

Risk Assessment for public health related to Dengue in the Americas Region

12 December 2023

Risk assessment date: 30 November 2023¹

Overall risk
Regional
High

Confidence in available information
Regional
Moderate

Overall Risk statement

Due to the rise of dengue infections and the unprecedented spread in 2023, this RRA aims to assess the current regional risk, considering the current vector activities (dengue season) by subregion and a more detailed situation at the country levels, including capacities to support the response (e.g., technical, diagnostics, supply).

The worldwide incidence of dengue has increased over the past two decades with dengue becoming a growing public health problem worldwide. From 2000 until 2018, WHO recorded an eight-fold increase in global dengue cases, from 500,000 to 4.2 million reported cases. Cases hit an all-time high in 2019, with 5.2 million cases reported in 129 countries.

Since early 2023 and as of 23 November 2023, the world has faced an upsurge of dengue transmission characterized by the number, size, and concurrence of multiple outbreaks and the spread to areas previously free of dengue. A number of countries have seen unexpected increases in dengue cases, and over 5 million cases and more than 5,000 dengue-related deaths have been reported in 80 countries/territories globally, although this figure is likely an underestimate of the true burden.

In the Americas, 2023 is the year with the highest historical record of dengue cases, registering more than 4.1 million new infections. This figure exceeded those of 2019, the year in which more than 3.1 million cases were registered, including 28,203 serious cases and 1,823 deaths.

Several factors are associated with the increasing risk of spread of the dengue epidemic, including the changing distribution of the vector (*Aedes aegypti*), especially in previously dengue native areas; the consequences of climate change leading to high rainfall, humidity and increasing temperatures; the fragile health system in the midst of political and financial instabilities in countries facing complex humanitarian

¹ This assessment includes the information available as of 28 November 2023.

crises and high population movements. These factors also challenge the response to the epidemic, even in endemic countries and the risk of further spread to other countries.

The average dengue CFR reported, so far, in 2023 is below the regional target rate of less than 0.05 % (14 of the 18 affected countries in the region are reporting a CFR higher than the regional target of 0.05%).

Dengue infections are the most common vector-borne viral infections worldwide and one of the major public health problems in tropical and subtropical countries. It is also a significant public health concern in other non-endemic countries. The emergence and re-emergence of dengue and its unprecedented worldwide spread are supported by climate conditions, underdeveloped health systems, increasing urbanization, and human activities, creating a more permissive environment for vector-host interaction. Cross-border population movements, coupled with increased global travel following the COVID-19 pandemic, increasing the risk of international spread and a shift in introducing new DENV serotypes and the reemergence of dengue serotypes that have not been circulating for the past 15 years. However, the distribution of risk of dengue is uneven across regions, countries, and within countries.

The lack of robust dengue surveillance and management systems raises concerns about potential undetected cases or unrecorded travel movements that could contribute to unnoticed disease spread.

Protracted and concurrent dengue outbreaks strain public health response personnel and deplete regional and local resources.

Simultaneous outbreaks across countries strain the capacity for epidemic response. The overall capacity to respond to multiple, concurrent outbreaks continues to be strained due to the lack of resources, including shortages of good quality dengue diagnostic kits for early detection, lack of trained clinical and vector control staff, and community awareness, etc. Emergency response mechanisms have been established, and PAHO/WHO support has been provided to selected countries. However, the number of affected countries strains the capacity of the technical teams, leading to limited and delayed technical support to affected countries. Coordination with partners, including UNICEF, has resulted in developing and implementing common analyses and priority-setting tools. Nevertheless, sustaining and enhancing partners collaboration is imperative.

Considering the current situation, certain critical aspects stand out, in particular:

- 1) **Continuous risk of spread:** high population movements (within countries and across countries), and conducive social, entomological and environmental factors that favour proliferation of the *Aedes* mosquito. Proximity to low-income urban and peri-urban centers is also associated with greater risk, particularly for those with good transport connections.
- 2) **Environmental and social factors that favour the proliferation of the *Aedes* mosquito;** High rainfall, humidity and temperature, disordered urban planning, population growth, and emergent factors related to the globalization process.

