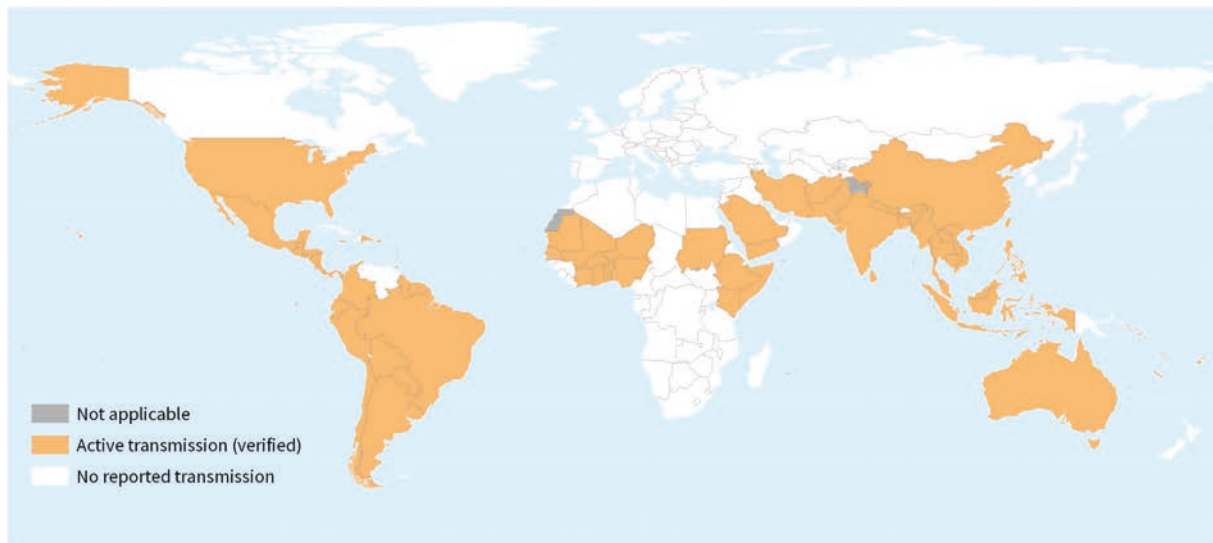
Global dengue epidemiological situation

The worldwide distribution and expansion of dengue are impacted by different variables, including climate, socioeconomic conditions, and the abundance and competency of the *Aedes* (*Stegomyia*) mosquito vectors, primarily *Aedes aegypti* and *Aedes albopictus*. Dengue is endemic in tropical and subtropical climates, with the highest burden seen in South-East Asia, the Western Pacific and the Americas. The geographical spread of dengue is evolving, with occasional flare-ups and shifts in endemicity impacted by factors such as urbanization, population development and climate change.

As of end June 2024, more than 10.9 million cases (5.6 million confirmed), including over 24 000 severe cases and 6500 deaths, have been reported to WHO from all six WHO regions (Fig. 5). Most cases have been reported in the Region of the Americas; however, the global dengue surveillance system is still under development in other regions, and the actual number of cases may well be higher, with known verified transmission occurring in 99 countries or territories in 2024 (Fig. 6). Further information can be obtained from the [WHO global dengue surveillance dashboard](#) which integrates monthly regional reporting.

Fig. 5. Global trend in reported dengue cases as of end June 2024

Source: WHO

Fig. 6. Countries and territories with reported dengue transmission as of end June 2024**Reported autochthonous dengue transmission in 2024** (as of end June 2024)

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Data Source: World Health Organization
Map Production: WHO Health Emergencies Programme
Map Date: 13 August 2024

0 1,500 3,000 km



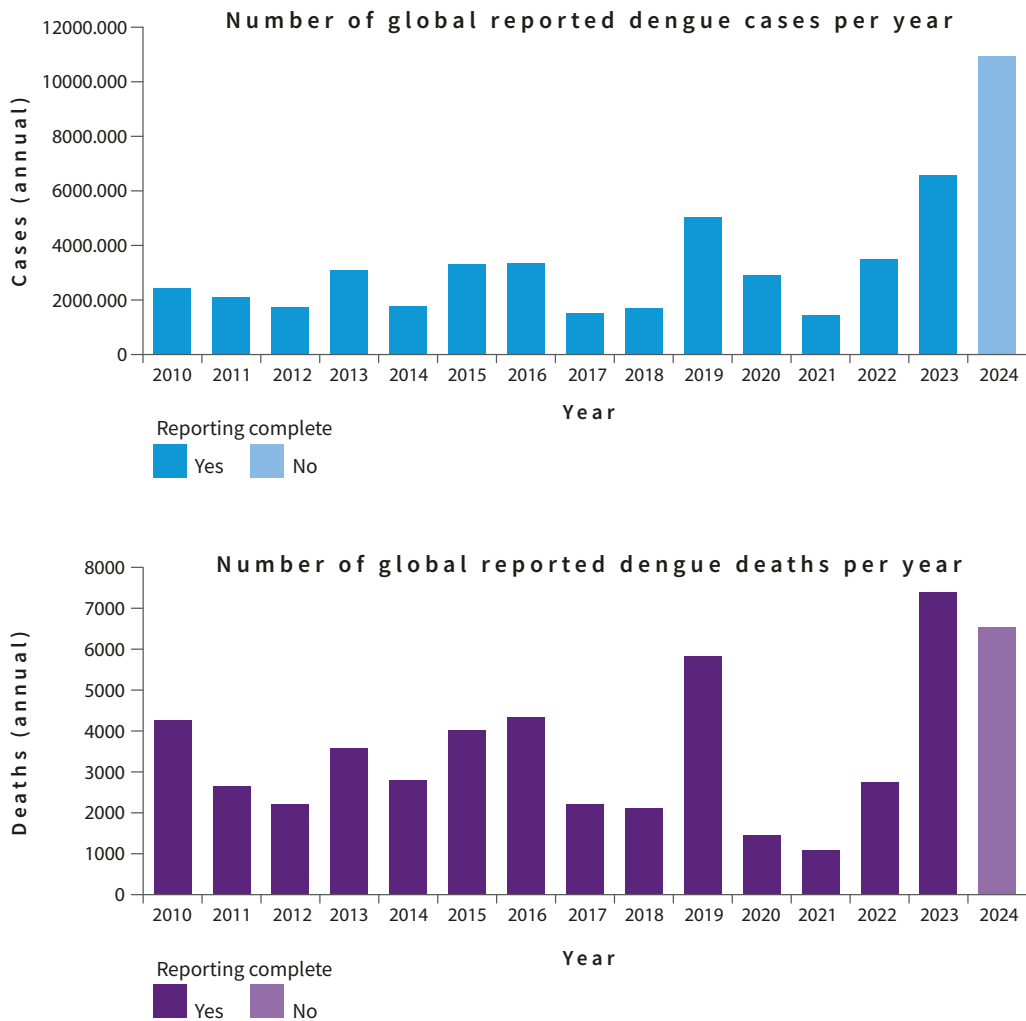
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Annual reported cases of dengue have been increasing in recent years, with the number of cases approximately doubling each year since 2021 (Fig. 7). In 2023, the highest number of dengue cases ever recorded was reported, with a total of 6.5 million cases. However, by June 2024, this total had already been surpassed. A similar trend has been observed in dengue-related deaths. Although the 6508 deaths recorded to date in 2024 remain below the 7403 deaths recorded in 2023, the overall trend in recent years is concerning. The increasing incidence of dengue is partly attributable to the growing number of countries reporting cases although several countries are also experiencing their highest incidence in the current season.

