



Pan American
Health
Organization



World Health
Organization
REGIONAL OFFICE FOR THE
Americas

Epidemiological Alert Sustained circulation of dengue in the Region of the Americas

5 December 2023

In light of the beginning of the peak dengue circulation season in the southern hemisphere, the persistence of viral activity in the Central American Isthmus subregion and Mexico, and the identification of serotypes, mainly DENV-3, that had not circulated for several years in some areas, the Pan American Health Organization / World Health Organization (PAHO/WHO) encourages Member States to continue efforts to maintain surveillance, early diagnosis, and timely treatment of dengue cases and other arboviruses. This is aimed at preventing complications and deaths associated with these diseases. At the same time, it calls for the intensification of preparedness actions within healthcare services to facilitate access and proper management of patients.

Situation Summary in the Region

Dengue continues to be the arbovirus with the highest number of reported cases in the Region of the Americas, and outbreaks occurring cyclically every 3 to 5 years.

The year 2023 is the historical record year for dengue cases, surpassing 4.1 million new infections. This figure exceeded those of 2019, a year in which more than 3.1 million cases were recorded, including 28,203 severe cases and 1,823 deaths (1.2).

In 2023, between EW 1 and EW 45, there were 4,101,698 dengue cases reported, with a cumulative incidence rate of 412 cases per 100,000 population. The highest cumulative incidence rates were reported in the following subregions¹: The Southern Cone with 1,049 cases per 100,000 population, the Andean Subregion with 378 cases per 100,000 population, and the Central American Isthmus and Mexico with 260 cases per 100,000 population. This year, of the 4,101,968 dengue cases reported, 1,861,029 (45.3%) were laboratory confirmed and 6,340 (0.15%) were classified as severe dengue. The highest number of dengue cases were reported in Brazil with 2,909,404 cases, followed by Peru with 269,603 cases (as of EW 44 of 2023) and Mexico with 216,277 cases (1).

Of the 6,340 severe dengue cases reported in 2023, the highest numbers were recorded in the following countries: Brazil with 1,474 cases, Colombia with 1,390, Mexico with 1,142, Peru with 1,065, and Bolivia with 640 cases. Additionally, during the same period, a total of 1,954 deaths were reported in the Region of the Americas (case fatality rate [CFR]: 0.048%).

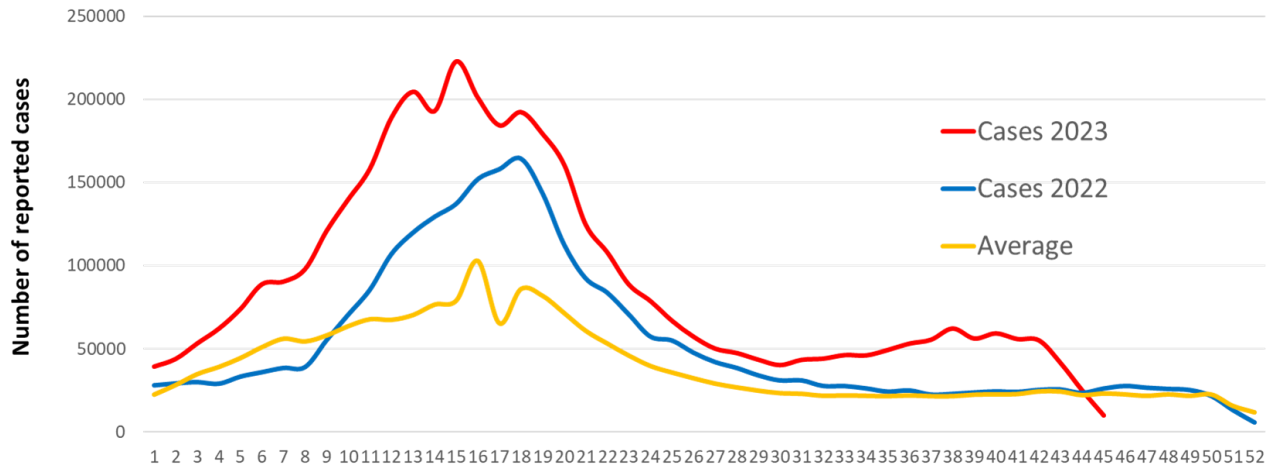
¹ Note: the subregions and the corresponding countries and territories follow the divisions described in the Health Information Platform for the Americas (PLISA). Washington, DC: PAHO; 2023 [cited 30 November 2023]. Available from: <https://bit.ly/3IGwSwc>.

Suggested citation: Pan American Health Organization / World Organization of Health. Epidemiological Alert: Sustained circulation of dengue in the Region of the Americas. 5 December 2023, Washington, D.C. PAHO/WHO. 2023

On 23 March 2023, the World Health Organization reported on the geographical expansion of dengue and chikungunya cases beyond the historical transmission areas in the Region of the Americas, constituting a significant public health problem (3).

On 15 September 2023, the Pan American Health Organization / World Health Organization (PAHO/WHO) issued an epidemiological alert regarding the increase in dengue cases in Central America and the Caribbean due to the rising cases in countries and territories of this subregion, considering the proximity of the onset of the summer season in South America (4).

Figure 1. Number of dengue cases in 2022, 2023, and last 5-year average. Region of the Americas. Up to EW 45 of 2023.



