# Epidemiological Update
Dengue

7 February 2020

Situation summary

In the Region of the Americas, between epidemiological week (EW) 1 and EW 52[1] of 2019, a total of 3,139,335 cases of dengue have been reported (321.58 cases per 100,000 population), including 1,538 deaths. Of the total cases, 1,367,353 (43.6%) were laboratory-confirmed and 28,169 (0.9%) were classified as severe dengue. The case-fatality rate was 0.049%.

The number of cases reported in 2019 through EW 52 (3,139,335) is the largest recorded in the history of dengue in the Americas, exceeding the number of cases reported in the 2015-2016 epidemic period by 30% (**Figure 1**). In 2019, the proportion of severe dengue (0.9%) has exceeded that observed in the previous four years; however, it is below that observed between 2010-2014 (ranging 1.35% to 3.05%).

Between EW 1 and EW 5 of 2020, 155,343 dengue cases were reported, including 28 deaths. Of this total, 15,392 were laboratory-confirmed and 715 were classified as severe dengue.

Figure 1. Distribution of reported dengue cases and proportion of severe dengue cases, by year of report. Region of the Americas, 1999-2020 (up to EW 5 of 2020).
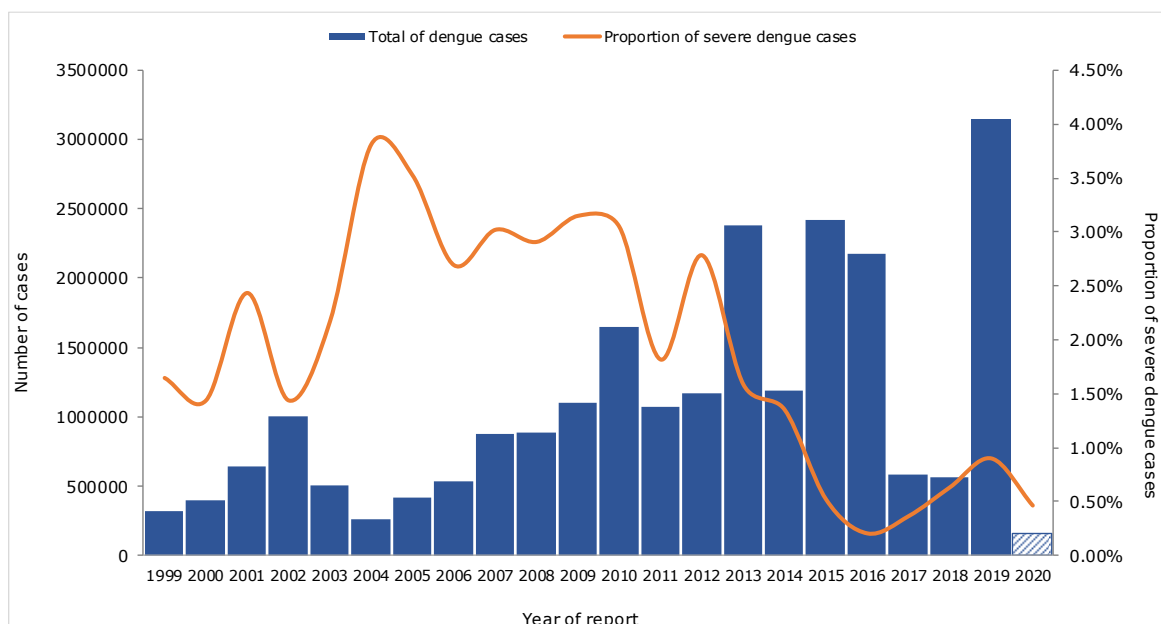
Source: Data entered into the Health Information Platform for the Americas (PLISA, PAHO / WHO) by the Ministries and Institutes of Health of the countries and territories of the Region.

---

[1] Data available in the Health Information Platform for the Americas (PLISA, PAHO / WHO), accessed on 7 February 2020. Available at: https://bit.ly/314Snw4
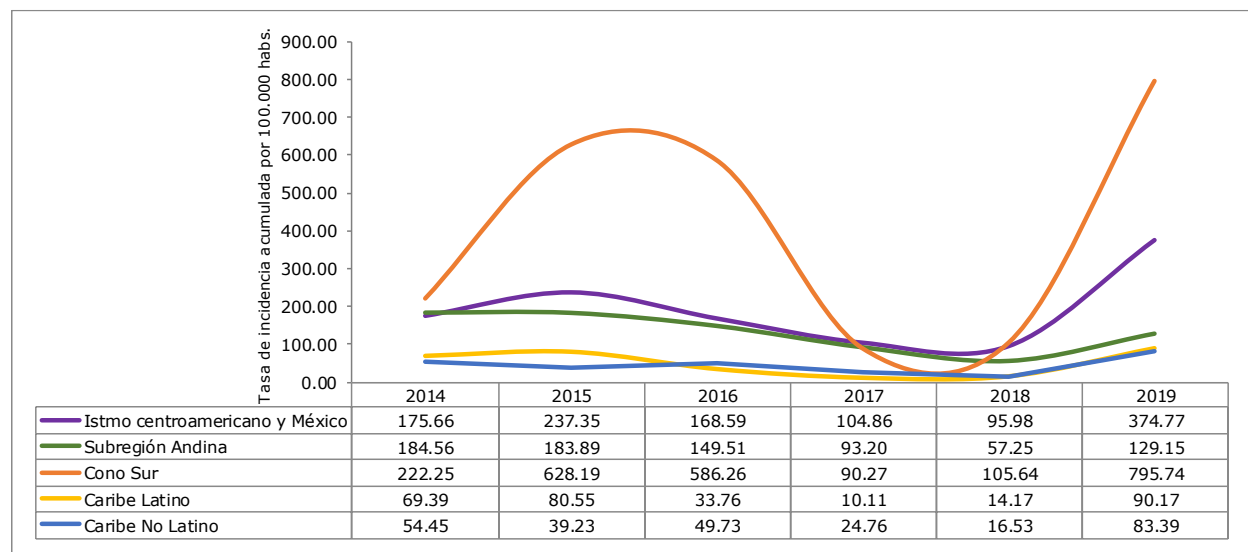
Suggested citation: Pan American Health Organization / World Health Organization. Epidemiological Update: Dengue. 7 February 2020, Washington, D.C. PAHO / WHO. 2020

When comparing the cumulative incidence rates by sub-region in 2019 (through EW 52) with the previous epidemic period (2015-2016, through EW 52), the incidence rates exceed those during the previous epidemic cycle for all sub-regions except for the Andean sub-region (**Figure 2**).

In 2019, 34 countries and territories of the Region of the Americas reported an increase in cases at the national level or in some areas of the country compared to 2018. Countries such as Belize, Costa Rica, El Salvador, Mexico, and Nicaragua reported three times more cases than the previous year. Other countries and territories, such as Antigua and Barbuda, Brazil, the Dominican Republic, Guadeloupe, Guatemala, Honduras, Jamaica, and Martinique, reported seven to ten times more dengue cases.

In the first 4 weeks of 2020 in the Region of the Americas, 125,514 dengue cases were reported (12.86 cases per 100,000 population), including 27 deaths, 12,891 laboratory-confirmed cases, and 498 cases classified as severe dengue (0.4%). Countries such as Bolivia, Honduras, Mexico, and Paraguay have reported an increase of two to three times more dengue cases in 2020 compared to the same period in 2019.