- 3) **El Nino phenomenon and climate change:** with the potential risk of increase in drought or flooding in countries already affected by climate change and at risk for dengue outbreaks. Climate change, particularly rising temperatures, facilitates the geographical expansion of *Aedes* mosquitoes, exposing new populations to dengue transmission. Variations in precipitation patterns impact mosquito breeding sites availability, influencing dengue transmission dynamics.
- 4) **Changes in the predominant circulating serotypes and co-circulation of multiple dengue serotypes in the different regions:** may result in increased numbers of severe dengue and deaths due to the effect of antibody-dependent enhancement following secondary infection with a heterologous serotype.
- 5) **Challenges in clinical diagnosis:** given that dengue symptoms are non-specific and resemble other febrile infections, such as chikungunya, Zika, and malaria, among others, potentially leading to challenges in case management.
- 6) **Laboratory and testing capacity:** Dengue diagnosis is challenging given the high cross-reactivity of antibodies between flaviviruses in serological assays. The lack of training, laboratory rapid tests and reagents, as well as consumables and limited testing capacity (testing sites, human resources) in addition to the technical challenges in the molecular diagnosis.
- 7) **Prolonged ongoing outbreaks, including the COVID-19 pandemic:** The concurrent COVID-19 pandemic, has impacted and continues to affect countries, with significant social, economic and health consequences, from which most countries are still in the process of recovery.
- 8) **Impact on Healthcare Facilities:** stresses the epidemic's size, healthcare facilities capacity for dengue patient treatment is affected, overwhelmed healthcare facilities in some areas given high caseloads, and other concurrent outbreaks of other communicable diseases.
- 9) **Context:** the context in many affected countries results in mass movement or migration of persons, limited responder access to affected areas (road and air), security concerns for aid workers leading to disrupted provision of health care services and infection control, and destruction of health care facilities infrastructure.
- 10) **Lack of specific treatment for Dengue:** There is no specific treatment for dengue; instead, medical care focuses on managing the symptoms.
- 11) **Capacity building and maintenance:** challenge in entomological surveillance and vector-control activities as well as in training on clinical management focused on detection of early predictors of

severe diseases, also exacerbated by high rotation of healthcare workers, as well as limited maintenance and procurement of equipment and insecticides to perform vector control activities.

12) **Lack of engagement and mobilization of local communities in vector control activities:** Surveillance systems, integrated vector management, community engagement, and health education are crucial for adapting to climate-induced changes in dengue transmission.

13) **Lack of coordination among all stakeholders:** dengue is a historically and chronically underfunded program, and donor interest is low.

The **risk at the regional level is assessed as High** and thus a regional threat to public health and an indicator of inequity and lack of social development.

Please refer to the Exposure Assessment section for the Americas Region countries specific summary.

Criteria	Assessment		Risk	Rationale
	Likelihood	Consequences		
Potential risk to human health	Likely	Moderate	High	<p>Stressed surveillance systems in many affected countries may lead to delayed reporting and response and missed identification of symptoms, contributing to increased severe dengue outcomes.</p> <p>There is a lot of heterogeneity in capacity within the region. Some countries are endemic for the disease and have the capacity to control and manage cases. However, there are pockets of vulnerability that require a more enhanced response. Additionally, secondary infection leads to severe dengue which can overcrowd health facilities.</p>
Risk of geographical spread of the event	Likely	Minor	Moderate	<p>Dengue is endemic in several countries in the Region of the Americas. New areas with dengue naïve populations are reporting cases though numbers are relatively small.</p> <p>Dengue transmission and risk are heterogenous within and between countries. Risk increases with higher altitude, decreasing proper wastewater disposal, increase in water storage inside households, increasing vector range, and stagnant water pools.</p>
Risk of insufficient control capacities	Likely	Moderate	High	<p>Laboratory capacity to diagnose dengue plays a critical role in the timely diagnosing of dengue and establishing containment measures to prevent disease spread. Although the majority of affected countries have the capacity to control further spread, the number of outbreaks and geographic scope have stretched the capacity to provide technical support and guidance. Parallel large-scale, high-risk</p>