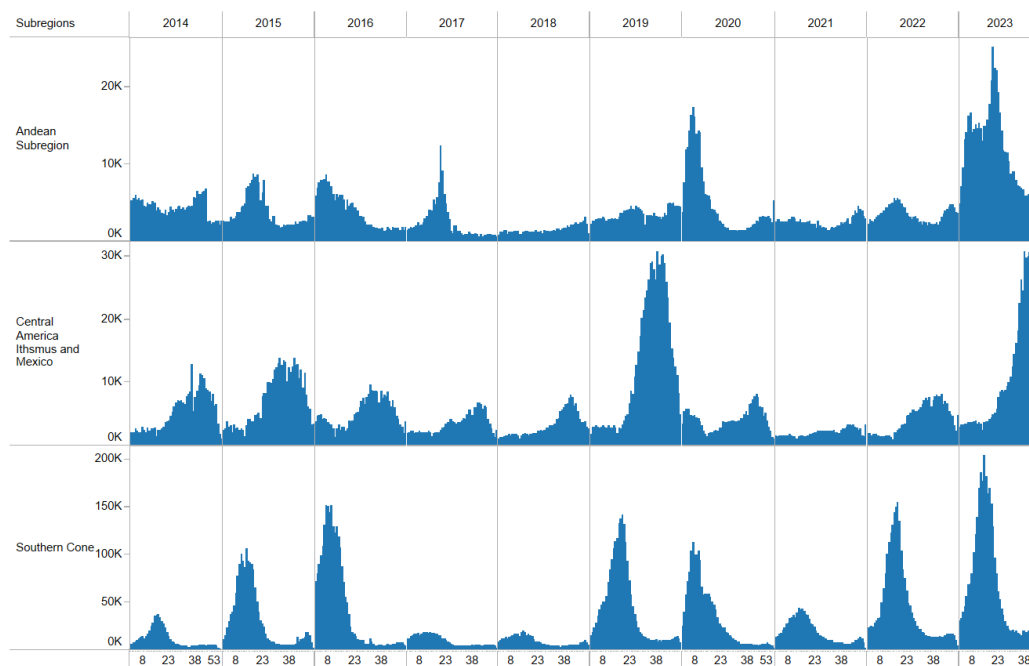
Source: Adapted from Pan American Health Organization. PLISA Health Information Platform for the Americas, Core Indicators Portal. Washington, DC: PAHO; 2023 [cited 27 November 2023]. Available from: <https://opendata.paho.org/en>

In EW 45 of 2023, there is a 56% increase (4,128,033 cases) compared to the same week in 2022 (2,648,804 cases) and a 114% increase compared to the average of the last five years (1,925,186 cases) (Figure 1).

In the second semester of 2023, some countries in the Central American Isthmus subregion and Mexico have observed a sustained pattern of dengue cases with particularly high incidence (Figure 2).

Consequently, given the proximity of the peak seasonal circulation of dengue in the southern hemisphere, it is important to consider the potential impact in endemic areas. Therefore, taking preventive measures and strengthening the preparedness and response of health systems is crucial to address this epidemiological situation.

Figure 2. Number of dengue cases for the subregions of the Americas by epidemiological week and year. Up to EW 45 of 2023.



Source: Adapted from Pan American Health Organization. PLISA Health Information Platform for the Americas, Core Indicators Portal. Washington, DC: PAHO; 2023 [cited 27 November 2023]. Available from: <https://opendata.paho.org/en>

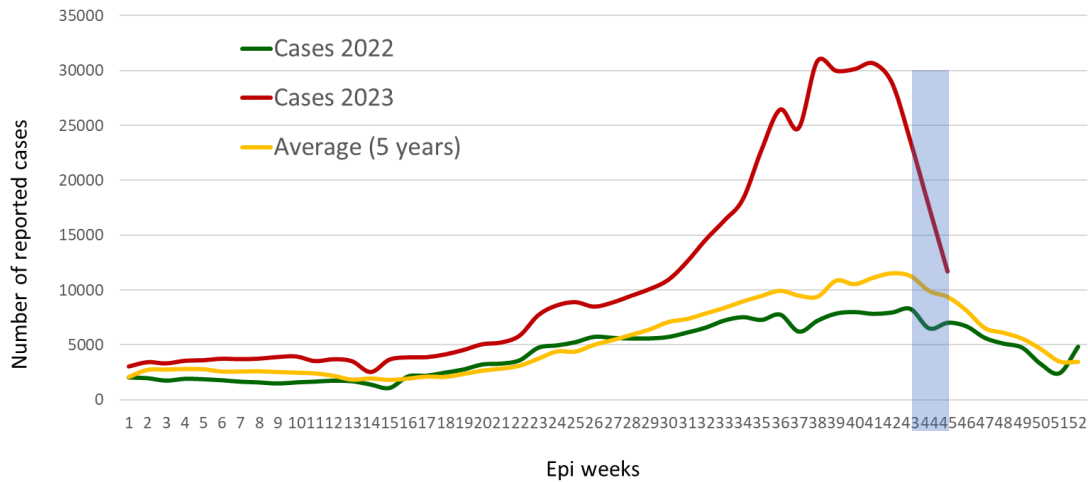
Summary of the situation in the Central American Isthmus subregion and Mexico

In 2023, between epidemiological week (EW) 1 and EW 45, there were 505,356 dengue cases reported, with a cumulative incidence rate of 276 cases per 100,000 population in the subregion. The highest cumulative incidence rates were reported in the following countries (1): Nicaragua with 2,278 cases per 100,000 population, Belize with 1,009 cases per 100,000 population, Costa Rica with 377 cases per 100,000 population, and Panama with 354 cases per 100,000 population. This year, of the 505,356 reported dengue cases, 72,795 (14.4%) were laboratory confirmed and 1,588 (0.31%) were classified as severe dengue. The highest number of dengue cases was observed in Mexico with 235,616 cases, followed by Nicaragua with 152,675 cases, and Guatemala with 53,705 cases.