Figure 2. Incidence rates of reported dengue cases through EW 52, by year and sub-region. Region of the Americas, 2014-2019.

	2014	2015	2016	2017	2018	2019
Istmo centroamericano y México	175.66	237.35	168.59	104.86	95.98	374.77
Subregión Andina	184.56	183.89	149.51	93.20	57.25	129.15
Cono Sur	222.25	628.19	586.26	90.27	105.64	795.74
Caribe Latino	69.39	80.55	33.76	10.11	14.17	90.17
Caribe No Latino	54.45	39.23	49.73	24.76	16.53	83.39

Source: Data entered into the Health Information Platform for the Americas (PLISA, PAHO / WHO) by the Ministries and Institutes of Health of the countries and territories of the Region.

The four dengue virus serotypes (DENV 1, DENV 2, DENV 3, and DENV 4) are present in the Americas. In 2019, co-circulation of all four serotypes was detected in Brazil, Guatemala, and Mexico; serotypes DENV 1, DENV 2, and DENV 3 co-circulated in Colombia, the Dominican Republic, Martinique, Panama, and Venezuela; DENV 1, DENV 2, and DENV 4 co-circulated in Paraguay and Peru; and DENV 2, DENV 3, and DENV 4 co-circulated in the Cayman Islands[2].

---

[2] More information on circulating serotypes by country is available at: PAHO / WHO Health Information Platform for the Americas (PLISA): https://bit.ly/314Snw4

In 2019, the five countries in the Americas with the highest incidence rates were Nicaragua (2,962.2 cases per 100,000 population), Belize (2,173.3 cases per 100,000 population), Honduras (1,230.7 cases per 100,000 population), Brazil (737.4 cases per 100,000 population), and El Salvador (428.4 cases per 100,000 population) (**Table 1**).

Table 1. Incidence rates and number of dengue cases, proportion of severe dengue cases, case-fatality rates, and serotypes, in 11 selected countries of the Region. EW 1 to EW 52 of 2019.

Country	Incidence rate (cases per 100,000 pop.)	Number of cases	Proportion of severe dengue (%)	Case fatality rate (%)	Serotypes reported
Nicaragua	2,962.18	186,173	0.65	0.016	2
Belize	2,173.30	8,302	1.31	0.000	1-2
Honduras	1,230.71	112,708	17.24	0.160	1-2
Brazil*	737.40	2,226,865	0.06	0.035	1-2-3-4
El Salvador	428.42	27,470	0.39	0.051	2
Guatemala	285.20	50,432	0.22	0.131	1-2-3-4
Colombia	475.40	127,553	1.10	0.068	1-2-3
Jamaica	260.61	7,555	0.04	0.318	2-3
Mexico	205.31	268,458	1.25	0.071	1-2-3-4
Costa Rica	189.78	9,400	0.12	0.000	1-2
Paraguay	171.25	11,811	N/A	0.076	1-2-4

*This value refers to the incidence rate of total dengue cases reported in Brazil, in the corresponding period.

Note: To calculate the incidence rates, proportion of severe dengue cases, and case-fatality rates, discarded cases were excluded.
N/A: Not applicable – no data available

Source: Data entered into the Health Information Platform for the Americas (PLISA, PAHO / WHO) by the Ministries and Institutes of Health of the countries and territories of the Region. For Brazil, Guatemala, Honduras, and Nicaragua, the data was shared by the International Health Regulations (IHR) National Focal Points (NFPs).

The following is a summary of the epidemiological situation for dengue in select countries.

In **Bolivia**, between EW 1 and EW 52 of 2019, 16,193 cases of dengue were reported, including 23 deaths. Of the total reported cases, 7,240 were laboratory-confirmed and 323 were classified as severe dengue. An increasing trend in reported cases was observed from EW 42 of 2019. Of the confirmed cases reported, 80% were in four departments: Tarija (23%), La Paz (21%), Beni (19%), and Cochabamba (17%).

In 2019, the national cumulative incidence rate was 144.37 cases per 100,000 population, representing a 113% relative increase compared to the same period in 2018 (67.73 cases per 100,000 population), and exceeding that observed in the previous 2 years. In 2019, serotypes DENV 1 and DENV 2 circulated.

The case-fatality rate at the national level in 2019 was 0.142%, which is above that observed in 2018 (0.079%). La Paz Department accounted for 65% of reported deaths.

In 2020, as of EW 4, there were 9,142 dengue cases reported, with an incidence rate of 81.51 cases per 100,000 population, representing seven times more cases than reported during the same period in 2019 (11.09 cases per 100,000 population). Of the total cases, 29 were classified as severe dengue and there were 5 deaths reported (case-fatality rate 0.055%). The departments with the highest number of cases reported are Beni (1,664 cases) and Santa Cruz de la Sierra (5,641 cases). Deaths have been reported in the departments of Beni (1), La Paz (1), Pando (1), and Santa Cruz (2). DENV 1 and DENV 2 serotypes continue to circulate.

In **Brazil**, between EW 1 and EW 52 of 2019, a total of 2,226,865 probable cases of dengue were reported, including 789 deaths. Of the total cases, 1,594,663 cases were probable cases, 1.244.082 were laboratory-confirmed, and 30,074 remain under investigation. Of the confirmed cases, 19,187 were classified as dengue with warning signs and 1,453 as severe dengue; of the cases of dengue with warning signs and severe dengue cases, 1,099 cases remain under investigation.

The case-fatality rate at the national level in 2019 was 0.05%. Of the total deaths reported in 2019, 13% (103 deaths) were confirmed by clinical-epidemiological criteria and 307 remain under investigation. The highest case-fatality rates were observed in the Central-West (0.08%) and the South (0.06%) regions. By age group, persons aged 80 years and older had the highest case-fatality rate (0.97%), followed by persons aged 60 to 79 years (0.17%) (**Figure 4**).