				<p>outbreaks and other public health emergencies further stretch resources and limit the capacity to provide human resource support. Rapid procurement of diagnostic for dengue, lack of sound case referral and management of cases and lack of trained vector control staff have increased the challenges in controlling dengue. Lack of coordination among multisectoral actors within countries is an obstacle to efficiently using existing capacity.</p>
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Hazard assessment

Dengue

Dengue, caused by a flavivirus of the family *Flaviviridae*, is a viral disease transmitted through the bite of *Aedes* mosquitoes. These mosquitoes reproduce indoors and outdoors and are widely distributed in tropical and sub-tropical regions. The incubation period for human infection ranges from 3 to 14 days, with an average of 4 to 7 days. Viremia reaches the highest titters the day before symptom onset and usually remains at a level sufficient for mosquito infection for the next four days.

There are four distinct serotypes of the dengue virus (DENV-1, DENV-2, DENV-3, DENV-4), with several genotypes among each serotype. While immunity to one serotype tends to be lifelong, it does not confer protection against the other three. A second infection increases the risk of severe dengue due to the risk of antibody-dependent enhancement. Humans are the primary amplifying virus host, particularly in tropical and subtropical urban areas where a transmission cycle between humans and mosquitoes is sustained. All four serotypes are currently co-circulating worldwide.

Between 40% and 80% of dengue infections are asymptomatic. Clinical presentations often include sudden-onset high fever, severe headaches, retroorbital pain, myalgia, arthralgia, maculopapular rash, and minor haemorrhages. Symptoms typically follow a sequential pattern, with a brief remission after the third to fifth day. The illness rarely lasts more than 10 days, but convalescence can be prolonged and debilitating. A small proportion of cases, usually less than 5%, can develop severe manifestations and a fraction of these cases can be fatal. Most severe cases and deaths occur in secondary infections and can affect children, adolescents and young adults. Severe dengue is characterized by increased vascular permeability, potentially leading to fatal shock.

Since Dengue is a viral haemorrhagic disease, it is under worldwide surveillance. It is the most widespread mosquito-borne viral disease worldwide, with an estimated 390 million infections, tens of millions of yearly symptomatic cases and an estimated 20,000 to 70,000 deaths. Timely recognizing and managing patient warning signs is crucial in preventing complications and death. The only mode of transmission is through the bite of an infected mosquito. Mosquitoes get infected with the virus when they feed on a viremic host. Although it can take weeks for a mosquito to become infected, mosquitoes remain carriers for life once infected. New human infections occur when virus-containing saliva is injected into a non-immune host during subsequent blood meals.

Dengue is a disease of urban areas because its main vector, *Aedes aegypti*, is abundant in indoor environments, and is also found around houses and buildings. The species is a highly effective vector: it primarily feeds on humans, breeds in small man-made water containers, and rests within 400 meters from human wells. Its biting habits are predominantly diurnal.

A second species, *Aedes albopictus* (Asian tiger mosquito), may be common in peri-home environments, especially in urban areas with abundant vegetation. It is considered as a secondary vector as it does not have a specific host preference and feed on animals as well.

Dengue viruses can be spread by infected travellers and in cargo transportation, playing a role in the transmission of dengue vectors.

Exposure assessment

Based on available information, dengue cases have been reported in 43 countries and territories of the Americas Region since January 2023. Currently, 17 countries are reporting active, the following table shows a summary of the situation in the most affected countries in the Region.