In Brazil, community health workers visit local residents to help find and destroy mosquito breeding sites.

© WHO / Karina Zambrana



Fig. 7: Global trends in annual reported dengue cases and deaths from 2010–2024

Note: 2024 totals are as of end of June 2024

Source: WHO

Region of the Americas

Dengue is endemic to the Region of the Americas and an ongoing public health threat. Approximately 500 million people in the Americas are at risk of dengue infection. *Aedes aegypti* mosquitoes are widely distributed across the continent except for Canada. Moreover, the vector has spread to new areas such as northern Chile, southern Argentina and Uruguay, increasing the risk of the disease appearing in immunologically naive populations. The four dengue serotypes (DENV-1, DENV-2, DENV-3 and DENV-4) circulate simultaneously throughout the Americas and in some countries.

In 2023, the highest dengue case burden was recorded in the region, when 23 countries experienced dengue epidemics. Over 4.6 million cases were reported, including 7954 severe cases and 2423 deaths (CFR: 0.053%). However, in 2024, over 10.5 million cases and over 5600 deaths had already been recorded in the region by the end of June. It is noteworthy that 8.9 million of these reported dengue cases were recorded in Brazil, 4.8 million were laboratory-confirmed and over 6400 were classified as severe dengue, with all four serotypes being detected in 2024. Recorded cases in the region show a 3.3 fold increase compared to the same period of 2023.

WHO entomologist checks an empty bottle for mosquito larvae.
© WHO, Mauritius



African Region

From 2017 to November 2023, the WHO African Region recorded 51 dengue outbreaks with 195 882 cases and 745 fatalities (CFR: 0.4%) across 25 Member States. The 2023 dengue outbreak was the largest ever documented in the region, accounting for 80.3% of cases and 91.5% of fatalities. In 2024, 18 countries have verified that dengue transmission is occurring in the region. According to the available data, over 41 000 dengue cases and 58 deaths have been reported this year from Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, Ethiopia, Ghana, Kenya, Mali, Mauritania, Mauritius, Niger, São Tomé and Príncipe, Senegal and the Seychelles. As of end June 2024, Burkina Faso and Mauritius accounted for three quarters of dengue cases reported in 2024. Circulation of three of the four dengue serotypes (DENV-1, DENV-2, DENV-3) has been confirmed in the region. The reported main challenges hindering preparedness and response in the affected countries include funding constraints and a shortage of vector control specialists and lab technicians along with limited dengue-duo RDT supplies.

Eastern Mediterranean Region

Dengue outbreaks are currently reported in fragile, conflict-affected and vulnerable countries such as Afghanistan, Pakistan, Sudan, Somalia and Yemen due to disruption of health services (Sudan), fragile health systems (Afghanistan, Somalia, Sudan, Pakistan and Yemen), mass population movements, poor water and sanitation infrastructure, and natural disasters such as annual floods (Yemen, Sudan, Somalia, and Pakistan) and earthquakes (Afghanistan). However, outbreaks have also been reported in middle- and high-income countries such as Egypt, Oman, Qatar and Saudi Arabia owing to climate change, which has led to unusual rainfall. The highest number of confirmed cases in 2023 was reported by Pakistan (24 068 cases), followed by Saudi Arabia (14 055 cases) and Oman. In 2024, as of end June, seven countries have reported autochthonous cases.



Dengue outbreak response in Bangladesh
© WHO / Fabeha Monir

South-East Asian Region

Five countries from the WHO South-East Asia Region (SEAR) (India, Indonesia, Myanmar, Sri Lanka and Thailand) are among the 30 most highly dengue-endemic countries worldwide. Over 1.5 billion people live in endemic areas in ten SEAR countries, while dengue has not been reported in the Democratic People's Republic of Korea. In 2022, SEAR registered 0.65 million dengue cases with 2169 deaths (CFR: 0.33%). In recent years, Thailand, Sri Lanka, Nepal and Bangladesh have experienced dengue outbreaks, with Bangladesh reporting higher numbers of fatalities than usual. The high burden of dengue cases in the South-East Asia Region is coupled with the absence of effective treatment and comprehensive vector control.

Western Pacific Region

The Western Pacific Region (WPR) faces a high burden of dengue and other *Aedes*-borne arbovirus diseases. Since 2013, 21 Pacific Island Countries and Areas have continued to be affected by a range of vector-borne diseases including dengue, drawing attention to the sustained burden of morbidity and mortality in the Pacific.

In 2023, eight countries reported 574 758 cases with 834 deaths (CFR: 0.14%). The Philippines is the most affected country, accounting for 34% of cases and 79% of deaths. Viet Nam reported 29% of cases and 5% of deaths, while Malaysia had 20% of cases but 11.5% of deaths. As of end June 2024, over 122 000 cases have been recorded in the region.

While some WPR countries have sufficient capacity to manage dengue and other *Aedes*-borne arbovirus diseases, there are pockets of at-risk populations require additional support. The Mekong region and Pacific Island countries are particularly vulnerable to the effects of dengue outbreaks owing to several factors which include limited detection and control capacities, climate change, underdevelopment and cross-border population movements.

Sewage system failures in congested areas create breeding places for mosquitoes. North Jakarta, Indonesia. © WHO / Budi Chandra.



European Region

Since 2022, an increase in autochthonous cases has been reported in the European Region (EUR), notably France (65) and Spain (6). In 2023, three countries – Italy (82), France (43) and Spain (3) – reported cases. One death involving an imported case was reported in Italy, and no additional deaths were reported in the affected countries in 2023. The competent vector *Aedes albopictus* is now established in 13 countries, whereas only 8 countries were affected in 2013. In contrast, *Aedes aegypti* has been documented in only two countries and was associated with a large outbreak of more than 2000 cases in Madeira (Portugal).

While European Union countries at risk such as Italy, France and Spain report autochthonous cases to the European Centre for Disease Prevention and Control (ECDC) as cases occur, many of the countries in EUR rarely test for dengue and only report cases on an annual basis. The epidemiology of dengue and other arboviruses in the region is therefore largely unknown at a time when climate disruption may have effects on its transmission in areas where the vector is primed to spread. Based on published models, 30 countries have been identified as having suitable climatic and vectorial conditions for dengue transmission.