In 2019, the cumulative national incidence rate of probable cases was 737.4 cases per 100,000 population, representing a 486.4% relative increase compared to the same period in 2018 (126.7 cases per 100,000 population). By geographical region, the highest incidence rate was reported in the Central-West (1,386.9 cases per 100,000 population), followed by the Southeast (1,156.4 cases per 100,000 population), Northeast (377.5 cases per 100,000 population), North (198.7 cases per 100,000 population), and South (165.5 cases per 100,000 population). The federal units with the highest incidence rates were Minas Gerais (2,278.3 cases per 100,000 population), Mato Grosso do Sul (1,993.9 cases per 100,000 population), Goiás (1,724.7 cases per 100,000 population), Espírito Santo (1,606.8 cases per 100,000 population), the Federal District (1,272.0 cases per 100,000 population), and São Paulo (964.9 cases per 100,000 population). Of the total probable cases reported, 66% were in the Southeast region (**Figure 3**).
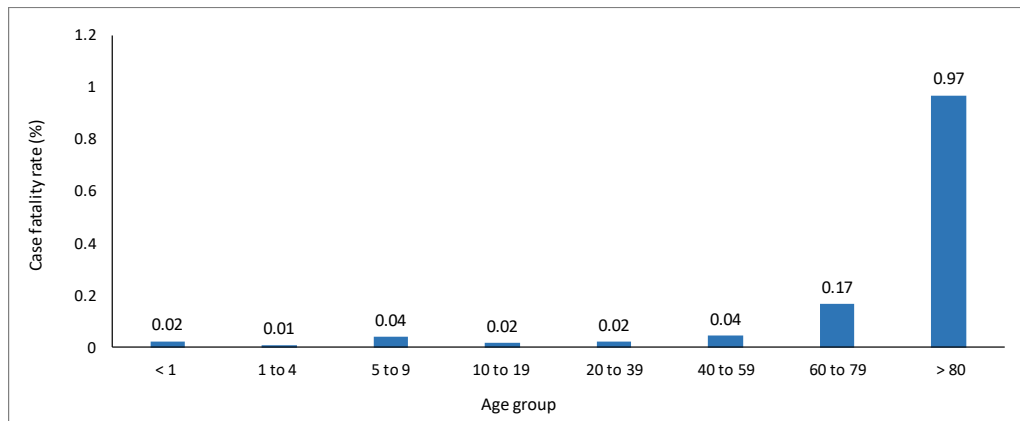
All four serotypes, DENV 1, DENV 2, DENV 3, and DENV 4, circulated in 2019.

Figure 3. Dengue incidence rate distribution by region and epidemiological week of report. Brazil, EW 1 to EW 52 of 2019.
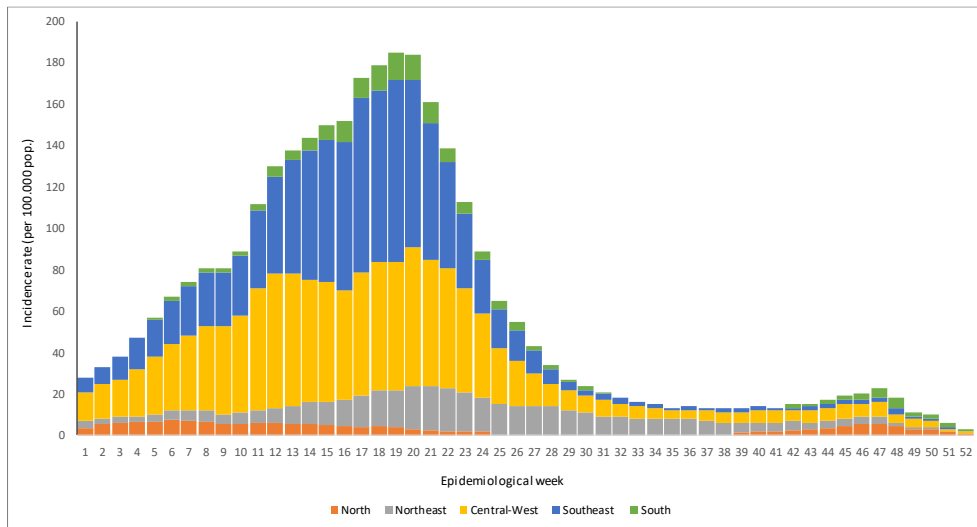
Source: Data published by the Brazil Ministry of Health and reproduced by PAHO/WHO.

Figure 4. Dengue case-fatality rate, by age group. Brazil, 2019.

Source: Data received from the Brazil International Health Regulations (IHR) National Focal Point (NFP) and reproduced by PAHO/WHO.

In **Colombia**, between EW 1 and EW 52 of 2019, 127,553 cases of dengue were reported, including 87 confirmed deaths. Of the total reported cases, 4,063 were laboratory-confirmed, 64,716 were classified as dengue with warning signs, and 1,406 as severe dengue. Since EW 8 of 2019, an increasing trend above the epidemic threshold was observed with a peak in EW 27, followed by a gradual decrease in reported cases, while remaining above the epidemic threshold until EW 52 of 2019. Of the cases reported, 72.4% were in 10 departments: Antioquia, Casanare, Cesar, Huila, Meta, Norte de Santander, Santander, Sucre, Tolima, and Valle del Cauca.

Of the 261 total deaths reported, 87 were laboratory-confirmed, 118 were discarded, and 56 remain under investigation.

5

In 2019, the cumulative national incidence rate was 475.4 cases per 100,000 population, representing a 425% relative increase compared to the same period in 2018 (90.62 cases per 100,000 population) and has exceeded that observed in the previous 8 years.

Of the 36 territorial entities of the country, 20 had incidence rates above the national rate (475.4 cases per 100,000 population). The departments with an incidence rate exceeding 1,000 cases per 100,000 population were in the following departments in decreasing order: Amazonas (5,809.2 cases per 100,000 population), Meta (2,187.3 cases per 100,000 population), Casanare (1,986.3 cases per 100,000 population), Huila (1,556 cases per 100,000 population), Tolima (1,525.8 cases per 100,000 population), Guainía (1,218.3 cases per 100,000 population), Putumayo (1,159.6 cases per 100,000 population), Vaupes (1,147 cases per 100,000 population), Arauca (1,134.7 cases per 100,000 population), Sucre (1,101.4 cases per 100,000 population), and Vichada (1,078.8 cases per 100,000 population).

In 2019, serotypes DENV 1, DENV 2, and DENV 3 circulated.

In 2020 until EW 3, a total of 8,624 cases of dengue were reported, of which 3,878 (45.0%) were classified as dengue cases without warning signs, 4,634 (53.7%) dengue cases with warning signs, and 112 (1.3%) cases of severe dengue. Of the 36 territorial entities of the country, 9 accounted for 67% (5,750 cases) of the national total: Cali, Tolima, Valle del Cauca, Huila, Cesar, Santander, Meta, Barranquilla, and Cundinamarca.

In 2020, 53.5% of the reported cases are male, and children under 5-years-old accounted for 12.2% of the overall cases (1,036) and 17.0% (19) of severe dengue cases.

In 2020, serotypes DENV 1, DENV 2, and DENV 3 have continued to circulate.

Between EW 8 of 2019 and EW 3 of 2020, an epidemic has been observed at the national level, with cases reported above the expected threshold in comparison to the data from previous years (2013-2019) (**Figure 5**).

Figure 5. Dengue cases reported by endemic channels by epidemiological week of report. Colombia, EW 1 of 2019 to EW 3 of 2020.
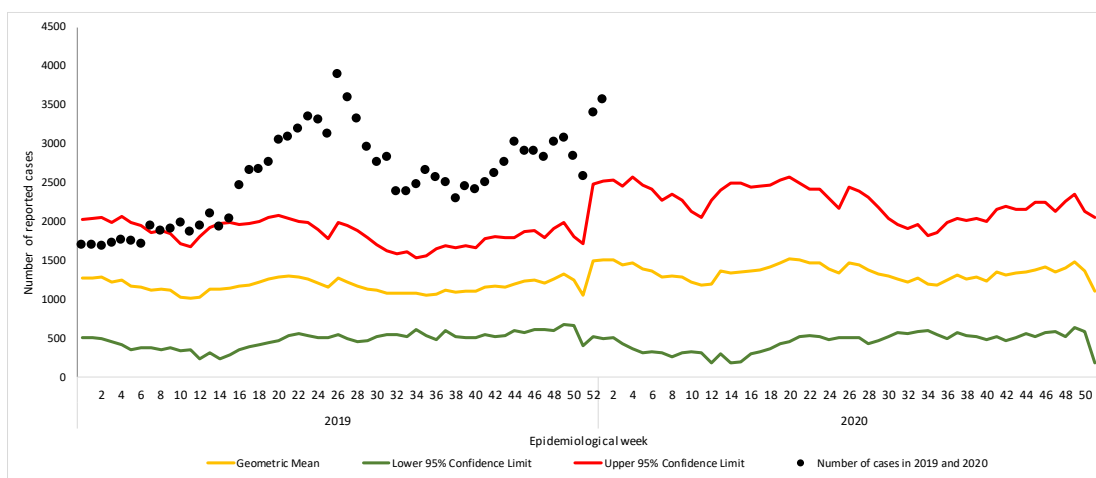
Source: Data published by the Colombia National Institute of Health and reproduced by PAHO/WHO.