With regard to severe dengue cases reported in 2023, the highest number were reported in the following countries: México with 1,272 cases, Honduras with 147, Guatemala with 124, Panama with 27, and Nicaragua with 14 cases. Additionally, during the same period, a total of 253 deaths were reported in the Subregion (case fatality rate [CFR]: 0.050%).

Comparing the reported cases in the Central American Isthmus subregion and Mexico between SE 37 to 40 of 2023 (112,038) against those reported between SE 41 to 44 (113,319), there was an increase of 1.1%, indicating persistence in circulation over the last 4 analyzed EW. The countries that showed the highest increases during these periods were Costa Rica with 10% and Nicaragua with 63%.

Figure 3. Dengue cases in 2022, 2023 and average of the last 5 years – Central American Isthmus and Mexico. Up to EW 45 of 2023.



Source: Adapted from Pan American Health Organization. PLISA Health Information Platform for the Americas, Core Indicators Portal. Washington, DC: PAHO; 2023 [cited 30 November 2023]. Available from: <https://opendata.paho.org/en>

In EW 45 of 2023, the Central American Isthmus subregion and Mexico showed an increase of 150% (499,494 cases) compared to the same week in 2022 (199,519 cases) and a 107% increase compared to the average of the last five years (241,329 cases) (Figure 3).

Summary of the situation in South America (Andean and Southern Cone subregions)

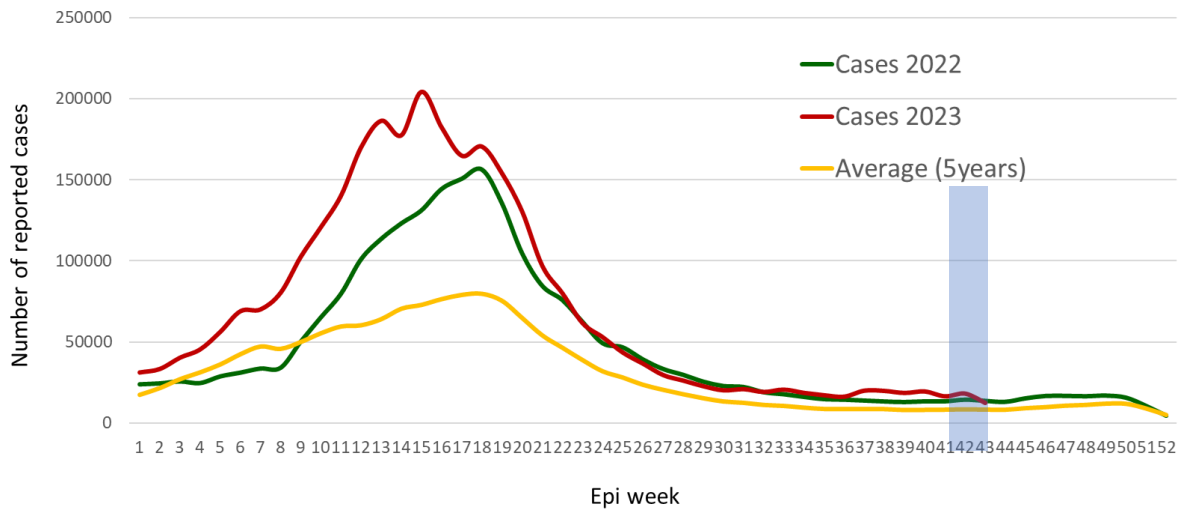
In 2023, between EW 1 and EW 45, a total of 3,587,942 dengue cases were reported, with a cumulative incidence rate of 829 cases per 100,000 population. The highest cumulative incidence rates were observed in the following countries (1): Brazil with 1,359 cases per 100,000 population, Bolivia with 1,217 cases per 100,000 population, Peru with 808 cases per 100,000 population, and Argentina with 271 cases per 100,000 population. In this year, out of the 3,587,942 reported dengue cases, 1,791,927 (49.9%) were laboratory-confirmed, and 4,708 (0.13%) were classified as severe dengue. Brazil had the highest number of dengue cases with 2,909,404 cases, followed by Peru with 269,603 cases, and Bolivia with 164,065 cases.

Regarding the number of severe dengue cases reported in 2023, the highest numbers were observed in the following countries: Brazil with 1,474 cases, Colombia with 1,425 cases, Peru with 1,065 cases, Bolivia with 640 cases, and Ecuador with 87 cases. Additionally, during the same period, a total of 1,729 deaths were reported in the subregion (case fatality rate [CFR]: 0.048%).