Global epidemiological situation of other *Aedes*-borne arboviruses

Transmission of *Aedes*-borne chikungunya and Zika viruses continue in endemic areas in the Americas, and outbreaks and sporadic cases of autochthonous transmission were reported in Asia and Africa in 2023. In 2023, several countries reported a total of 411 086 cases of chikungunya to the Pan American Health Organization (PAHO), with a cumulative incidence of 41.35 per 100 000 population. Furthermore, 420 deaths were reported, raising the CFR to 0.10, twice that of the CFR for dengue in the same year. By the end of June 2024, the Region of the Americas recorded over 360 000 chikungunya cases in 13 countries and 155 chikungunya-related deaths (CFR: 0.04%). Brazil has the highest cumulative incidence, followed by Paraguay. The cumulative incidence of chikungunya by end of June 2024 is 38.05 cases per 100 000 inhabitants.



In Brazil, community health workers visit local residents to help find and destroy mosquito breeding sites.
© WHO / Karina Zambrana

Regarding Zika, systematic reporting of cases occurs mainly in the Americas and in a few countries in Asia. In 2023, a total of 55 813 suspected Zika cases were reported in the Americas, of which 11% were laboratory-confirmed. As of end June 2024, a total of 24 641 suspected cases of Zika had been reported in the region, of which 8496 (34%) were laboratory-confirmed. Brazil has the highest cumulative incidence but confirmed cases have been detected in Guatemala and Mexico. Outside of the Americas, Thailand reported outbreak activity in 2023, and India in 2024. Because of maternal infection during pregnancy, Zika remains a public health concern.

Dengue risk mapping

Due to the changing risk of dengue globally, WHO performed a risk-mapping exercise using several key indicators to categorize countries according to the risk of dengue outbreaks. The objective was to identify countries where essential preparedness and response interventions were needed and to register countries that are candidates for heightened surveillance activities.

Indicators and methodology used varied by region taking into account their different circumstances. However, most regions considered likelihood and impact (consequences) to be elements of an overall criticality score. Various indicators used to estimate the overall criticality score included:

- the INFORM risk index, a global, open-source risk assessment tool for humanitarian crises and disasters;
- data on outbreaks in the past decade;
- total disability-adjusted life years (DALYs) for reported dengue cases; and
- estimated mean index P, a climate-driven suitability measurement for mosquito-borne viruses.

Other factors, including existing capacity and severity of dengue within the country, were also taken into consideration.



Perifocal residual spraying for control of adult mosquitoes, Tuvalu.
© WHO / Yoshi Shimizu

Part II. Targeted plan for preparedness and response to dengue and other *Aedes*-borne arbovirus outbreaks

An integrated plan – the 5Cs

This integrated SPRP represents a comprehensive strategy to mitigate the impact of dengue and other *Aedes*-borne diseases through coordinated actions across various sectors, including public health, vector control, health care, community engagement and research. By combining strategic interventions tailored to local contexts and leveraging synergies between stakeholders, this plan seeks to reduce dengue transmission, alleviate disease burden, and safeguard the health and well-being of communities. Through collaboration, innovation and sustained commitment, we endeavour to confront the challenges posed by dengue and move closer to controlling it in communities.

Given the complex transmission dynamics of the *Aedes*-borne arboviruses and their vectors, a multidisciplinary approach will be used to achieve the outlined objectives, including the following interconnected pillars.

- **Pillar 1:** Leadership, coordination, planning, monitoring and prevention of sexual misconduct.
- **Pillar 2:** Risk communication and community engagement (RCCE) and infodemic management.
- **Pillar 3:** Surveillance, case investigation, and contact tracing.
- **Pillar 4:** Travel, trade, and points of entry surveillance and control.
- **Pillar 5:** Laboratory and diagnostics.
- **Pillar 6:** Integrated Vector Management and WASH & IPC.
- **Pillar 7:** Clinical management and therapeutics.
- **Pillar 8:** Operational support and logistics.
- **Pillar 9:** Essential health services and systems.
- **Pillar 10:** Vaccination.
- **Pillar 11:** Research, innovation and evidence.

In terms of global health security architecture, this SPRP is aligned with the [WHO Framework for Health Emergency Prevention, Preparedness, Response and Resilience](#) (HEPR) launched in 2023. HEPR adopted a strategic shift towards an ecosystem approach to prevention, preparedness and response in the context of health emergencies. This shift focuses on strengthening five (Fig. 8) core health emergency components: collaborative surveillance, community protection, safe and scalable care, access to countermeasures and emergency coordination.

