

## Diagnosis

The disease is difficult to diagnose, and symptoms are hard to differentiate from other hemorrhagic fevers on clinical observation. Blood tests such as RT-PCR are sometimes used to detect the virus in early stages. In later stages of the disease, antibody detection tests such as ELISA are helpful.

## Treatment

Early supportive treatment to manage conditions such as dehydration, liver and kidney failure and fever can improve survival rates. Associated bacterial infections can be treated with antibiotics.

Prevention of the disease by vaccination is most important, especially in endemic regions or for individuals travelling to endemic regions. Vaccination strategy ranges from routine infant immunization to mass vaccination campaigns in high-risk areas to vaccination of travelers, depending on the country's policy.

## *Viral Hemorrhagic Fevers–Dengue*

### Incidence and Geographical Distribution

Dengue is a mosquito-borne viral disease that is prone to pandemics. The last 50 years have seen a 30-fold increase in incidence and geographic spread. The causative Flavivirus is transmitted by female Aedes mosquitoes and has a high prevalence in urban and sub-urban tropical, and sub-tropical regions.

Table 30  
Global Prevalence and Incidence of Dengue, 2019

Measure	Value
Prevalence	3,394,136.30
Incidence	56,878,729.98

Incidence: The number of new cases of a given disease during a given period in a specified population.

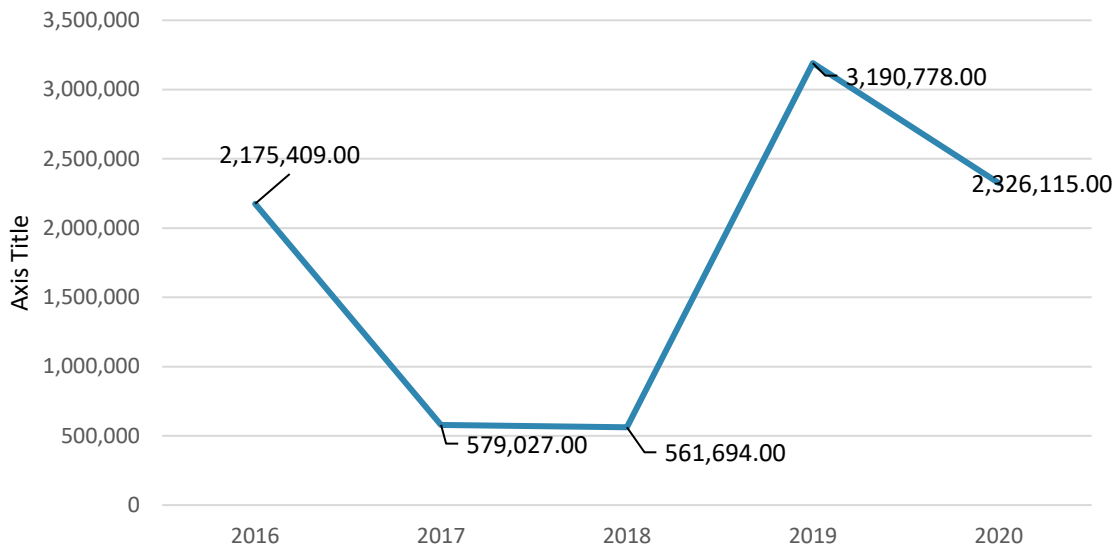
Prevalence: The total number of cases of a given disease in a specified population at a designated time.

Source: WHO, Institute of Health Metrics and Evaluation

The global incidence of dengue fever has gone up drastically. The number of dengue cases reported to WHO in the last two decades has increased eightfold, from 505,430 cases in 2000 to 2.4 million in 2010 and to 5.2 million in 2019. Even the reported deaths between the period 2000 to 2015 have increased from 960 to 4032.

In 2020, dengue affected several countries, with increased number of cases in Bangladesh, Brazil, the Cook Islands, Ecuador, India, Indonesia, Maldives, Mauritania, Mayotte (Fr), Nepal, Singapore, Sri Lanka, Sudan, Thailand, Timor-Leste and Yemen. The largest number of dengue cases ever reported globally was in 2019.