In South America, comparing reported cases between EW 37 to 40 and EW 41 to 44 of 2023, the countries that showed the highest increases during this period were Paraguay with a threefold increase in reported cases, Bolivia with a 14% increase, and Colombia with a 2% increase.

In EW 45 of 2023, in the Southern Cone subregion, there is an increase of 35% (3,042,661 cases) compared to the same week in 2022 (2,259,636 cases) and a 104% increase compared to the average of the last five years (1,487,177 cases) (Figure 4).

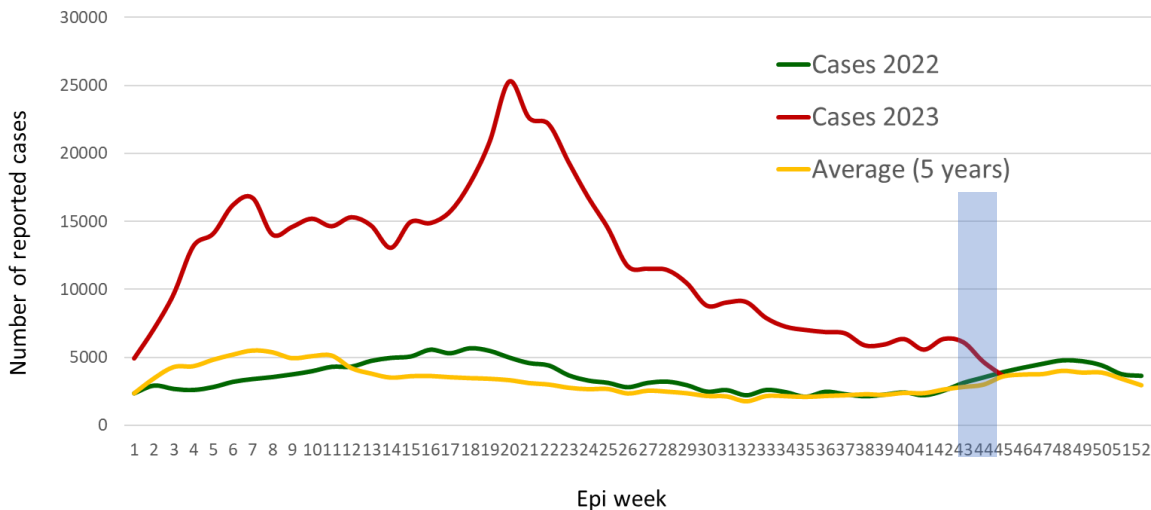
Figura 4. Dengue cases in 2022, 2023 and average of the last 5 years – Southern Cone subregion. Up to EW 45 of 2023.



Source: Adapted from Pan American Health Organization. PLISA Health Information Platform for the Americas, Core Indicators Portal. Washington, DC: PAHO; 2023 [cited 30 November 2023]. Available from: <https://opendata.paho.org/en>

In the Andean subregion, in EW 45 of 2023, there is an increase of 249% (544,896 cases) compared to the same week in 2022 (155,908 cases) and a 274% increase compared to the average of the last five years (145,615 cases) (Figure 5).

Figura 5. Dengue cases in 2022, 2023 and average of the last 5 years – Andean subregion. Up to EW 45 of 2023.



Source: Adapted from Pan American Health Organization. PLISA Health Information Platform for the Americas, Core Indicators Portal. Washington, DC: PAHO; 2023 [cited 30 November 2023]. Available from: <https://opendata.paho.org/en>

Circulation of dengue serotypes (1)

The four serotypes of the dengue virus (DENV1, DENV2, DENV3, and DENV4) are present in the Region of the Americas.

In the Central American Isthmus subregion and Mexico, all four serotypes of the dengue virus (DENV1, DENV2, DENV3, and DENV4) are currently circulating. In 2023, up to EW 45, simultaneous circulation of all four serotypes has been detected in Costa Rica, Guatemala, Honduras, Mexico, Nicaragua, and Panama.

In South America, all four serotypes of the dengue virus (DENV1, DENV2, DENV3, and DENV4) are also currently circulating. In 2023, up to EW 45, simultaneous circulation of all four serotypes has been detected in Brazil, Colombia, and Venezuela.

Figure 6. Identification of serotypes in countries and territories of the Americas, EW 45 2023.



Source: Adapted from Pan American Health Organization. PLISA Health Information Platform for the Americas, Core Indicators Portal. Washington, DC: PAHO; 2023 [cited 30 November 2023]. Available from: <https://opendata.paho.org/en>

Recently, in some countries, the circulation of dengue virus serotypes, mainly DENV-3, has been identified, which had not circulated for several years, as shown in Table 1.

Table 1. Reintroduction of serotypes in countries of the Region of the Americas and the time period without their circulation, up to EW 45 of 2023.