In **Dominica**, between EW 31 and EW 52 of 2019, 1,066 cases of dengue were reported, of which 47 were confirmed by laboratory, 199 were hospitalized, and 12 were severe dengue. One death in an individual with comorbidities was reported. Persons aged 1 to 15 years represented 53% of the total reported cases and 19% of the total hospitalized cases. During 2019, DENV 3 was the circulating serotype.

The national cumulative incidence rate was 179.73 cases per 100,000 population, representing a 195% relative increase compared to the same period in 2018 (60.81 cases per 100,000 population) and exceeding the rates observed in the preceding 5 years.

Between EW 1 and EW 3 of 2020, 37 cases of dengue were reported (52 cases per 100,000 population), of which none were confirmed by laboratory and one was classified as severe dengue. No deaths have been reported.

In the **Dominican Republic**, between EW 1 and EW 52 of 2019, a total of 20,183 cases of dengue were reported (cumulative incidence rate of 194.8 per 100,000 population). Of the total reported cases, 3,648 were confirmed, including 53 deaths, and 328 were classified as severe dengue.

By age group, the highest incidence rates in 2019 were among children under 15 years (546.3 cases per 100,000 population) and persons aged 15 to 49 years (71.3 cases per 100,000 population).

In 2019, among the 32 provinces, 10 had incidence rates above the national rate (194.8 cases per 100,000 population), in decreasing order: San José de Ocoa (665.0 cases per 100,000 population), Barahona (460.0 cases per 100,000 population), Independencia (432.1 cases per 100,000 population), Valverde (330.4 cases per 100,000 population), Azua (286.8 cases per 100,000 population), Monte Cristi (252.1 cases per 100,000 population), Sánchez Ramírez (250.6 cases per 100,000 population), Peravia (218.0 cases per 100,000 population), Santo Domingo (214.9 cases per 100,000 population), and Baoruco (162.9 cases per 100,000 population). In 2019, serotypes DENV 1, DENV 2, and DENV 3 circulated.

In 2020 as of EW 1, 188 probable cases of dengue were reported, and no laboratory-confirmed cases or deaths were reported. The cumulative national incidence rate is 93.56 cases per 100,000 population and the provinces with the highest cumulative incidence are: Hermanas Mirabal (564.0 cases per 100,000 population), Hato Mayor (303.0 cases per 100,000 population), Santiago (253.7 cases per 100,000 population), and Sánchez Ramírez (239.5 cases per 100,000 population).

The highest incidence rates by age group were reported among children under 15 years (5.1 cases per 100,000 population) and among persons aged 15 to 49 years (0.6 cases per 100,000 population).

In **Guadeloupe**, between EW 42 and EW 2 of 2020, 4,000 cases of dengue were reported, of which 800 were confirmed, and an increasing trend in the number of clinical cases reported by the sentinel doctors' network was observed. The observed values have exceeded the epidemic threshold.

The cumulative incidence rate for Guadeloupe is 719.38 cases per 100,000 population, representing a relative increase of 637% compared to the same period in 2018 (97.55 cases per 100,000 population) and exceeds the rates observed in the 5 previous years.

No cases of severe dengue or deaths have been reported. Serotypes DENV 1, DENV 2 and DENV 3 were identified in 2019, with DENV 2 predominating.

In **Guatemala**, between EW 1 and EW 52 of 2019, there were 50,449 suspected dengue cases, of which 1,629 were laboratory-confirmed, 17,938 were classified as dengue with warning signs, and 236 as severe dengue, including 90 deaths (of which 66 were confirmed).

The cumulative national incidence rate in 2019 was 285.2 cases per 100,000 population, representing a 650% relative increase compared to the same period in 2018 (43.9 cases per 100,000 population).

The number of suspected cases reported in 2019 far exceeds the number reported in 2018. During the 2019 epidemic cycle, an increasing trend was observed from EW 20 of 2019, with a peak of cases in EW 31 and EW 33, followed by a gradual decrease starting in EW 34, though still did not reach the same level of cases that was reported at the beginning of the year (**Figure 6**).

Figure 6. Distribution of suspected dengue cases by epidemiological week of report. Guatemala, EW 1 of 2018 to EW 49 of 2019.
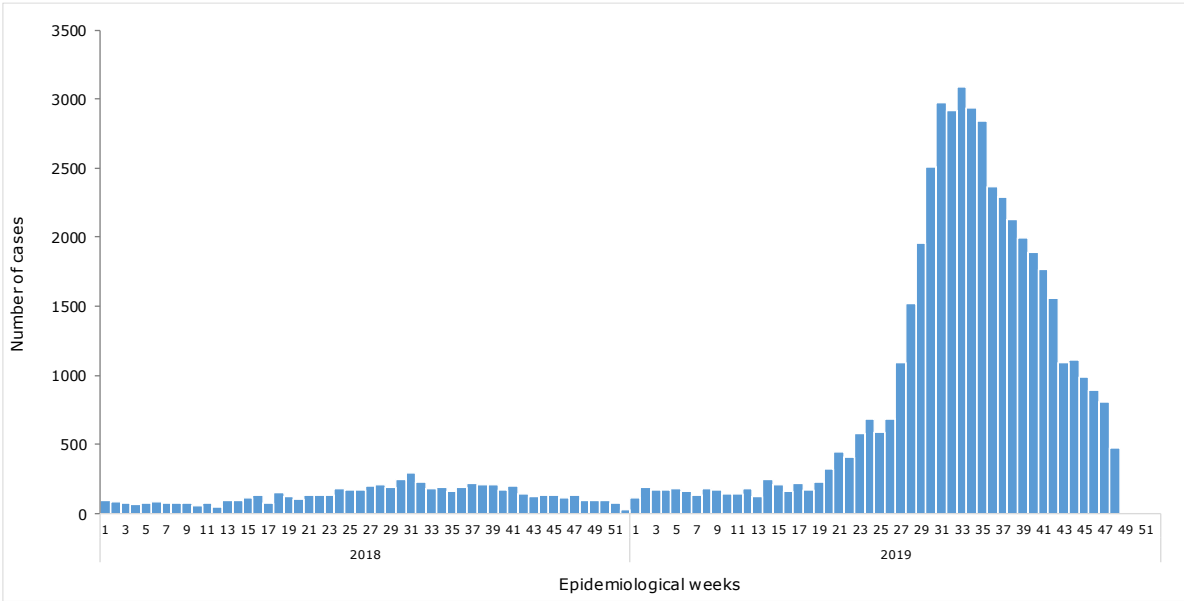
Source: Data published by the Guatemala Ministry of Public Health and Social Assistance and reproduced by PAHO/WHO.