Fig. 8: The five Cs - core components of the HEPR

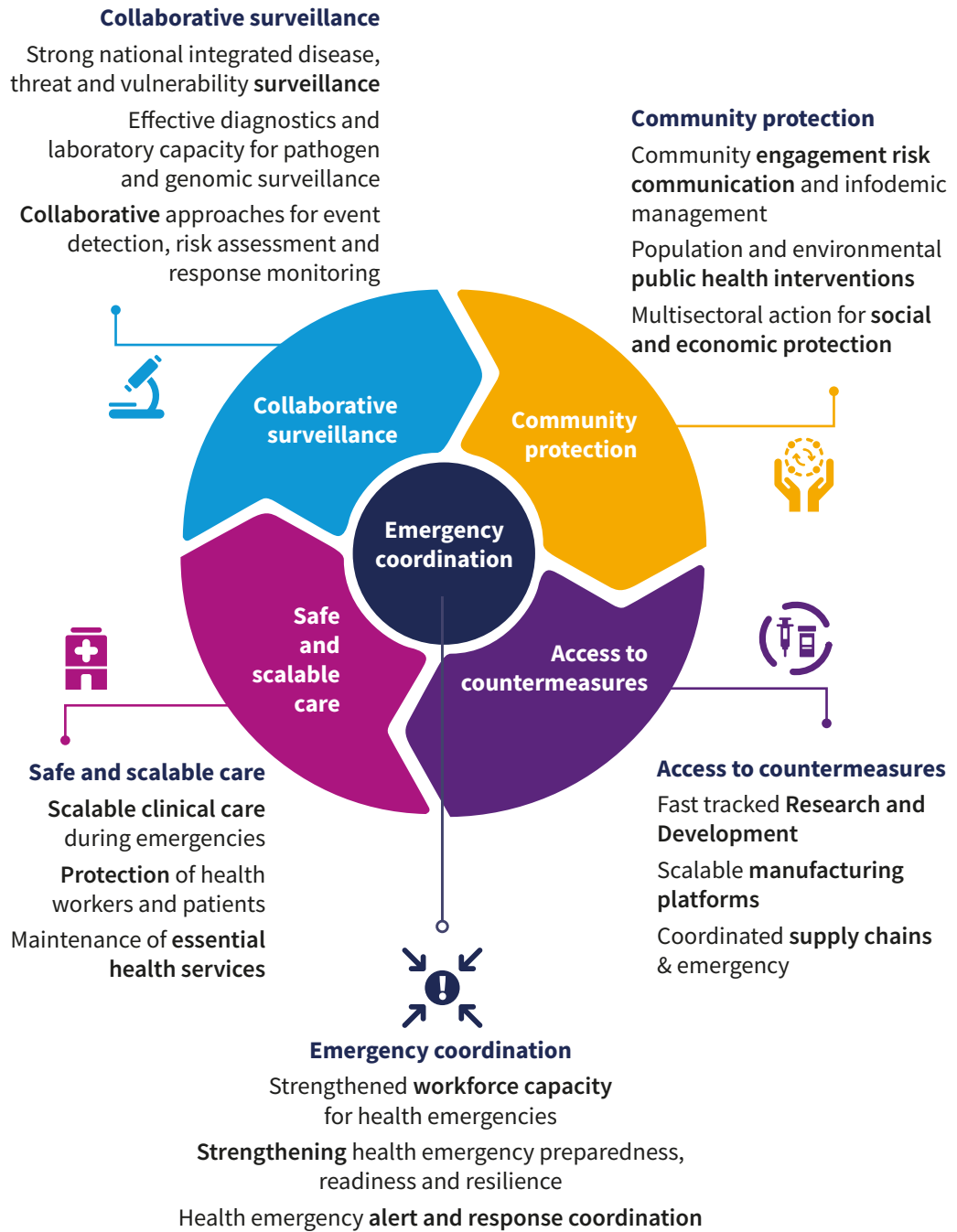


Table 1 below aligns the 11 pillars of this SPRP with the five core health emergency components of WHO's HEPR.

TABLE 1. Alignment of the pillars of the global SPRP 2024–2025 for dengue and other arboviruses with the core components of the proposed global health architecture	
Core components of the WHO global architecture for HEPR	Pillars of the global SPRP for dengue and other arboviruses
C1. Emergency coordination	<ul style="list-style-type: none"> • Pillar 1. Leadership and coordination, prevention of sexual misconduct culture bottle)
C2. Collaborative surveillance	<ul style="list-style-type: none"> • Pillar 3. Surveillance, epidemiological and entomological investigation • Pillar 5. Laboratory surveillance and diagnostics
C3. Community protection	<ul style="list-style-type: none"> • Pillar 2. Risk communication, community engagement and infodemic management • Pillar 4. Travel, trade, and points of entry surveillance and control • Pillar 6. Integrated vector management and WASH & IPC
C4. Safe and scalable care	<ul style="list-style-type: none"> • Pillar 7. Clinical management and therapeutics • Pillar 9. Essential health systems and services
C5. Access to countermeasures	<ul style="list-style-type: none"> • Pillar 8. Operational support and logistics • Pillar 10. Vaccination • Pillar 11. Research, innovation and evidence

C1. Emergency coordination

Leadership and coordination

Leadership, coordination, planning, financing and monitoring are fundamental to any successful outbreak response. Each element is critical towards ensuring that objectives are met efficiently and effectively. Together, they deliver a clear roadmap to success, enabling potential challenges to be anticipated and risk-mitigating strategies to be developed, while ensuring that activities are implemented at the community level. The principal activities are:

- developing partnerships across government sectors, academic institutions, NGOs and the private sector to coordinate and leverage resources to control dengue and other *Aedes*-borne arboviruses;
- enhancing collaboration with international organizations and neighbouring countries to share best practices, data and resources, addressing dengue and other *Aedes*-borne arbovirus as a regional and global health issue;
- securing ongoing funding and resources for dengue and other *Aedes*-borne arbovirus control initiatives, surveillance and research in order to maintain and scale up effective interventions;
- exploring innovative financing mechanisms and partnerships for long-term prevention and control strategies for dengue and other *Aedes*-borne diseases;
- integrating dengue risk reduction into emergency preparedness and response plans, ensuring readiness to respond to outbreaks effectively; and
- ensuring coordination across all players in terms of how the scientific community tracks virus diversity.

The ultimate aim of these activities is to facilitate collaboration between health services, environmental agencies, community organizations and the private sector to coordinate dengue prevention and control activities and resource allocation and sharing.

Prevention of sexual misconduct

During an outbreak, certain groups may become more vulnerable to sexual exploitation, abuse and harassment (SEAH): these include women, children and marginalized communities. Ensuring safe programming to avoid SEAH, coupled with effective prevention and response measures to all forms of sexual misconduct, is critical to protect affected populations from additional harm and to uphold their rights and dignity in crucial situations. Additionally, efforts also need to be made in order to mitigate the risks of sexual harassment among responders and ensure their well-being: appropriate measures should be implemented to facilitate reporting and management of sexual exploitation and abuse as well as sexual harassment whenever they occur. Safe programming to avoid SEAH remains a key consideration in all scaled-up interventions for controlling dengue and other *Aedes*-borne arbovirus diseases in prioritized countries. WHO will work in close collaboration with – and as part of their respective in-country PRSEAH networks – countries prioritized for preparedness, readiness and response to the escalating disease burden of dengue and other arboviruses to strengthen efforts for PRSEAH integration and mainstreaming in planned interventions by:

- enhancing measures for SEAH prevention which target all stakeholders involved in scaled-up operations for preparedness, readiness and response to dengue and other *Aedes*-borne arbovirus outbreaks;
- collaborating with all key stakeholders, including community leaders, health care workers and civil society members, to promote reporting of allegations through contextualized, safe and accessible reporting mechanisms, ensuring appropriate linkages to WHO reporting channels for rapid action;
- working with all in-country stakeholders to promote access to services and ensure the application of a victim and survivor-centred approach;
- promoting SEAH risk and needs assessments to inform the planning and implementation of evidence-based risk mitigation and response measures;
- enhancing the coordination of PRSEAH actions through the PSEA network, including promoting accountability to affected people;
- promoting SEAH risk mitigation measures among partners, enhancing collaboration with national counterparts on measures for prevention and response to sexual misconduct, and promoting safe programming in all interventions; and
- supporting countries and localized geographical areas designated for preparedness based on relevant risk indicators to integrate and mainstream PRSEAH readiness actions in their preparedness and readiness activities.

C2. Collaborative surveillance

Epidemiological surveillance

Collaborative and integrated surveillance systems contribute to the early detection and control of dengue and other *Aedes*-borne arboviruses outbreaks. They allow health authorities to rapidly identify outbreaks and implement control measures by systematically collecting and analysing data from suspected and confirmed cases, and to step up entomological surveillance across regions and countries after integrating relevant environmental factors. A rapid response is critical to reduce the spread of disease and its impact on communities.

Collaboration fosters an exchange of information and best practices, improving the quality of data collected on dengue incidence, severity and spread. High-quality, standardized data contributes to more accurate integrated analysis and modelling, enables a better understanding of dengue transmission dynamics and informs public health interventions.

Epidemiological investigations that are collaborative in nature also help to ensure that resources for controlling dengue outbreaks such as vector control efforts, medical supplies and health care personnel are allocated efficiently. By understanding the geographical spread and severity of an outbreak, resources can be targeted to those areas most in need, optimizing their impact.