Country	DENV-3		DENV-4		Serotypes 2023 EW 46
	Year of recirculation	Year of Last Report	Year of recirculation	Year of Last Report	
Costa Rica	2022	2016	2022	Without report	1,2,3,4
EL Salvador	2022	2015	2022	2011	Without report serotypes
Honduras	2023	2018	2021	2014	1,2,3,4
Nicaragua	2022	2015	2022	2014	1,2,3,4

Panama	2023	2019	2023	2000	1,2,3,4
Peru	2023	2019	---	---	1,2,3
Venezuela	---	---	2022	2016	1,2,3,4
Argentina	2023	2017	---	---	1,2,3
Puerto Rico	2022	2015	---	---	1,2,3

Source: Adapted from Pan American Health Organization. PLISA Health Information Platform for the Americas, Core Indicators Portal. Washington, DC: PAHO; 2023 [cited 30 November 2023]. Available from: <https://opendata.paho.org/en>

Guidance for national authorities

According to the seasonal pattern of dengue and the current rainy season, there has been a significant increase in dengue during the second half of 2023 in several countries of the Region of the Americas, especially in Central America and the Caribbean. In addition, a notable rise in the notification of locally transmitted cases has been observed in places such as The Bahamas and the state of Florida in the United States. As anticipated, this increase in the incidence of the disease has placed an additional burden on healthcare systems in some affected areas, leading to the declaration of health emergencies in some countries. Therefore, it is crucial to take appropriate measures to prepare healthcare systems to cope with the rise in cases, particularly in the southern hemisphere with the onset of the summer season.

Given this situation, the Pan American Health Organization / World Health Organization (PAHO/WHO) urges Member States to take measures to have a surveillance system that allows detecting the alteration of the epidemiological pattern in a timely manner, implement appropriate measures at the level of patient care services, including triage, diagnosis, and timely and appropriate treatment of cases of dengue, chikungunya, and other arboviruses. Simultaneously, it calls for intensified preparedness actions of health care services to facilitate access and proper management of patients with these diseases.

PAHO/WHO reminds Member States that the same guidance published in the Epidemiological Update of 10 June 2020 on Dengue and Other Arboviruses, available in Spanish from: <https://bit.ly/3dRrUZR>.

Adequacy of health-care services

Due to the recent increases in the incidence of dengue in some areas of the Region, Member States are urged to adapt their health care services to provide timely and adequate response to the population at all levels of care.

- Organize in each institution, by levels of care, the screening, patient flow and clinical surveillance and hospitalization areas,
- Reorganize healthcare services in outbreak/epidemic situations at different levels of patient care.
- Strengthen patient care networks in diagnosis, management and follow-up of patients with suspected chikungunya (including the chronic phase of the disease) or dengue.

Integrated Surveillance

PAHO/WHO encourages continued epidemiological surveillance and sharing reports of suspected and confirmed cases of dengue, chikungunya, and Zika.

Given that the clustering of cases is common in both diseases (dengue, chikungunya), efforts should be made to analyze the spatial distribution of cases to allow rapid response at the local level of the most affected areas. Information from dengue and chikungunya hotspots should be directed towards intensive vector control.

Sentinel entomological surveillance assists with assessing changes in the risk of vector-borne diseases and the impact of vector control measures.

Laboratory confirmation

It is important to note that the initial diagnosis of DENV infection is clinical, and proper suspicion may guide the confirmation protocol. However, laboratory results should always be analyzed in conjunction with demographic information and according to epidemiological context, for surveillance purposes and not for clinical decision making.

Laboratory confirmation of dengue infection is based on virological (RT-PCR, NS1 antigen detection, and in some cases viral isolation in culture for further characterization) and serological (IgM and/or IgG detection) tests. However, for the confirmation of cases, virological assays that demonstrate the presence of the complete virus, its genetic material or its proteins should be prioritized. In general, virological assays for dengue are performed on serum samples taken during the first 5 days after symptom onset (acute phase), although highly sensitive molecular methodologies can detect viral RNA for up to 7 days depending on viremia (**Figure 7**).

On the other hand, serological assays based on the detection of IgM (or IgG) should be analyzed carefully, taking into account the time that antibodies circulate in the blood after an infection, as well as the possibility of cross-reaction with other flaviviruses (including Zika, yellow fever and others) and nonspecific detection. Thus, a single IgM result in a patient only indicates a possible recent contact with the virus, but it may have occurred up to 6 months ago. A second sample taken at least one week apart, processed in parallel with the first and with a quantitative serological assay (PRNT, for example) to demonstrate seroconversion or increase in antibody titer, may be useful to clarify the diagnosis (**Figure 8**).

It is important to have a clear laboratory algorithm that allows early detection. Although multiple molecular methodologies (*multiplex* PCR) are useful when there is no clear clinical suspicion, in a case of dengue that meets the established definitions and where the clinic is compatible, it is suggested to prioritize protocols for specific detection (*singleplex*) of the virus (5).