Of the 236 severe dengue cases, 113 were confirmed (including 66 deaths) and 52 remain under investigation (including 24 deaths). Among severe dengue cases, 64% were among children under 15 years and 57% were female. Incidence rates were highest among children aged 5 to 9-years-old, followed by 10 to 14-year-olds, for both sexes.

8

Of the 29 health areas in the country, 12 had incidence rates above the national rate (285.2 cases per 100,000 population) in 2019, as follows: Petén Sur Oriental (1,774.6 cases per 100,000 population), Baja Verapaz (983.8 cases per 100,000 population), Zacapa (827.4 cases per 100,000 population), Petén Sur Occidental (598.3 cases per 100,000 population), Santa Rosa (594.0 cases per 100,000 population), Jutiapa (531.9 cases per 100,000 population), Chiquimula (517.8 cases per 100,000 population), Huehuetenango (444.2 cases per 100,000 population), Quetzaltenango (402.6 cases per 100,000 population), Ixcán (347.5 cases per 100,000 population), Izabal (329.9 cases per 100,000 population), Central Guatemala (288.0 cases per 100,000 population), and Retalhuleu (268.1 cases per 100,000 population).

In 2019, all four serotypes DENV 1, DENV 2, DENV 3, and DENV 4 circulated, with a predominance of DENV 2.

In 2020 until EW 4, a total of 1,054 suspected cases of dengue have been reported, of which 68 were confirmed by laboratory, 376 were classified as dengue with alarm signs, and 9 as severe dengue, including 2 deaths (suspected).

In 2020, 11 health areas had incidence rates that exceeded the national incidence rate (5.96 cases per 100,000 population), as follows: Baja Verapaz (42.83 cases per 100,000 population), Santa Rosa (32.44 cases per 100,000 population), Jutiapa (19.84 cases per 100,000 population), Quetzaltenango (14.36 cases per 100,000 population), Petén Sur Oriental (14.21 cases per 100,000 population), Escuintla (10.24 cases per 100,000 population), Sacatepéquez (10.01 cases per 100,000 population), Chiquimula (8.30 cases per 100,000 population), Suchitepéquez (7.05 cases per 100,000 population), Central Guatemala (6.73 cases per 100,000 population), and Izabal (6.19 cases per 100,000 population).

In **Honduras**, between EW 1 and EW 52 of 2019, a total of 112,708 suspected cases of dengue were reported, including 180 laboratory-confirmed deaths, and 17.2% (19,435 cases) were classified as severe dengue.

Between EW 24 and EW 30 of 2019, an increasing trend in dengue cases without warning signs was observed, after which the overall trend has been decreasing but have not reached the expected endemic values (**Figure 7**).

Of the 266 deaths reported, 180 were laboratory-confirmed, 52 were discarded following laboratory testing, 13 were identified as another disease, and 23 remain under investigation. Of the 180 laboratory-confirmed deaths, 58% (103 deaths) were among children under 15 years and 59% (105 deaths) were among females.

In 2019, all 20 health regions reported dengue cases. The regions that reported the highest proportion of severe dengue cases were Cortés (37%), San Pedro Sula (36%), Santa Barbara (7%), and Metropolitan Central District (7%). Of the total deaths, 71% (127 deaths) were reported in the regions of Cortés (20.2%), Yoro (17.4%), San Pedro Sula (10.1%), Olancho (7.9%), Santa Barbara (7.9%), and Atlantida (7.9%). Serotypes DENV 1 and DENV 2 circulated.

In 2020 until EW 3, a total of 3,232 cases of dengue were reported nationally, of which 9% (275 cases) were classified as severe dengue. In this same period, 6 suspected deaths were reported and, 66% (4 deaths) of which were among children under 15 years old, as was observed in 2019. Of the deaths, 3 were laboratory-confirmed, 2 had no samples, and one had negative laboratory results.

Figure 7. Distribution of dengue cases without warning signs by epidemiological week. Honduras, 2018-2020 (until EW 3 of 2020)
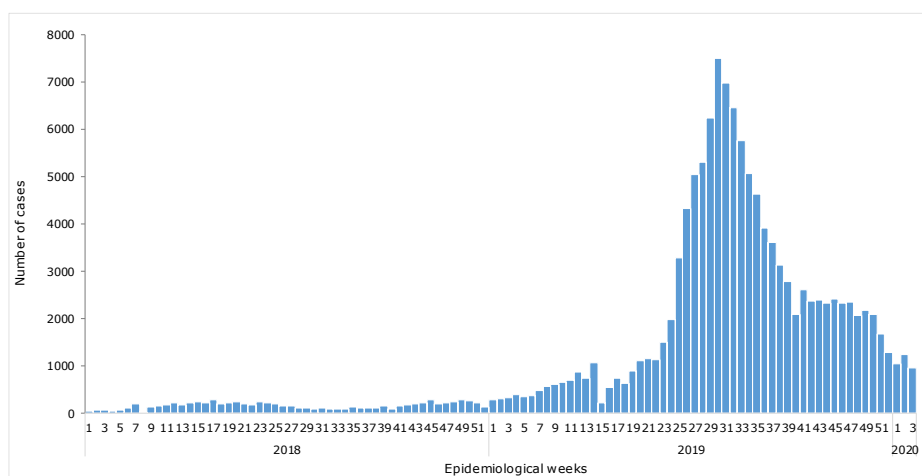
Source: Data received from the Honduras International Health Regulations (IHR) National Focal Point (NFP) and reproduced by PAHO/WHO.

Overall, 60% of dengue cases without warning signs were distributed among 5 health regions: Central District (669 cases), Yoro (416 cases), El Paraíso (246 cases), Cortés (233 cases), and Atlantida (214 cases). However, the San Pedro Sula Metropolitan health region reported 75% of severe dengue cases (205).

In **Jamaica**, between EW 1 and EW 52 of 2019, 7,555 cases of dengue were reported (**Figure 8**), of which 137 were confirmed by laboratory, including 24 deaths. Of the total cases reported, 3 were severe dengue. Since EW 23 of 2019, an increasing trend above the epidemic threshold was observed, peaking in EW 40 of 2019 followed by a gradual decrease in cases, with another peak in EW 50 of 2019. The national cumulative incidence rate was 260.61 cases per 100,000 population, representing a 666.3% relative increase compared to the same period in 2018 (34.01 cases per 100,000 population) and exceeded that observed in the preceding 12 years.

In 2019, serotypes DENV 2 and DENV 3 circulated.

In 2020, until EW 2, no cases of dengue were reported.