In summary, collaborative surveillance, epidemiological analysis and modelling, and epidemiological investigation enhance the effectiveness and efficiency of any response measures, and help to control and prevent dengue transmission and outbreaks. They bring together diverse forms of expertise and resources, and lead to better preparedness, more robust responses and – ultimately – reduce the burden of dengue on public health. WHO's plan supports Member States to:

- conduct dengue risk-categorization exercises to prioritize country support (resource allocation, technical support and surveillance intensity): not all countries are at equal risk for dengue, and some have well established national programmes that do not require substantial WHO support; and



Dengue researchers, together with WHO staff surveying potential breeding site in Italy.
© WHO / Halldorsson

- develop and implement an integrated and comprehensive surveillance system for dengue and other *Aedes*-borne arboviruses, or consolidate an existing system: it should be syndromic, indicator-based, laboratory-based and event-based to detect and monitor cases in real-time, along with environmental and entomological surveillance to facilitate timely interventions.

Establish or strengthen systematic dengue and other *Aedes*-borne arbovirus surveillance, including at points of entry (PoE), and the reporting system at the regional level, which will feed into the global dengue surveillance system and dashboard.

Laboratories and diagnostics

Laboratories are critical to monitoring the transmission of arboviruses. In emergency response efforts during dengue, Zika and chikungunya outbreaks, they provide rapid diagnostic testing, analyse samples and support epidemiological investigations and surveillance. They help to characterize the extent and severity of outbreaks, pinpoint high-risk areas and guide the implementation of targeted control measures. National laboratory systems perform a range of critical functions which contribute to outbreak responses and surveillance activities such as:

- coordinating laboratory system and diagnostics at the national level: they collaborate with other response pillars and ensure effective communication and use of laboratory data to inform response interventions;
- implementing diagnostic testing strategies and algorithms that can include virus detection by Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR) and/or detection of antigens or antibodies by serological tests including rapid diagnostic tests (RDTs), the comparative advantages and limitations of which (e.g. sensitivity, specificity, bio risks, etc.) should be weighed up depending on the epidemiological context and country capabilities;
- organizing procurement and delivery of relevant laboratory equipment and diagnostic tests to designated testing sites;

A lab worker
at Ethiopia's
National Influenza
and Arbovirus
Laboratory.
© WHO
Otto Bakano



- assuring timely, safe and equitable access to rapid and reliable diagnostics for suspected dengue cases based on diagnostic strategies and algorithms in order to facilitate early case detection, appropriate patient management and targeted public health interventions;
- further characterizing of viruses through specialized, complementary diagnostic techniques such as sequencing for genomic surveillance, or viral isolation;
- overseeing the implementation of quality management systems, including participation in external quality assessment schemes, to ensure high-quality testing;
- sharing relevant testing data and information with clinicians, epidemiologists and other stakeholders to inform patient management and public health actions;
- conducting capacity-building activities, such as training programmes and workshops to enhance laboratory staff skills; and
- connecting laboratories and testing sites through subnational, national and international networks, including by referring specimens and sharing data via reliable, safe and transparent mechanisms, to ensure fair access to any potential benefits.

This SPRP will allow WHO to support Member States in key strategic activities including:

- coordinating laboratory needs and priorities across regions and countries to strengthen the laboratory response to the global dengue emergency;
- developing interim laboratory guidance for dengue fever such as updated diagnostic algorithms and guidance on applying genomic surveillance;
- supporting test selection and procurement of diagnostics for dengue by setting up an Expert Review Panel for Diagnostics to review diagnostic test kits and develop procurement recommendations;
- coordinating and facilitating test kit evaluation via WHO collaborating centres and reference laboratories;
- facilitating equitable access to essential diagnostics in close collaboration with operational support and logistics colleagues and country and regional offices;
- sharing information on the laboratory response to the dengue emergency with laboratory leaders, partners and stakeholders via global webinars; and
- supporting training and capacity-building for laboratory staff in priority countries via WHO country and regional offices.

C3. Community protection

Risk communication, community engagement and infodemic management (RCCE-IM)

Community engagement is central to our strategy in recognition of the fact that community participation prevents transmission and supports control efforts. By involving, dialoguing with and listening to those at risk or affected, dengue-related actions can be tailored to local realities and respond more effectively to the needs of people living in or travelling to areas where dengue is prevalent. Risk communication messages related to dengue transmission, health care seeking and prevention and control measures should be strengthened to foster a proactive community response. Community engagement requires meaningful and actionable strategies to integrate communities into dengue outbreak readiness and response activities guided by local knowledge: only this approach is likely to lead to sustained behavioural impact. Infodemic management intervention is essential to monitor community narratives and identify information gaps owing to the circulation of mis- and disinformation messages. Support will be given to the following activities:

- implementing social listening and feedback loop mechanisms to collect insights, perceptions and concerns about dengue, analysing the findings and acting upon them to reorient RCCE-IM and broader response activities;
- developing critical messages, health communication and information products based on the affected population's needs in terms of dengue transmission and prevention, timely medical care and other community-oriented activities to mitigate the outbreak;
- collecting best practices and experiences from community participation in dengue prevention activities to strengthen local action and cross-country cooperation;
- coordinating with other pillars, e.g. mass gatherings, clinical management, surveillance and vector control, for joint capacity development and implementation of RCCE-IM training and tools to build capacity at the country and local levels; and
- strengthening social and behavioural evidence generation to promote preventive and protective behaviours.

Dengue control
emergency
campaign in Yemen
© WHO / Nesma Khan



Integrated vector management

Entomological surveillance

Vector or entomological surveillance is the regular and systematic collection, analysis and interpretation of entomological data for risk assessment, planning, implementation, monitoring and evaluation of vector control interventions. It is an essential part of integrated surveillance for vector-borne diseases, disease surveillance, case management and the monitoring of environmental and social risks.

Vector surveillance is a requisite for designing, planning, monitoring and sustaining cost-effective vector control interventions. Moreover, in areas or regions where a disease pathogen is not yet circulating, vector surveillance can be adapted to assess disease risk as a basis for planning appropriate preventive measures. The distribution and spread of invasive vectors such as *Aedes albopictus* and *Aedes aegypti* should be monitored because their arrival heralds the potential for pathogen transmission. Where a vector is established, vigilance is called for because the vectors may become infectious after a blood meal on an imported active case, resulting in local transmission.

Vector surveillance has two primary objectives:

- strengthening technological resources for reporting, consolidating and analysing entomological information; and
- generating evidence for decision-making on vector control, and monitoring and evaluating its subsequent quality and effects.

Testing the bio-efficacy of insecticidal vector control measures is a way of monitoring whether an intervention is adequate. Data on vector population densities can then be used to evaluate the impact of the vector control programme.