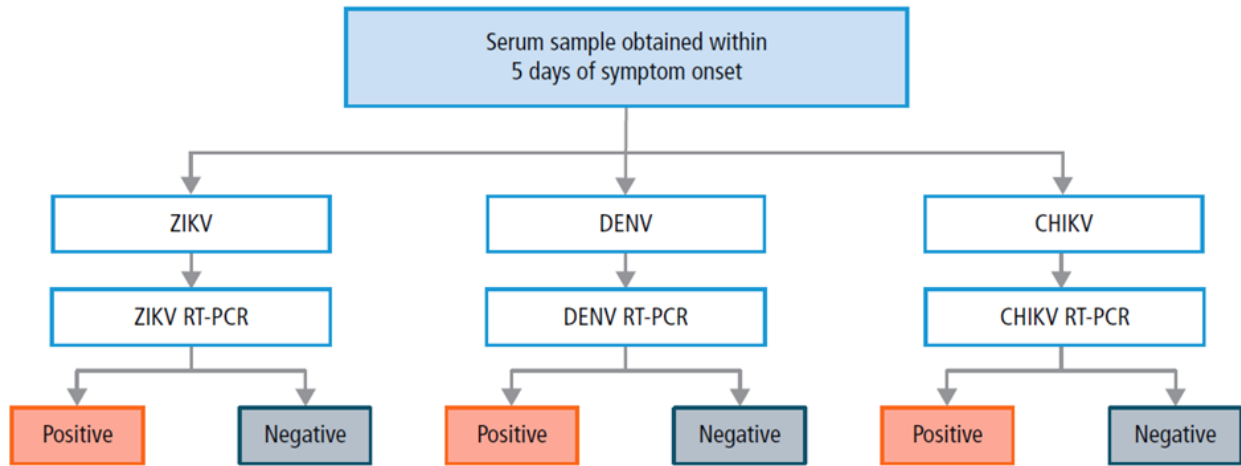
In fatal cases, tissue samples (liver, spleen, kidney) should be considered both for detection of genetic material (RT-PCR) and for histopathological and immunohistochemical study. Taking biopsies from a patient with suspected dengue is completely contraindicated.

On the other hand, the use of rapid tests (NS1 and/or antibodies) is not recommended since their low sensitivity can lead to false negative results. Its use should be limited to community studies under established protocols, but in no case to rule out infection or to implement medical behaviors.

Since laboratory services are a key component of dengue epidemiological and virological surveillance, timely detection and characterization in appropriate samples should be maintained. Where possible and depending on the capacities of each laboratory, confirmation

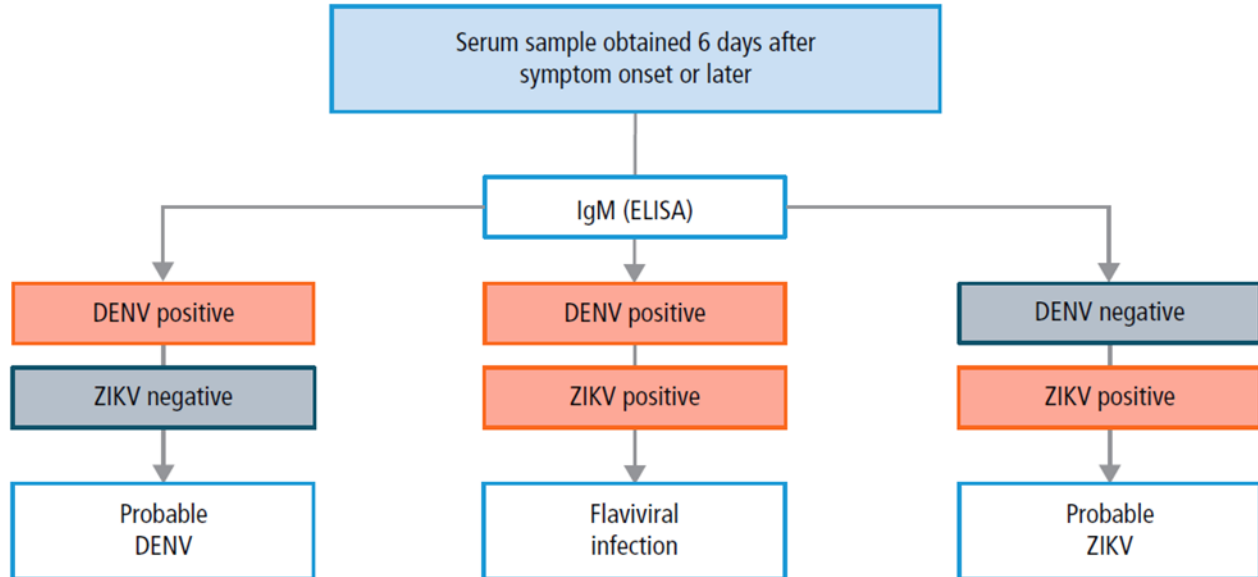
of all severe and fatal dengue cases is recommended, while only a proportion (10-20% or a limited number of samples depending on installed capacity) of those cases without warning signs will be necessary for surveillance.

Figure 7. Algorithm for virological testing in suspected cases of dengue, chikungunya, and Zika



Source: Pan American Health Organization. Recommendations for Laboratory Detection and Diagnosis of Arbovirus Infections in the Region of the Americas. Washington, DC: PAHO; 2023. Available from: <https://iris.paho.org/handle/10665.2/57555>

Figure 8. Algorithm for serological testing in suspected cases of dengue and Zika



Source: Pan American Health Organization. Recommendations for Laboratory Detection and Diagnosis of Arbovirus Infections in the Region of the Americas. Washington, DC: PAHO; 2023. Available from: <https://iris.paho.org/handle/10665.2/57555>

Case Management

Measures to ensure proper clinical management of suspected dengue cases should be a priority.

Capacities must be strengthened at the level of primary health care and, from this level, avoid progression to severe forms and deaths from dengue. This requires early clinical diagnosis and recognition of warning signs in dengue (such as severe and sustained abdominal pain or tenderness of the abdomen, persistent vomiting, clinical fluid accumulation, mucosal bleeding, lethargy, restlessness, liver enlargement >2 cm below the costal ridge and enlargement progressive hematocrit) in order to initiate an adequate management according to the recommendations published in the PAHO clinical guidelines. In cases where dengue is suspected, healthcare workers should provide clear guidance to patients and/or families to monitor for warning signs and seek immediate medical attention should they occur. These measures will also help reduce the number of patients who must be referred to hospitals, thus avoiding the saturation of these facilities and intensive care units.