10

Figure 8. Distribution of dengue cases by year of report. Jamaica, 2004-2019.
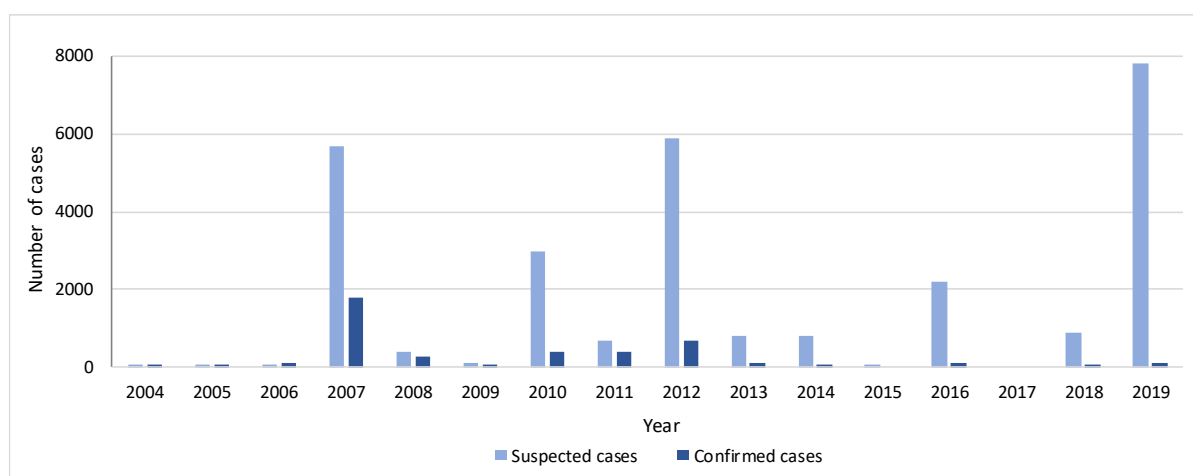
Source: Data published by the Jamaica Ministry of Public Health and reproduced by PAHO / WHO.

In **Martinique**, between EW 27 and EW 2 of 2020, 1,600 clinical cases of dengue were reported. During the same period, 349 laboratory-confirmed cases were reported, including cases imported from the Ivory Coast, Cuba, the Dominican Republic, Reunion, and Saint-Martin. In 2018, no dengue cases were confirmed. The cumulative incidence rate in Martinique was 397.40 cases per 100,000 population, representing a 1,996% relative increase compared to the same period in 2018 (18.96 per 100,000 population) and exceeds that observed in the preceding 5 years.

No cases of severe dengue or deaths have been reported, and serotypes DENV 1, DENV 2, and DENV 3 have been identified, with DENV 3 predominating.

In **Nicaragua**, between EW 1 and EW 52 of 2019, a total of 186,173 suspected cases of dengue were reported (2,962.2 cases per 100,000 population), of which 10,587 were confirmed, including 30 deaths. Of the total reported cases, 1,210 were classified as severe dengue.

By age group, the highest incidence rates were among under 1-year-olds (8,989.2 cases per 100,000 population) and 1 to 4-year-olds (7,597.4 cases per 100,000 population).

In 2019, the highest incidence rates were reported in the departments of Carazo (6,090.6 cases per 100,000 population), Granada (5,110.4 cases per 100,000 population), and León (4,651.3 cases per 100,000 population). In 2019, DENV 2 circulated.

In 2020 until EW 4, a total of 6,345 suspected cases of dengue were reported, which is 3% higher compared with the same period in 2019, and with an incidence rate of 101.38 cases per 100,000 population. Of the suspected cases, 264 were laboratory-confirmed and 10 were classified as severe dengue. By age group, the highest incidence rates are among under 1-year-olds (354.0 cases per 100,000 population) and 1 to 4-year-olds (251.5 cases per 100,000 population). The highest incidence rates have been reported in the departments of Granada (210.7 cases per 100,000 population), León (184.5 cases per 100,000 population), and Madriz (147.8 cases per 100,000 population). In 2020, DENV 2 continues to circulate.

11

In **Peru**, between EW 1 and EW 52 of 2019, 17,143 cases of dengue were reported, including 37 deaths. Of those, 9,878 were laboratory-confirmed, 2,980 were classified as dengue with warning signs, and 163 as severe dengue. From EW 39 of 2019, an increasing trend of cases was observed, with a peak in EW 45, followed by a gradual decrease in cases. Overall, 81.4% of cases were reported from 5 departments: Madre de Dios, Loreto, San Martín, Tumbes, and Lambayeque.

The cumulative national incidence rate was 52.66 cases per 100,000 population, representing a 243% relative increase compared to the same period in 2018 (13.1 cases per 100,000 population).

Five of the 24 departments in the country had incidence rates above the national incidence rate (52.66 cases per 100,000 population) in 2019, as follows: Madre de Dios (4,754.93 cases per 100,000 population), Tumbes (394.97 cases per 100,000 population), Loreto (272.12 cases per 100,000 population), San Martin (240.62 cases per 100,000 population), and Ucayali (115.4 cases per 100,000 population).

By age group, the highest incidence rates were among 30 to 59-year-olds (34.60%), 18 to 29-year-olds (24.88%), and children under 11 years (21.04 %), followed by adolescents (12.78%) and adults over 60-years-old (6.68%).

In 2019, the serotypes DENV 1, DENV 2, and DENV 4 circulated.

In 2020 until EW 4, a total of 4,054 cases of dengue have been reported, including 10 deaths. Of the reported cases, 797 were classified as dengue with warning signs and 43 as severe dengue. The cumulative national incidence rate is 12.43 cases per 100,000 population, exceeding that observed during the same period in the preceding 5 years. As in 2019, Madre de Dios, Loreto, San Martín, Tumbes and Lambayeque departments continue to report the greatest number of cases.

In 2020, the highest incidence rates by age group were reported among 30 to 59 year-olds (29.57%), 18 to 29-year-olds (26.81%), and children under 11 years (23.6%), followed by adolescents (14.25%) and adults over 60-years-old (5.75%).

In 2020, DENV 1 has been circulating.

In **Saint-Martin**, between EW 40 of 2019 and EW 2 of 2020, 420 cases of dengue were reported, of which 109 cases were confirmed. The cumulative incidence rate in Saint-Martin was 812.50 cases per 100,000 population, representing a 150% relative increase compared to the same period in 2018 (325.0 cases per 100,000 population) and exceeding that observed in the preceding 5 years.

In 2019, serotypes DENV 1, DENV 2, and DENV 3 were identified, with DENV 1 predominating.

Advice to Member States

Given the increase in cases of dengue and severe dengue in several countries and territories in the Region of the Americas, the Pan American Health Organization / World Health Organization (PAHO/WHO) urges Member States to implement inter-sectoral preparedness and response measures for these outbreaks. PAHO/WHO reiterates the recommendations provided to Member States in the 21 November 2018 Epidemiological Alert[3] and the 22 February 2019 Epidemiological Update[4].

The following is a summary of the key recommendations regarding outbreak preparedness and response, case management, laboratory diagnosis, risk communication, and integrated vector management.

Outbreak preparedness and response

As part of outbreak preparedness and response, it is recommended that Member States:

- strengthen disease surveillance, including laboratory diagnosis;

- review emergency plans;

- strengthen and intensify vector surveillance and control;

- ensure that healthcare professionals are properly trained for appropriate clinical diagnosis and clinical management of patients with dengue or other arboviruses, **with a special focus on age groups and at-risk groups with the highest case-fatality rates;**

- involve the community in prevention and control activities;

- ensure performance of the outbreak response is monitored and systematized, including the establishment of a situation room; and

- adapt risk communication according to the epidemiological scenario.