SPRP supports the following activities:

- building capacity through regional training on integrated vector management;
- establishing sentinel sites in countries for routine reporting of virus circulation in mosquitoes and insecticide resistance data to guide appropriate control measures;
- integrating and introducing novel vector control tools currently under evaluation by the Vector Control Advisory Group;
- enhancing local and regional entomology/vector control capacity networks and coordinating their activities and support mechanisms;
- upholding the development and implementation of WHO recommendations adapted to the local eco-epidemiological situation; and
- sequencing virus subsets during outbreak investigation activities in order to track virus diversity in the vector.

Vector control

Vector control is a fundamental strategy in controlling dengue outbreaks and the spread of other *Aedes*-borne arboviruses such as Zika and chikungunya. The primary goal of vector control is to interrupt the transmission cycle of diseases. Controlling mosquito populations and limiting human-mosquito contact can significantly disrupt the virus transmission cycle, reducing disease incidence. Public health authorities can thereby dramatically reduce the likelihood of large-scale outbreaks by maintaining mosquito populations below the threshold that typically leads to disease transmission, protecting communities and saving lives.

Investing in vector control is cost-effective compared to the expenses associated with treating severe dengue and other *Aedes*-borne viral diseases. Prevention through vector control can

Dengue response
in Bolivia.
Source reduction
measures
in household.
© WHO / PAHO



be more economical in the long run than managing large numbers of infected individuals, especially considering the potential complications and hospitalizations associated with severe forms of these diseases.

Climate change and urbanization create conditions that can increase the habitats suitable for *Aedes* mosquitoes, potentially expanding the geographical range of vectored diseases. Vector control strategies, such as eliminating breeding sites and using larvicides, are essential in adapting to these changing conditions and preventing diseases spreading to new areas. In view of the importance of vector control, the SPRP covers several strategic activities:

- tailoring vector-control initiatives to local contexts, employing traditional methods and innovative technologies to reduce mosquito populations;
- promoting community-led environmental management practices to eliminate mosquito breeding sites and reduce vector density;
- assessing and adapting dengue-control strategies after stratifying transmission risk in the light of changing climate patterns that may affect vector distribution and dengue transmission dynamics;
- sustaining multisectoral and intersectoral coordination in vector control by allocating adequate resources;
- conducting capacity-building activities such as training programmes and workshops to enhance entomological surveillance and vector control skills;
- building up technical and coordination capacity as part of mitigation measures against climate change;
- involving communities in mosquito control and prevention methods through sound media communication and information;
- enhancing the implementation of integrated vector management; and
- supporting planning, acquisition and delivery of equipment and inputs relevant to entomological surveillance and vector control.

Cross-border disease vector control

Dengue and other *Aedes*-borne arboviruses present global health issues that do not respect borders. Cross-border collaborative surveillance and investigation facilitate cross-border cooperation in disease control. They are essential to prevent the spread of dengue and other *Aedes*-borne arboviruses to new areas and to control outbreaks in regions with porous borders.

According to the capacities set out in the International Health Regulations (IHR) (2005), it is incumbent upon countries to develop, strengthen and maintain their capacities for vector surveillance and control at points of entry (PoE). These capacities should encompass a comprehensive programme for surveillance and control of vectors at PoE, and within a 400-meter perimeter from PoE operational areas, in response to the persistent threat of vectors and vector-borne diseases being spread by ship, aircraft and other conveyances from one country to another.

Given the dramatic surge in international travel and subsequent rapid translocation of mosquitoes and mosquito-borne diseases, leading to their spread into previously unaffected areas, it is of utmost urgency to examine the effectiveness of disinfection measures. This is a critical step in preventing the spread of mosquitoes via international travel and supporting evidence-based decision-making.

The SPRP, a crucial tool in our efforts, provides support for the following activities:

- delivering as far as practicable a programme and trained personnel for the surveillance and control of vector reservoirs in and near PoE, in line with Annex 1b, Annex 5 of the IHR (2005) and the [WHO Handbook on vector surveillance and control at ports, airports and ground crossings](#);
- ensuring linkages between surveillance at PoE and the national public health surveillance system for travellers and vectors, as well as other PoE vector-control measures as per Annex 5 of the IHR (2005);
- providing adequate and prompt information to travellers visiting or returning from endemic areas about prevention and protection measures, signs and symptoms, and how to access health care when necessary, with leveraging of strategic locations for these risk communication interventions such as PoE and travel health clinics;
- conducting a systematic review of the effectiveness of disinfecting conveyances to prevent or reduce the spread of mosquito vectors via international travel and publishing an evidence review; and
- holding an emergency technical consultation based on the systematic review output and implementation of IHR (2005).

WASH in communities

Water, sanitation and hygiene (WASH) and solid waste management are critical to prevent and control mosquito-borne diseases by targeting the aquatic phase of the mosquito life-cycle. Water source management is essential to avoid the accumulation of stagnant water, which serves as a breeding site for mosquitoes. This includes providing improved drainage, covering water storage containers and eliminating potential breeding sites around homes and communities. Proper waste management and safe sewage disposal help to reduce the breeding sites for mosquitoes. Keeping the environment clean and free of solid waste thus reduces the risk of dengue transmission, as do other measures such as:

- improving management of water, sanitation, and solid waste through multisectoral collaboration and community involvement;

WHO and partners
examining water
found in open cans
during dengue
prevention campaign
in Aden, Yemen.
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- incorporating improvements in water, sanitation and solid waste management, and prioritizing areas of high arbovirus transmission; and
- training community volunteers on WASH management in their communities using the technical note recommendation on WASH and mosquito control.

C4. Safe and scalable care

Clinical management

Clinical management is pivotal in addressing dengue and other *Aedes*-borne arbovirus outbreaks, such as Zika and chikungunya. These diseases can have significant health impacts, ranging from mild symptoms to severe, life-threatening conditions and, in the case of Zika, severe birth defects. Effective clinical management is crucial for improved patient outcomes. Dengue, for instance, can progress to severe dengue (previously known as dengue haemorrhagic fever or dengue shock syndrome), which requires immediate medical attention to prevent death. Proper clinical management ensures patients receive supportive care promptly, including fluid management and close monitoring of warning signs.

Early recognition and appropriate management of symptoms can prevent complications associated with these diseases. This includes monitoring of warning signs and signs of severe disease, such as plasma leakage, severe bleeding or organ impairment in dengue, and providing appropriate interventions to manage these complications.

Clinical management protocols based on the latest evidence and guidelines ensure that patients receive the highest quality of care tailored to the severity of their illness. This includes clinical management, advice on symptom relief and preventing transmission to others.

Clinical management also plays a role in disease surveillance and reporting. Health care providers can identify trends in the presentation and severity of diseases, contributing valuable data to public health authorities. This information is crucial for monitoring the spread of the disease, evaluating the effectiveness of control measures and adjusting public health responses accordingly.



Medical tent to treat patients with dengue in Peru.
©WHO / PAHO

The SPRP supports the following:

- strengthening capacity to promptly diagnose and manage suspected dengue cases to prevent severe disease and complications in a given country;
- updating patient care protocols to ensure health care providers have the knowledge and tools to manage dengue cases effectively;
- establishing and disseminating standardized clinical guidelines for managing dengue cases, ensuring effective and consistent care for *Aedes*-borne arbovirus diseases; and
- enhancing health care capacities through training and resources to manage dengue cases, especially during outbreaks, thereby minimizing morbidity and mortality.