Table 1. Summary of dengue outbreaks ongoing and/or reported as of November 2023

Americas Region
<p>Dengue is the most widespread arbovirus and causes the highest number of cases in the Region of the Americas, with cyclic epidemics recurring every 3 to 5 years. Approximately 500 million people in the Americas are at risk of dengue infection today. Dengue incidence has increased in the Americas over the past four decades, from 1.5 million cumulative cases in the 1980s to 16,2 million in 2010-2019. The four dengue serotypes (DENV-1, DENV-2, DENV-3 and DENV-4) circulate throughout the Americas and in some countries simultaneously. So far in 2023, the region of the Americas is among the regions reporting the highest number of cases ever registered, with 4.1 million cases, including 6508 severe cases and 2016 deaths (CFR 0.05).</p> <p>Currently, 17 countries are reporting active epidemics. DENV-3 and DENV-4 are being detected more frequently in 2023 after several years of predominantly detecting DENV-1 and DENV-2. Nevertheless, nine countries are currently reporting the co-circulation of all four dengue serotypes. Simultaneous serotypes circulation has been detected in Brazil, Colombia, Costa Rica, Guatemala, Honduras, Mexico, Nicaragua, Panama, and Venezuela. The <i>Ae. aegypti</i>, the vector mosquito for dengue, is widely distributed in the Americas, only Canada is free from dengue and its vector. Uruguay has no dengue cases, but it does have <i>Ae. aegypti</i>.</p> <p>Before 2023, in 2019, had been the year with the highest historical dengue caseload, with more than 3.18 million cases, including 28,208 severe cases and 1,823 deaths (CFR 0.06). Between epidemiological week (EW) 1 and EW 46 of 2023, the Region reported 4,133,937 dengue cases, with a cumulative incidence of 416 cases per 100,000 population. Increased incidence rates were specifically observed in the Southern Cone (1050 cases per 100,000 population), the Andean Subregion (381 cases per 100,000 population), and the Central American Isthmus and Mexico (276 cases per 100,000 population).</p> <p>Of the total number of dengue cases until EW 46 of 2023, 1,870,543 (45%) were laboratory confirmed, and 6,508 (0.16%) were classified as severe dengue. Brazil recorded the highest number of dengue cases at 2,909,404 cases, followed by Peru with 269,603 cases and Mexico with 235,616 cases. In terms of severe</p>

dengue, Brazil reported the most cases (1,474; 0.05% of cases), followed by Colombia (1,425), Mexico (1,272), Peru (1,065), and Bolivia (640).

Although dengue is endemic in most countries of South America, Central America, and the Caribbean, during the current season, an increase in dengue cases is observed at levels above the average number of cases recorded in the last five years and beyond historical areas of transmission. The following is a situation summary of the epidemiological situation of dengue in countries and territories of the Americas Region (in alphabetical order), based on cases reported through [PLISA](#) to PAHO/WHO.

Country/Territories	Context
Argentina	In 2023 up to EW 45, 132,473 dengue cases were reported, all lab confirmed. Compared the same period of 2022, the cases for 2023 represent an 15,054% increase and a 658% increase compared to the last five-years average. A total 65 deaths have been reported (CFR: 0.053%).
Belize	In 2023 up to EW31, 4,450 cases were reported, with a cumulative incidence of 1,009 per 100,000 population. Among these cases, 86 cases were lab confirmed, accounting for 2% of the total case burden. Case counts for 2023 are 227% higher than the last five-years average.
Bolivia	In 2023 up to EW 45, of the 144,065 reported dengue cases, 23,136 (16%) were laboratory confirmed, and 640 (0.44%) were classified as severe dengue. The cases registered to EW 45 of 2023 are 387% and 1,132% higher than the cases reported in the same period of 2022. In the same period, 77 deaths were reported (CFR: 0.058%).
Brazil	In 2023 up to EW 44, of the 2,909,404 reported dengue cases, 1,331,036 (46%) were laboratory confirmed, and 1,474 (0.05%) were classified as severe dengue. The cases registered up to EW 44 of 2023 show an increase of 28% compared to the same period of 2022 and 103% compared to the average of the last five years. In the same period, a total of 1,011 deaths were reported (case fatality rate: 0.035%). All four serotypes have been detected in 2023.
Colombia	In 2023 up to EW 45, of the 103,670 reported dengue cases, 77,867 (75%) were laboratory confirmed, and 1,425 (1.37%) were classified as severe dengue. The cases registered in EW 45 of 2023 are 79% higher than those reported in the same period of 2022 and 64% higher compared to the average of the last five years. In the same period, 74 deaths were reported (CFR: 0.071%). All four serotypes have been detected in 2023.
Costa Rica	In 2023, up to EW 43, of the 19,844 reported dengue cases, 1,992 (10%) were laboratory confirmed, and one case was classified as severe dengue. The cases registered up to EW 43 of 2023 are 201% higher than the case load during the same period of 2022, and 232% higher compared to the average of the last five years. In the same period, no deaths were reported. All four serotypes have been detected in 2023.
Dominican Republic	In 2023, up to EW 42, 15,606 cases have been reported for a cumulative incidence of 142 per 100,000 population. Among the cases, 25 have been laboratory confirmed (0.16%), 128 have been reported as severe