At the same time, all second and third level hospitals must be prepared to handle dengue cases with warning signs and cases of severe dengue.

More information on the clinical management of dengue cases is available in the Guidelines for the Clinical Diagnosis and Treatment of Dengue, Chikungunya and Zika (6) and the Instrument for the Diagnosis and Care of Patients with Suspected Arbovirus (7), both published by PAHO.

PAHO reiterates the recommendations for technical teams in charge of malaria control, which also apply to personnel involved in arbovirus care, available at: <https://bit.ly/3ZucrPK>.

Community Involvement

Every effort should be made to gain community support for the prevention of dengue.

Simple Information, Education, and Communication (IEC) materials can be disseminated through various media (including social media).

Household members should be encouraged to eliminate both residential and peri domiciliary sources of mosquito breeding.

Highly productive mosquito breeding sites, such as water storage containers (drums, raised tanks, clay pots, etc.), must be subject to prevention measures to avoid vector reproduction. Other breeding sites, such as roof gutters and other water retention containers, should also be cleaned periodically.

Local teams often know how to convey this information more effectively, and in many cases national campaigns and messages are not as effective as local initiatives.

Aedes prevention and control measures

PAHO/WHO urges the effective use of available resources to prevent and/or control vector infestation in affected areas and in health services. This will be achieved through the implementation of integrated vector control strategies in emergencies, which include the following processes:

- Selection of control methods based on knowledge of vector biology, disease transmission and morbidity.
- Use of multiple interventions, often in combination and synergistically.
- Collaboration of the health sector with public and private sectors linked to environmental management whose work impacts the reduction of vectors.
- Integration of individuals, families and other key partners (education, finance, tourism, water and sanitation and others) into prevention and control activities.
- Strengthening of the legal framework that allows an integrated and intersectoral approach.

Given the high infestation by *Aedes aegypti* and the presence of *Aedes albopictus* in the Region, it is recommended that prevention and control measures aim to reduce the density of the vector and have the acceptance and collaboration of the local population. Prevention and control measures for implementation by national authorities should include the following:

- Strengthen environmental management actions, mainly the elimination of vector breeding sites in homes and common areas (parks, schools, cemeteries, etc.).
- Reorganize solid waste collection services to support breeding site disposal actions in areas of greatest transmission and, if necessary, plan intensive actions in specific areas where regular garbage collection has been interrupted.
- Apply measures for the control (8) of breeding sites through the use of physical, biological and / or chemical methods, while actively involving individuals, families, and the community.
- Define the high-risk transmission areas (risk stratification) (9) and prioritize those with high concentrations of people (schools, terminals, hospitals, health centers, etc.). In these facilities, the presence of mosquitoes must be eliminated in a diameter of at least 400 meters. It is important to pay special attention to health care units, and to ensure that these are free of the presence of the vector and its breeding sites so that they do not become spreading sources of the virus.
- In areas where active transmission is detected, implementing measures aimed at eliminating infected adult mosquitoes (mainly through the use of insecticides) is suggested in order to stop and cut transmission. This action is of an exceptional nature and is only effective when conducted by well-trained personnel under internationally accepted technical guidelines, and when it is carried out simultaneously with the other proposed actions. The main action to interrupt intensive transmission is the elimination of infested adult mosquitoes (active transmission) through indoor spraying, using individual equipment added to the destruction and/or control of vector breeding sites within households (8).
- An effective modality of adult control that can be used, considering the available operational capabilities, is indoor residual spraying, which should be applied selectively to the resting places of *Aedes aegypti*, avoiding the contamination of storage containers of water used for drinking or cooking. This intervention performed in treated areas is effective for a period of up to 4 months; it can be used in shelters, homes, health services, schools and others. For more information, consult the PAHO Manual for applying indoor residual spraying in urban areas for the control of *Aedes aegypti* (14) and the

document Control of *Aedes aegypti* in the scenario of simultaneous transmission of COVID19 (11).

- Correctly choose the insecticide to be used (following PAHO/WHO recommendations), regarding its formulation and be aware of which mosquito populations are susceptible to this insecticide (12).
- Guarantee the proper functioning of fumigation equipment and its maintenance and ensure insecticide reserves.
- Intensify the actions of supervision of the operators' field work (quality control) during both the focal treatment and in the adulticide treatment (fumigation), ensuring compliance with personal protection measures.

Personal prevention measures

Patients infected with dengue, chikungunya, and/or Zika virus are the reservoir of infection for others both in their households and in the community. It is necessary to communicate to the sick, their families, and the affected community about the risk of transmission and ways to prevent contagion by decreasing the vector population and contact between the vector and people.

To minimize vector-patient contact it is recommended:

- Patients should rest under mosquito nets, impregnated, or otherwise, with insecticide.
- Patients, as well as other household members, must wear long sleeves (if there are sick people in the house) to cover the extremities.
- Repellents containing DEET, IR3535 or Icaridin, can be applied to exposed skin or clothing, and must be used in strict accordance with the instructions on the product label.
- Use wire-mesh/mosquito nets on doors and windows.