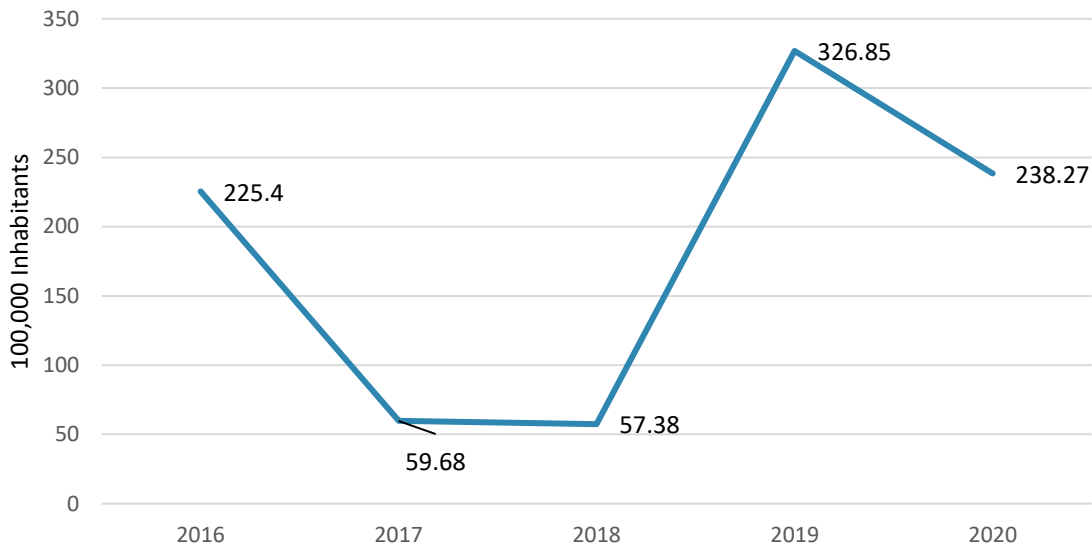
Figure 27  
Total Number of Dengue Cases Reported in the Americas, 2016-2020



Source: BCC Research

According to estimates by the Pan American Health Organization, the number of reported cases of dengue in 2020 in the Americas totaled 2,326,115. The four dengue serotypes (DENV-1, DENV-2, DENV-3 and DENV-4) circulate throughout the Americas.

Figure 28  
Incidence Rate of Dengue in the Americas, 2016-2020  
(per 100,000 Inhabitants)



Source: BCC Research

These infection rates are only the ones that are apparent and reported. There are many mild or asymptomatic infections that are not detected by public health surveillance systems and go unreported. About 50 million to 100 million dengue infections are estimated to occur every year in over 100 endemic countries.

### Risk Factors

The global incidence of dengue has risen sharply over the decades and so have the number of endemic regions. According to WHO estimates, about half of the world's population is at risk. High-risk factors include settlements near standing water that can pose as mosquito breeding grounds.

### Etiology and Symptoms

*Aedes aegypti*, transmitted by the bite of the female mosquito, is the primary vector. While infected asymptomatic humans are the main carriers, patients infected with the virus can transmit infection via mosquito for four to five days after their first symptom appears. The mosquito is a daytime feeder and breeds in urban, manmade containers filled with standing water.

Four serotypes of the virus (DEN-1, DEN-2, DEN-3 and DEN-4) can cause dengue. Symptoms, which can last for two to seven days, include high fever accompanied by a severe flu, such as illness with debilitating headache, pain behind the eyes, muscle and joint pain, nausea, vomiting, swollen glands and rash.