	dengue (0.82%) and there have been 16 deaths (CFR: 0.103%). The current cases represent a 99% increase compared to the same period of 2022 and a 159% increase compared to the average of the past five years.
Grenada	In 2023, up to EW 45, 609 cases have been reported, with a cumulative incidence of 534 per 100,000 population. Four cases of severe dengue have been reported (0.66%) along with one death (CFR 0.164%). The current cases represent a 139% increase compared to the same period in 2022 and a 203% increase compared to the average of the past five years.
Guadeloupe	In 2023, up to EW 41, 8,481 cases have been reported with a cumulative incidence of 2,120 per 100,000 population. Among the cases, 896 have been lab confirmed (11% of total cases). There have been 23 severe dengue cases (0.27%) and six deaths reported (CFR: 0.071%).
Guatemala	In 2023, up to EW 44, of the 53,705 reported dengue cases, 5,719 (10.6%) were laboratory confirmed, and 124 (0.23%) were classified as severe dengue. The cases registered up to EW 44 of 2023 are 612% higher compared to the same period of 2022, and 303% higher compared to the average of the last five years. In the same period, 87 deaths were reported (CFR: 0.16%). All four serotypes have been detected in 2023.
Honduras	In 2023, up to EW 39, 18,532 cases have been reported, representing a cumulative incidence of 184 per 100,000 population. 713 cases have been lab confirmed (3.85% of total cases). Also, 147 severe dengue cases (0.79%) and 23 deaths have been reported (CFR: 0.124%). All four serotypes have been detected in 2023.
Jamaica	In 2023, up to EW42, 2,563 dengue cases have been reported, representing a cumulative incidence of 86 per 100,000 population. Also, 577 cases have been lab-confirmed (22.5%). Two deaths have been reported (CFR: 0.078%). Compared to 2022, the caseload from 2023 represents a 3,614% increase compared to the same period of 2022 and a 73% increase compared to the 5-year average.
Martinique	In 2023, up to EW 41, 9,359 dengue cases have been reported, representing a cumulative incidence of 2,495 per 100,000 population. Among the cases, 749 have been lab-confirmed (8%) and 14 severe cases have been reported (0.15%). Six deaths have been reported (CFR: 0.064%). Compared to the same period of 2022, this year's caseload represents a 4,154% increase. The caseload for 2023 represents a 77% increase compared to the last 5-year average.
Mexico	In 2023, up to EW 45, of the 235,616 reported dengue cases (cumulative incidence 179 per 100,000), 44,264 (18.8%) were laboratory confirmed, and 1,272 (0.54%) were classified as severe dengue. Also, 132 deaths were reported (CFR: 0.056%). The cases registered up to EW 45 of 2023 are 363% higher compared to the same period in 2022 and 145% higher