In countries with presence of the vectors but without dengue virus circulation, preparedness and response plans should focus on strategies to reduce the risk of transmission. Rapid investigation of all clinically suspected cases should be carried out as well as laboratory testing to confirm the presence of the dengue virus.

Situation Room

The situation room is a key tool for informed decision making, wherein information is analyzed through multi-disciplinary teams to support health management. It has a key role in the response to outbreaks and emergencies situations. In the case of dengue, the situation room

---

[3] Pan American Health Organization / World Health Organization. Epidemiological Update: Dengue. 21 November 2018, Washington, D.C. PAHO / WHO. 2018. Available at: https://bit.ly/2U13MtX
[4] Pan American Health Organization / World Health Organization. Epidemiological Update: Dengue. 22 February 2019, Washington, D.C. PAHO / WHO. 2019. Available at: https://bit.ly/2VUSX1C

is typically where key aspects of the inter-sectoral response are tracked, bringing together information from all involved sectors. The activities carried out in the situation room include, but are not limited to:

- Analysis and continuous systematic assessment of the current and prospective situation.

- Integration of epidemiological information, including laboratory diagnosis, vector control, and case management, aimed at:

  o Early detection of cases and outbreaks.

  o Monitoring trends and incidence.

  o Understanding the dynamics of viral circulation.

- Guide and maintain data collection, including data quality control.

- Monitor actions and impact of intervention measures.

- Produce periodic concise, operationally focused situation reports to support coordination of the emergency or outbreak response. The situation report should:

  o Provide a snapshot of the current needs, response, and gaps during outbreaks or emergency situations.

  o Be a tool for mobilizing resources.

- Manage key aspects of logistics for the ongoing prevention and control response.

Case management

While the clinical manifestations of the disease are complex, treatment is relatively simple, inexpensive, and very effective in saving lives if timely and adequate management is provided. Early recognition of warning signs at different stages of the disease is critical in order to provide the necessary health care, and therefore prevent progression to severe disease.

When the clinical diagnosis is suggestive of dengue, chikungunya, or Zika, patients (particularly children), should be managed as a case of dengue and monitored daily to detect warning signs of severe illness, especially during the critical phase of the disease[5].

WARNING SIGNS OF DENGUE
1. Intense abdominal pain or tenderness.
2. Persistent vomiting.
3. Clinical accumulation of liquids.
4. Bleeding from mucous membranes.
5. Lethargy or irritability.
6. Postural hypotension (lipothymia).
7. Hepatomegaly greater than 2 centimeters.
8. Progressive increase in hematocrit.

---

[5] PAHO / WHO. Dengue: Guidelines for patient care in the Region of the Americas, 2nd Edition 2016. Available at: https://bit.ly/2U1Pp8t

In cases of dengue without warning signs, patients[6] should receive information about these signs for timely identification of warning signs and for seeking medical assistance.

Clinical management and treatment of patients suspected with dengue should be initiated without waiting for laboratory confirmation of dengue. Initial clinical diagnosis is sufficient to offer timely and adequate medical care and treatment.

Organization of healthcare services and referral of patients

The main objective of the prevention and control measures during dengue outbreaks is to prevent deaths. Consequently, timely and adequate care of patients, as well as strengthening coordination between different health areas and services, should be promoted. If dengue cases increase, the healthcare network should consider expanding healthcare services and ensuring sufficient supplies, equipment, medication, access to clinical tests, and hospital beds; adequate patient monitoring and the use of patient tracking forms should also be ensured.

The ***primary level of healthcare*** is key in the management of dengue cases, as this is the level in which the first contact with patients occurs and where most cases receive medical attention. Therefore, it is recommended that the primary level of healthcare:

- Have sensitized and trained personnel for the triage of cases upon arrival at the healthcare service. These personnel should provide instructions and guidance to patients and/or family members on how to identify warning signs of dengue and seek the nearest healthcare service as soon as these signs occur.

- Have healthcare personnel trained to observe and detect patients who present with warning or severe signs in waiting, in order to ensure immediate care and reduce waiting time.

- Establish *dengue units* for the management of dengue cases with warning signs.

- Ensure continuous clinical monitoring of patients with specialized medical needs, co-morbidities, pregnant women, concomitant conditions, or persons whose social situation makes it difficult to access the necessary care (such as persons living in remote places, refugees, displaced persons, among others).

- Establish referral and counter-referral systems for severe dengue cases between different healthcare levels. Severe cases of dengue should be referred to a higher-level unit (secondary or tertiary level), after stabilization of the patient and coordination between healthcare units.

- All units of this level should have flowcharts and guidelines for the clinical management of dengue, available to all medical and paramedical personnel, for any necessary consultation during medical attention of patients.

---

[6] Or parents or guardians, in the case of children.

The **secondary** and **tertiary levels of healthcare** should be designed for the management of severe cases of dengue. Thus, overwhelming these units is avoided and specific clinical care can be provided to patients requiring highly specialized care.

As part of the organization of the healthcare systems in emergency situations or outbreaks, the following is necessary:

- A group of highly specialized physicians should be established to provide medical guidance on diagnosis and management of dengue cases, mainly to support physicians in remote areas (peripheral areas).

- A hotline for consultation with a trained physician, particularly for healthcare personnel in peripheral areas.

- The healthcare personnel in healthcare units should have access to clinical guidelines and flowcharts for the care of dengue cases.

- Continuous education should be maintained in healthcare units, particularly regarding the management of severe and difficult-to-treat cases as well as the analysis of dengue deaths.

A timely approach, the correct classification of cases, and proper case management are key elements of healthcare to prevent patient deaths due to dengue. A delay in medical care for these cases is often related to the cause of death.

Laboratory diagnosis

Diagnosis and etiological confirmation of dengue infection can be performed through virological assays (viral isolation, detection of genetic material, detection of NS1 protein, or immunohistochemistry) or by serological tests for the detection of IgM antibodies.

Virological diagnosis

- *Molecular detection*: During the first 5 days from the onset of symptoms (acute phase, viremic period), viral RNA from a serum sample can be detected using molecular techniques such as conventional or real-time reverse transcription polymerase chain reaction (RT-PCR). A positive PCR result (with appropriate controls) confirms the diagnosis.

- *Viral isolation*: Can be performed by intracerebral inoculation in mice or in cell culture. However, due to its complexity, this is rarely used as a routine diagnostic test and is recommended only for research or characterization to complement public health surveillance.

- *NS1 Protein*: The nonstructural protein 1 (NS1) of the dengue virus can be detected by ELISA up to 9 days after the onset of symptoms. However, since it is a protein produced at an early stage of infection, it is most likely detected between the first 3 to 5 days after the onset of symptoms.

16

- *Post-mortem diagnosis*: In fatal cases, it is recommended to take tissue samples (preferably liver, followed by spleen and kidney) in buffered formalin for histopathological and immunohistochemical assay. Additionally, molecular methods (RT-PCR) from fresh tissue samples (taken in dry tube and maintained in refrigeration), or preserved in paraffin, can also be used for the confirmation of fatal cases associated with dengue or to conduct differential diagnosis.