Infection prevention and control (IPC) in health care facilities

Infection prevention and control (IPC) in health care facilities during dengue outbreaks is crucial to protect patients and health care workers and prevent further virus spread. Here are some strategic actions that the SPRP supports:

- enhancing health care worker capacities through training and guidance to prevent cross-contamination in health care settings;
- ensuring the availability and proper use of personal protective equipment (PPE), based on assessments by health care workers when handling patients suspected or confirmed to have dengue;
- implementing IPC standard precautions with a focus on hand hygiene, safe injection and sharps injury prevention, environmental cleaning and reprocessing of reusable medical equipment as well as patient placement;
- assessing health care facilities and identifying gaps for improvement;
- implementing patient isolation protocols for suspected or confirmed dengue cases in well screened or air-conditioned rooms to prevent mosquitoes from biting and spreading the virus; and
- establishing patient and visitor safety guidelines to limit the number of visitors and implement screening measures to identify and manage those with symptoms.

Strengthening essential health services and systems

During dengue outbreaks or other *Aedes*-borne viral diseases, health care systems may become overwhelmed with cases, with the risk of a disruption to routine health services. Strengthening health services ensures that infected patients and those with other medical needs continue to receive care, preventing additional morbidity and mortality from different diseases.

Effective management and triage can help prevent health care facilities from becoming overcrowded. By strengthening health systems, authorities can ensure adequate resources and protocols to efficiently manage the influx of patients, separating those who need critical care from those with milder symptoms who can be safely managed at home.

A well prepared and resilient health system can quickly mobilize and reorganize to respond to outbreaks. This includes deploying additional health care workers, setting up dengue management centres and implementing community-wide vector control measures. Strengthening health systems in advance ensures a faster and more effective response to outbreaks.

Essential health services include educating the public about preventing and recognising dengue fever and other *Aedes*-borne arboviral diseases. During outbreaks, it is vital to communicate effectively about the risks, how to avoid mosquito bites and when to seek medical help. Robust health systems can disseminate this information widely and accurately. Through the SPRP, WHO supports Member States by:

- strengthening and reorganizing health services and systems in response to a dengue outbreak, establishing protocols, training health care workers, improving health care infrastructure and securing necessary supplies.

C5. Countermeasures and research

Vaccination

The SPRP commits to supporting research and innovation to fill knowledge gaps, improving diagnostic and treatment options, and developing novel prevention strategies including vaccines.

Safe and effective dengue vaccine development has been pursued over several decades. The first dengue vaccine (Dengvaxia[®]) was licensed in 2015 in several disease-endemic countries but was not widely introduced in country programmes, since it requires pre-vaccination screening testing.

A second dengue vaccine (Qdenga[®]) has been widely licensed based on phase 3 results showing a high level of vaccine efficacy both in previously uninfected (seronegative) and infected (seropositive) individuals. Recognizing some remaining data gaps in seronegative individuals, WHO has issued a [conditional recommendation](#) for use in routine immunization programmes for geographic locations with high transmission intensity and where dengue poses a significant public health problem, targeting children aged 6–16 years.

Another dengue vaccine is currently in phase 3 clinical development and should be submitted for licensure soon.

The United States Food and Drug Administration (FDA) and European Medicines Agency (EMA) have recently licensed a first-generation chikungunya vaccine, which is under review by other regulatory agencies. WHO is assessing the vaccine recommendations and will develop a position on using chikungunya vaccines in due course.

This plan supports the following:

- providing regular updates to Member States on vaccine development progress, clinical trial results and regulatory approvals;
- organizing webinars and workshops with experts to educate and inform health officials and policymakers about vaccine benefits, safety and deployment strategies.



Researcher at the Public Health and Infectious Diseases at Sapienza University in Rome, Italy.
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Operational support and logistics

Operational support, logistics and supply chain management provisions in the SPRP for dengue and other *Aedes*-borne arboviruses are intended to guarantee readiness, responsiveness and resilience in prevention and control efforts by ensuring that all necessary resources are available, adequately distributed and efficiently utilized during surveillance, prevention, control and response activities, such as:

- establishing a central command centre to coordinate dengue response efforts across different sectors and regions;
- setting up efficient distribution networks to ensure the timely delivery of medical supplies, diagnostic kits, protective equipment and vector control tools to affected areas;
- arranging reliable transportation for rapid deployment of health care teams and supplies, especially to remote or hard-to-reach areas during outbreaks;
- maintaining a central inventory of essential supplies and equipment for dengue prevention and control, with real-time tracking to prevent stockouts and ensure readiness for outbreak responses;
- developing streamlined procurement processes to quickly acquire high-priority items such as insecticides, larvicides, bed nets and medical supplies, ensuring quality and cost-effectiveness;
- fostering strong relationships with suppliers and manufacturers to ensure a steady supply of necessary items, even during global health emergencies or supply chain disruptions;
- creating strategic stockpiles of critical supplies including vaccines (if available), rapid diagnostic tests and vector control products, to ensure a fast-response capability in dengue outbreaks;
- utilizing data analytics for supply chain optimization, and predicting demand for medical supplies and vector control products based on epidemiological data and outbreak trends; and
- regularly reviewing and adapting operational, logistic and supply chain strategies based on lessons learned from dengue-control activities and changes in the dengue epidemiological landscape.

Pharmacist manages supplies at the mobile health centre in Wad Madani, Sudan.
© WHO / Ala Kheir



Research, innovation and evidence

Research and innovation in dengue are essential to develop more effective preventive and treatment strategies, enhance diagnostic capabilities and improve public health in managing and controlling dengue outbreaks. The SPRP supports:

- developing research initiatives on vaccine development, vector control innovations and novel diagnostic methods, as well as advancing the prevention and treatment of dengue and other *Aedes*-borne arbovirus diseases;
- extending research to integrate the above tools to allow sustainable community outbreak prevention;
- fostering collaborative work with academic and research institutions to facilitate knowledge exchange and the translation of research findings into practice;
- conducting periodical serosurveys/burden estimations to establish community prevalence;
- developing innovative, sustainable methods for mosquito control to reduce dengue virus transmission;
- investigating potential therapeutic approaches to reduce disease severity and prevent complications;
- identifying and prioritizing the warning signs of severe dengue to improve case management;
- researching the impact of climate change and environmental factors on the distribution and prevalence of *Aedes*-borne arboviruses; and
- devising new diagnostic technologies for dengue and other *Aedes*-borne arboviruses.