References

1. Pan American Health Organization. PLISA Health Information Platform for the Americas, Portal of Basic Indicators. Washington, DC: PAHO; 2023 [cited 30 November 2023]. Available from: <https://bit.ly/3H3BYwU>.
2. Pan American Health Organization / World Health Organization. As dengue cases increase globally, vector control and community engagement are key to preventing the spread of the disease. Washington, DC: PAHO; 2023. Available from: <https://www.paho.org/en/news/3-8-2023-dengue-cases-increase-globally-vector-control-community-engagement-key-prevent-spread>
3. World Health Organization. News on disease outbreaks. Geographical expansion of dengue and chikungunya cases beyond historical transmission areas in the Americas Region. Geneva: WHO; 2023. Available from: <https://www.who.int/emergencies/disease-outbreak-news/item/2023-DON448>
4. Pan American Health Organization / World Health Organization. Epidemiological Alert: Increase in dengue cases in Central America and the Caribbean. September 15, 2023. Washington, D.C. PAHO/WHO. 2023. Available from: <https://www.paho.org/en/documents/epidemiological-alert-increase-dengue-cases-central-america-and-caribbean-15-september>
5. Pan American Health Organization. Recommendations for Laboratory Detection and Diagnosis of Arbovirus Infections in the Region of the Americas. Washington, DC: PAHO, 2022. Available from: <https://iris.paho.org/handle/10665.2/57555>
6. Pan American Health Organization. Guidelines for the clinical diagnosis and treatment of dengue, chikungunya and Zika. Washington, DC. PAHO; 2022. Available from: <https://iris.paho.org/handle/10665.2/55867>
7. Pan American Health Organization. Instrument for the diagnosis and care of patients with suspected arbovirus. Washington, DC. PAHO; 2017. Available from: <https://iris.paho.org/handle/10665.2/33895>
8. Pan American Health Organization. Methods of entomological surveillance and control of the main vectors in the Americas. Washington, DC: PAHO; 2021. Available in Spanish from: <https://iris.paho.org/handle/10665.2/55241>
9. Pan American Health Organization. Technical document for the implementation of interventions based on generic operational scenarios for the control of *Aedes aegypti*. Washington, DC: PAHO; 2019. Available from: <https://iris.paho.org/handle/10665.2/51652>
10. Pan American Health Organization. Manual to apply intradomestic residual spraying in urban areas for the control of *Aedes aegypti*. Washington, DC: PAHO; 2019. Available from: <https://iris.paho.org/handle/10665.2/51637>
11. Pan American Health Organization. Control of *Aedes aegypti* in the scenario of simultaneous transmission of COVID-19. Washington, DC: PAHO; 2020. Available in Spanish from: <https://www.paho.org/es/documentos/control-aedes-aegypti-escenario-transmission-simultanea-covid-19>
12. Pan American Health Organization. Procedures for Assessing Insecticide Susceptibility of Major Mosquito Vectors in the Americas. Washington, DC: PAHO; 2023. Available in Spanish from: <http://bitly.ws/HTNA>

Additional resources

- Pan American Health Organization. PLISA Health Information Platform for the Americas, Portal of Basic Indicators. Washington, DC: PAHO; 2023 [cited 2-26 July 2023] Available from: <https://opendata.paho.org/en>
- Pan American Health Organization. Recommendations for Laboratory Detection and Diagnosis of Arbovirus Infections in the Region of the Americas. Washington, DC: PAHO, 2022. Available from: <https://iris.paho.org/handle/10665.2/57555>
- Pan American Health Organization. Measures to ensure continuity of the malaria response in the Americas during the COVID-19 pandemic, April 24, 2020. Washington, D.C.: PAHO/WHO; 2020. Available from: <https://iris.paho.org/handle/10665.2/52080>
- Pan American Health Organization. Methodology for evaluating national strategies for the prevention and control of arboviral diseases in the Americas. Washington, DC.: PAHO; 2021. Available from: <https://iris.paho.org/handle/10665.2/55745>
- Pan American Health Organization. Guidelines for the clinical diagnosis and treatment of dengue, chikungunya and Zika. Washington, DC.: PAHO/WHO; 2021. Available from: <https://iris.paho.org/handle/10665.2/55867>
- Pan American Health Organization. Instrument for the diagnosis and care of patients with suspected arbovirus. Washington, DC.: PAHO/WHO; 2016. Available from: <https://iris.paho.org/handle/10665.2/33895>
- Pan American Health Organization/World Health Organization. Dengue Outbreak Early Warning and Response System: operational guidance based on the online dashboard. Second edition. Washington, DC.: PAHO/WHO; 2021. Available in Spanish from: <https://bit.ly/3H1Oz3D>
- Pan American Health Organization/World Health Organization. Epidemiological Update on dengue and other arboviruses. Washington, D.C. PAHO/WHO. 2020. Available in Spanish from: <https://bit.ly/3dRrUZR>
- World Health Organization and United Nations Children's Fund Community-based health care, including outreach and campaigns, in the context of the COVID-19 pandemic. Provisional guidance of 5 May 2020. WHO/UNICEF; 2020. Available from: <https://bit.ly/2CO15bT>. License: CC BY-NC-SA 3.0 IGO.