Serological diagnosis

A positive IgM result using the ELISA technique (MAC-ELISA or any other immunoassay) in a sample taken after the fifth day of symptom onset is presumptive of recent dengue infection. A single serum in the acute phase is considered presumptive, so it is recommended that a second sample be taken between one and two weeks after the first sample to demonstrate seroconversion (negative to positive) or an increase up to four times the antibody titer (with one quantitative assay).

Cross-reactivity with other flaviviruses (mainly in secondary infections) should be considered in areas where co-circulation with other flaviviruses (e.g., Zika, yellow fever, St. Louis Encephalitis, etc.) is documented and where there is a likelihood that the population has been previously infected.

Therefore, the detection of antibodies for other flaviviruses (e.g., IgM for Zika) by ELISA should be conducted in parallel. A positive result for dengue IgM in the absence of IgM for Zika (negative) is presumptive of dengue infection, while a negative IgM result for dengue with Zika-positive IgM will be presumptive of infection by the latter. However, a positive result for the two assays only indicates a recent flavivirus infection, and therefore, it will not be possible to confirm an etiologic agent. For this reason, results should be analyzed while also considering the clinical characteristics and the epidemiological history of the case.

Rapid tests

Immunochromatography-based rapid tests have been widely used for the diagnosis of dengue. However, in addition to the challenges observed by cross-reactivity, these types of tests have shown low sensitivity so the negative predictive value is very low, and a negative result will not rule out a case. Due to this, implementation and use of these types of tests for public health purposes should be carefully assessed.

Risk Communication

Risk communication and information to the public is essential during outbreaks to reduce adverse impact, decrease domestic breeding sites, and for affected persons to seek timely medical assistance, and therefore prevent severe cases and deaths from dengue. Communication messages should focus on the identification of warning signs and obtaining timely medical assistance.

In addition, communication campaigns should raise public awareness on the importance of vector control interventions at home, identification of febrile cases, and special measures for vector control, specifically the control of intra- and peri-domiciliary breeding sites, and personal protection.

Integrated vector management

The objective of integrated vector management is to improve efficiency and achieve sustainability in vector prevention and control actions, and includes the following:

- Selection of control methods based on knowledge of the biology of the vector, disease transmission, and morbidity.

- Use of multiple interventions, often in combination and in a synergistic and synchronized manner.

- Collaboration of the health sector with other public and private sectors linked to the management of the environment that have work which impacts or could impact reduction of the vector.

- Integration of individuals, families, and other key partners (education, finance, tourism, water and sanitation, and others).

- Establishment of a legal framework that permits an integrated and intersectoral approach.

Given the high infestation by *Aedes aegypti* and the presence of *Aedes albopictus* in the Region, prevention and control measures should be aimed at reducing the density of the vector, with local community acceptance and collaboration in adopting such measures.

Prevention and control measures to be implemented by national authorities should include the following:

- Strengthen environmental management actions, mainly by eliminating vector breeding sites in every home and in common areas of neighborhoods and cities (parks, schools, cemeteries, etc.).

- Organize intensive environmental sanitation campaigns for the elimination of breeding sites in specific areas where routine garbage collection has been interrupted.

- Implement breeding site control measures through the use of physical, biological, and/or chemical methods, with the active involvement of individuals, family members and the community.

- Identify the areas at high-risk of transmission (risk stratification) and prioritize those where there are larger concentrations of people (schools, transportation terminals, hospitals, health centers, etc.). In these areas, the presence of mosquitoes must be removed within a diameter of at least 400 meters. Special attention should be given to health units, so that these are free of the presence of the vector and its breeding sites so that they do not become points of exposure for the virus.

- In areas where active transmission is detected, it is suggested to use adulticide treatment (mainly through spraying) to remove infected adult mosquitoes in order to stop and interrupt transmission. It is important to take into account that this action is of

18

exceptional nature and only effective when executed by properly trained personnel following internationally accepted technical guidelines and when performed concomitantly to other proposed actions. Spraying and elimination and/or control of vector breeding sites within households is the main action to interrupt transmission when it intensely occurs. The greatest impact for the elimination of infected adult mosquitoes (active transmission) is achieved with intra-domiciliary spraying, using individual equipment.

- Select appropriate insecticides (in accordance with PAHO/WHO recommendations), verify the product formula, and consider the susceptibility of mosquito populations to that insecticide.

- Maintain and use spraying equipment in an appropriate manner and maintain insecticide reserves.

- Ensure intensified monitoring actions (quality control) of field work operators both during larval control and during adulticide treatment (spraying).

- Emphasize integrated (simultaneous or coordinated) actions for vector control, in space and time (adulticidal and larval control by trained personnel, coupled with sanitation and the promotion of community actions), is essential to achieve a greater impact in the shortest time possible.

Personal Prevention Measures

Patients infected with the dengue virus are the reservoir of infection for other people both at home and in the community. Therefore, public health measures to minimize the exposure of patients to mosquitoes are critical in preventing the spread of the virus and, consequently, of the disease.

Patients, other household members, and the affected community must be informed about the risk of transmission to others and ways to minimize this risk by reducing the vector population and human-vector contact.

The following actions are recommended to minimize patient-vector contact:

- The patient must rest under mosquito nets, impregnated, or not, with insecticide.

- The patient, as well as other members of the household, must wear long sleeves (when ill persons are in the house) to cover extremities.

- Repellents containing DEET, IR3535, or Icaridine can be applied to exposed skin or clothing and its use must be in strict accordance with the instructions on the product label.

- Use wire-mesh/mosquito nets on doors and windows.

These personal prevention measures are also effective in preventing the transmission of the virus to healthy people.

Sources of information

1. PAHO / WHO Health Information Platform for the Americas (PLISA). Available at: https://bit.ly/314Snw4

2. **Bolivia** International Health Regulations (IHR) National Focal Point (NFP) report to PAHO/WHO received by email.

3. **Brazil** International Health Regulations (IHR) National Focal Point (NFP) report to PAHO/WHO received by email.

4. **Dominica** International Health Regulations (IHR) National Focal Point (NFP) report to PAHO/WHO received by email.

5. **Dominican Republic** International Health Regulations (IHR) National Focal Point (NFP) report to PAHO/WHO received by email.

6. **France** International Health Regulations (IHR) National Focal Point (NFP) report to PAHO/WHO received by email.

7. **Guatemala** International Health Regulations (IHR) National Focal Point (NFP) report to PAHO/WHO received by email.

8. **Honduras** International Health Regulations (IHR) National Focal Point (NFP) report to PAHO/WHO received by email.

9. **Jamaica** International Health Regulations (IHR) National Focal Point (NFP) report to PAHO/WHO received by email.

10. **Nicaragua** International Health Regulations (IHR) National Focal Point (NFP) report to PAHO/WHO received by email.

11. **Peru** International Health Regulations (IHR) National Focal Point (NFP) report to PAHO/WHO received by email.

Bibliography

1. Integrated Management Strategy for Dengue Prevention and Control in Region of the Americas. Washington DC, 2017. Pan American Health Organization – World Health Organization. Available at: https://bit.ly/2lNL7gB

2. Dengue Guidelines for Patient Care in the Region of the Americas. Second Edition PAHO / WHO. Available at: https://bit.ly/2U1Pp8t