<https://www.who.int/publications/m/item/pathogens-prioritization-a-scientific-framework-for-epidemic-and-pandemic-research-preparedness>



Colonies of *Aedes albopictus* or Tiger mosquito are reared in the insectaries for studies on their biology and behaviour, to inform control and prevention measures. Department of Public Health and Infectious Diseases at Sapienza University in Rome, Italy.
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Part III. Budget and performance indicators

Budget

The WHO requires an estimated US\$ 55 million to support its health preparedness, readiness and response actions (Table 2). The highlighted timeline for the global SPRP is September 2024 to September 2025.

TABLE 2. Summary of global budget for WHO preparedness, readiness and response activities to dengue and other Aedes-borne arboviruses outbreaks from September 2024 to September 2025.

GLOBAL SPRP BUDGET FOR DENGUE AND OTHER ARBOVIRUSES 2024–2025				
#	Intervention pillar	Response	Readiness/ preparedness	Overall
1	Leadership, coordination, planning and Monitoring	1 818 153	1 677 981	3 496 134
	PRSEAH	559 543	140 000	699 543
2	Risk communication, community engagement, infodemic management	2 854 161	2 459 580	5 313 741
3	Surveillance	3 705 540	4 395 678	8 101 218
4	Travel, trade and points of entry	490 147	914 154	1 404 301
5	Laboratory diagnostics and testing	2 840 618	2 260 382	5 101 000
6	Vector control	6 000 354	7 157 709	13 158 063
	WASH & IPC	792 111	975 014	1 767 125
7	Case management and therapeutics	2 799 207	3 418 433	6 217 640
8	Operational support and logistics	4 461 126	3 797 729	8 258 855
9	Essential health services and systems	358 896	510 556	869 452
10	Vaccination	91 320	74 230	165 550
11	Research, innovation and evidence	251 652	262 353	514 005
	TOTAL (in US\$)	27 022 828	28 043 799	55 066 627

Key performance indicators (KPI)

Intervention Pillar	KPI	Target	Responsible	Frequency
Leadership and coordination	Number of strategic coordination meetings held	Increased number of meetings over time (including 2L and 3L coordination)	WHO	Monthly
	Number of target stakeholders/partners engaged	Increased outreach and engagement activities with key stakeholders, donors and partners.	WHO	Monthly
	Number of regions with regional response strategy for <i>Aedes</i> -borne diseases	All regions with developed regional plan for dengue, including other arboviruses.	WHO	N/A
	Number of countries with a national strategy	Increased number of countries with a dengue preparedness, readiness and response strategy.	WHO	N/A
	Number of resource mobilization activities organized	Enhanced resource mobilization activities at all three WHO levels.	WHO	Monthly
PRSEAH	Percentage of responders who have had PRSEAH induction briefings and other training	All responders briefed or have received PRSEAH training.	WHO	Weekly
	SEAH risks and PRSEAH needs assessments conducted in priority countries	Needs and gaps assessed in all priority countries based on the level of field operations and emergency (preparedness or response) phase.	WHO	Monthly
	Number of PRSEAH awareness and sensitization meetings targeting communities, partners and government stakeholders organized	Communities, partners and government stakeholders aware of PRSEAH safeguarding measures.	WHO	Monthly
	Number of targeted countries with PRSEAH reporting mechanism established	Increased establishment and management of PRSEAH reporting mechanism at country level.	WHO	N/A
RCCE	Number of targeted community influencers reached with prevention and control messages	Increased number and capacity of community influencers in dengue prevention and control.	WHO	Quarterly
	Number of trained community mobilizers actively engaged in risk communication, community engagement and infodemic management	Increased number of RCCE-IM activities being conducted by trained community mobilizers.	WHO	Quarterly
	Number of rumours, mis- and disinformation messages investigated within 48 hours	Monitoring of rumours, mis- and disinformation messages.	WHO	Quarterly
Surveillance	Proportion of dengue signals investigated within 48 hours in countries with ongoing large outbreaks and no endemicity	Number of dengue signals investigated within 48 hours in countries with large outbreaks and no endemicity.	WHO	Weekly
	Preparation and sharing of outbreak investigation/situation report	Number of situations reports prepared and disseminated.	WHO	Weekly (at minimum)

Intervention Pillar	KPI	Target	Responsible	Frequency
Travel, trade and points of entry	Number of travelers screened for dengue symptoms at points of entry	Number of travelers screened at points of entry.	WHO	Weekly
	Availability of dengue awareness materials for travellers at points of entry	Number of points of entry with dengue awareness materials.	WHO	Monthly
Laboratory	Percentage of health care facilities/testing centers reporting RDT results in 24 hours	Number of health care facilities reporting RDT results in 24 hours or less.	WHO	Weekly
	Percentage of laboratories in high-risk regions fully enabled to perform RT-PCR testing	Number of equipped laboratories performing RT-PCR testing.	WHO	Weekly
IPC/WASH	Percentage of health care facilities with IPC protocols for dengue	Number of health care facilities that pass IPC assessment requirements.	WHO	Weekly
	Availability of WASH supplies (water, soap, disinfectant) at health care facilities	Availability of adequate WASH supplies ensured.	WHO	Weekly
	Percentage provision of sufficient and safe water in affected localities	Availability of adequate water supplies ensured.	WHO	Weekly
	Percentage of localities with adequate solid waste collection systems and wastewater management systems	Availability of adequate solid waste management system ensured.	WHO	Weekly
	Percentage of affected communities with ongoing water source management in the targeted areas	Increased number of communities with appropriate water quality monitoring.	WHO	Weekly
Vector control	Percentage of households implementing mosquito-control measures (larvicide, indoor/outdoor ULV insecticide, TIRS)	Increased number of households using appropriate mosquito-control measures.	WHO	Monthly
	Number of larval breeding sites identified and treated/eliminated	Increased number of breeding sites treated.	WHO	Monthly
Case management	Hospitalization rate for confirmed dengue cases	Lower recorded hospitalization rates.	WHO	Weekly
	Average time to appropriate treatment initiation	Treatment initiated within 24 hours following case investigation.	WHO	Weekly
Operational support and logistics	Stockpile of essential supplies (medicines, diagnostics) for dengue response	Sufficient stockpile levels of essential supplies for dengue response maintained.	WHO	Weekly
	Lead time from order placed to delivery	Adequate and efficient transportation ensured.	WHO	Weekly

Essential health services and systems	Availability of trained health care workers for dengue management	Increased number of trained health care workers available to support dengue response	WHO	Weekly
	Presence of at least one health system and service continuity focal point at national level	At least one health system and service continuity focal point available at national level	WHO	Weekly
	Monitoring and reporting of essential service uptake trends via existing health information platforms in affected countries	Continued use of essential services during dengue response	WHO	Weekly
Vaccination	Vaccine coverage in endemic areas	Vaccine availability targeted in heavily affected areas and vulnerable groups, when possible	WHO	When available
Research, innovation and evidence	Number of research studies conducted on dengue in the local context	Studies published in peer-reviewed journals and other outlets	WHO	Quarterly

Dengue research at Institute of Hygiene & Tropical Medicine (IHMT), Portugal. © WHO / Khaled Mostafa





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