	compared to the average of the last five years. All four serotypes have been detected in 2023.
Nicaragua	In 2023, up to EW 46, of the 152,675 reported dengue cases, 7,756 (5.1%) were laboratory confirmed, and 14 (0.01%) were classified as severe dengue. The cumulative incidence is 2,278 cases per 100,000 population. The cases registered up to EW 46 of 2023 are 81% higher compared to the same period in 2022 and 96% higher compared to the average of the last five years. In the same period, three deaths were reported (CFR: 0.002%). All four serotypes have been detected in 2023.
Panama	In 2023, up to EW 46, of the 15,812 reported dengue cases, 12,233 (77.4%) were laboratory confirmed, and 28 (0.18%) were classified as severe dengue. The cumulative incidence is 355 cases per 100,000 population. The cases registered up to EW 46 of 2023 are 56% higher compared to the same period of 2022, and 169% higher compared to the average of the last five years. In the same period, 10 deaths were reported (CFR: 0.063%). All four serotypes have been detected in 2023.
Paraguay	In 2023, up to EW 46, all 10,034 reported dengue cases, are laboratory confirmed. The cumulative incidence is 133 cases per 100,000 population. The cases registered up to EW 46 of 2023 are 631% higher compared to the same period of 2022. In the same period, 20 deaths were reported (CFR: 0.199%).
Peru	In 2023 up to EW 44, of the 269,603 reported dengue cases, 202,109 (75%) were laboratory confirmed, and 1,065 (0.40%) were classified as severe dengue. In the same period, a total of 441 deaths were reported (CFR: 0.16%). The cases registered up to EW 44 of 2023 represent a 335% increase compared to the same period of 2022 and a 759% compared to the 5-year average.
Saint Lucia	In 2023, up to EW 46, 55 cases were reported. The cases registered up to EW 46 of 2023 are 266% higher compared to the same period of 2022.
Saint Bartholomew	In 2023, up to EW 41, 163 cases of dengue have been reported, representing a cumulative incidence of 2,329 cases per 100,000 population. Of the reported dengue cases, 108 have been lab-confirmed (66.3%).
Saint Martin	In 2023, up to EW 41, 232 cases of dengue have been reported, representing a cumulative incidence of 703 cases per 100,000 population. Of the reported dengue cases, 68 have been lab-confirmed (29%).
Suriname	In 2023, up to EW 44, 221 cases of dengue have been reported. Of the reported dengue cases, 208 have been lab-confirmed (94%). The cases registered up to EW 44 of 2023 are 1,909% higher compared to the same

	period of 2022, and 46% higher compared to the average of the last five years.
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Context assessment

Dengue prevention and outbreak response has been managed within the public health sector; however, it requires a multidisciplinary and multisectoral integrated approach to achieve its goal of reducing the impact on public health. Rapid urbanization, inadequate consideration of health concerns concerning waste disposal, building construction and other sanitary measures have resulted in challenges in sustaining Aedes mosquito control in the region. The increasing migrations, effect of climate change (such as drought, rising temperatures, and flooding), political instability, and insufficient development are leaving a growing number of people at risk of dengue across the region. Of the countries reporting active outbreaks, many are experiencing conflict or political violence in affected areas or massive migration of persons e.g., in Central America. Other countries are experiencing the effects of climate change with increasing temperatures and rain, widespread floods or drought (e.g Central American countries). These factors, along with others, including financial crises, migration, have left large populations without access to adequate healthcare and thus at risk for dengue.

A large number of outbreaks, coupled with complex economical and/or political situation requiring significant health response, put a strain on the global medical kit supply in 2022, including for dengue, from which in 2023, the systems have still yet to recover. The increasing number of outbreaks is compounding this effect.

Prevention and control of dengue continue to be variable due to limited funding, competing health issues and perceptions about the effectiveness of interventions and control measures. Therefore, there is a need to increase advocacy and resource mobilization in an integrated approach to influence policymakers in affected countries in the region.

Countries must learn and adopt successful examples of effective case management, prevention, and control of dengue and other arboviruses through heightened research projects.

Capacities	Vulnerabilities
<p>Coordination</p> <ul style="list-style-type: none"> Regular meetings conducted to coordinate dengue readiness and response activities, involving sub-national authorities. Activation of Emergency Operations Centres (EOC) for dengue response in some countries. 	<p>Coordination</p> <ul style="list-style-type: none"> Insufficient coordination between departmental sectors contributing to dengue response. Low level of coordination between the health sector and other public and private actors in vector control. <p>Surveillance</p>