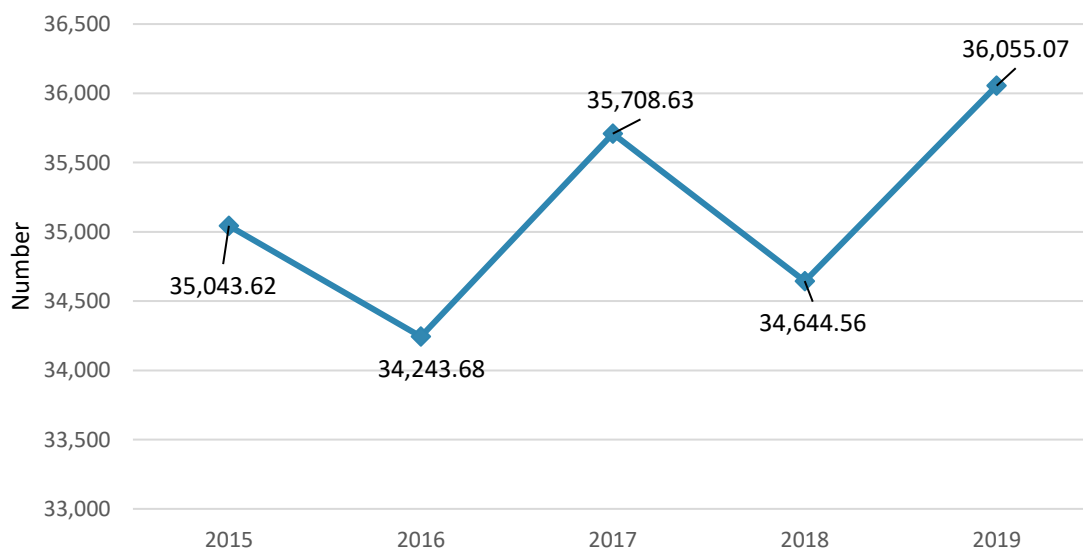
The severe form of the disease is potentially life-threatening; complications include plasma leaking, fluid accumulation, respiratory distress, severe bleeding and/or organ impairment. Warning signs such as severe abdominal pain, persistent vomiting, rapid breathing, bleeding gums, fatigue, restlessness and blood in vomit may be indicative of fatal complications.

### Socioeconomic Burden

Dengue has a significant impact on the health and socioeconomic burden of people living in endemic areas. In 2019, an estimated 3.1 DALYs per million were lost due to the disease, and if proper care is not provided, severe cases have a high fatality rate.

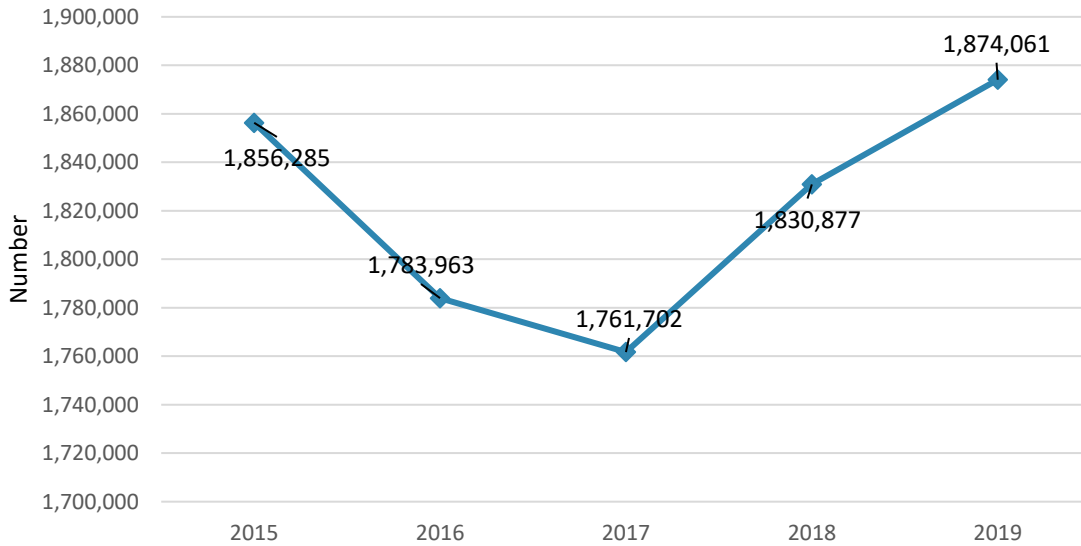
Because the mosquito bites during the day, it is a bigger threat to children playing outside or at school where exposure is high.

Figure 29  
Deaths Caused by Dengue, Worldwide, 2015-2019  
(Number)



Source: WHO, Institute of Health Metrics and Evaluation

Figure 30  
Dengue-Caused Years of Life Lost, Worldwide, 2015-2019  
(Number)



Source: WHO, Institute of Health Metrics and Evaluation

## Diagnosis

On presentation of symptoms, the clinician may choose to confirm the diagnosis by isolation of the virus, using serological tests (ELISA) or molecular methods (RT-PCR).

## Treatment

There is no specific treatment for the disease. Supervised medical care, such as the maintenance of body fluid volume, is critical to prevent mortality in severe cases. Currently Sanofi's Dengvaxia is the only marketed vaccine. Other dengue vaccines, notably TAK-003 from Takeda Vaccines and TV-003/005 from NIAID, Instituto Butantan and Merck are in late-stage development.