<ul style="list-style-type: none"> • A national dengue response plan has been developed, or existing preparedness and response plans in some countries have been activated. • PAHO/WHO is closely liaising with key partners and Member States to ensure a coordinated response for optimal support to countries in a constrained resource environment. <p>Surveillance</p> <ul style="list-style-type: none"> • Provision of epidemiological surveillance materials and technical assistance to national authorities. • The capacity in information systems and data management that was developed as part of the COVID-19 pandemic response is being leveraged for arboviral disease surveillance. • Virtual cooperation spaces (VCS) have been created in the Region as an effort of collaborative surveillance between PAHO/WHO and the Member States that allow the automated generation of different epidemiological analyses, situation rooms, and epidemiological bulletins, strengthening the epidemiological surveillance of dengue and other arboviruses. <p>Laboratory</p> <ul style="list-style-type: none"> • Trained laboratory personnel in testing dengue samples. • Testing algorithms developed and implemented. • Enhanced genomic surveillance capacity. 	<ul style="list-style-type: none"> • Exhausted national dengue responders and over stretched over all emergency response capacity due to numerous parallel large-scale and high-risk outbreaks and other public health emergencies. • Limited use of hot-spot mapping of cases for targeted response activities. • Limited use of prediction tools and integration of vector and climate data. • Multiple dengue outbreaks, geographic extent of dengue outbreaks, other disease outbreaks, the ongoing response to the COVID-19 pandemic, seriously reduce capacities to provide support. • Inadequate data reporting infrastructure in many areas with insufficient connectivity in other areas. <p>Laboratory</p> <ul style="list-style-type: none"> • Limited RT-PCR testing platforms in many countries. • Inadequate supplies of laboratory reagents and consumables <p>Case Management</p> <ul style="list-style-type: none"> • Inadequate treatment supplies (fluids, etc.) • Lack of adherence to national clinical management guidelines
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- RT-PCR and genomic sequence platforms installed in many countries.

Case Management

- Adequate referral management system in some affected areas.
- Trained healthcare professionals in the detection of warning signals of severe dengue.
- Some countries have National networks of clinical experts in arboviral diseases under the direction of the Ministries of Health in each country, which are responsible for conducting clinical training at the local level.
- PAHO/WHO is sharing case management guidelines and dengue clinical management training with health care workers through direct missions, webinars, online courses and refresher sessions.

Entomological monitoring and vector control

- Strengthened the capacity of Member States to monitor insecticide resistance.
- New operational model for Aedes control has been developed and is in the implementation phase in the Americas.
- Strengthened vector-control activities in affected countries.
- Supporting the implementation of effective interactive vector surveillance and control by Member States through publishing guidelines.

in some countries/territories

- Inadequate referral management system in some resource-limited settings.
- Inadequate understanding of clinical case definition among HCWs, thus delays in reporting/testing and treatment
- Insufficient dengue case management training for HCWs across 3 levels of healthcare facilities
- Pocket of clinicians with inadequate expertise to correctly detect and manage severe dengue cases.

Entomological monitoring and vector control

- Exacerbation of dengue outbreaks due to natural disasters and climatic effects.
- Rapid urbanization resulting in congested living conditions.
- Sub-optimal waste control practices leading to more vector breeding sites.
- Sub-optimal vector control activities.
- Countries have few formally trained entomologists working within Ministries of Health.
- Vector control programs have been underfunded for decades, and their limited resources were

<ul style="list-style-type: none"> • WHO has facilitated the deployment of medical epidemiologists, entomologists and clinical experts to support dengue response and the supply of diagnostics and other health commodities. <p>Risk Communication and Community Engagement</p> <ul style="list-style-type: none"> • Strengthened partners coordination. • Facilitated awareness raising among health workers (by sharing factsheets and surveillance tools) and affected local population using risk communication messages. • Enhanced Risk communication and community engagement to strengthen community involvement in vector control and knowledge of warning signs of dengue infection and recommended actions. <p>Logistics</p> <ul style="list-style-type: none"> • PAHO/WHO experts are being deployed to countries that are experiencing high-magnitude outbreaks. 	<p>frequently redirected to other response activities during COVID-19.</p> <p>Risk Communication and Community Engagement</p> <ul style="list-style-type: none"> • Limited resources. • Lack of targeted and effective risk communication, community engagement and wastewater management in communities, with effective community feedback mechanisms. • Limited understanding of risk perception and health seeking behaviours of affected populations <p>Logistics</p> <ul style="list-style-type: none"> • Inadequate financial resources to respond in a timely and effective manner at country level. • Insufficient experienced dengue vector control staff and resources in some countries. • Many dengue-affected countries are also facing ongoing outbreaks.
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