Dengue is now endemic in more than 100 countries—here's what you need to know

May 6 2024, by Simge Eva Dogan

Credit: CC0 Public Domain

Over the last 20 years, there has been a tenfold increase in reports of dengue—an infectious disease that spreads to humans through the bite of infected Aedes aegypti and Aedes albopictus mosquitoes.

A high fever, headache, vomiting and rash are some of the most common symptoms of dengue. In rare and severe cases, it can also cause death. The symptoms become more extreme in individuals with subsequent infections.

Dengue thrives in hot, humid and densely populated conditions. While it is most common in tropical and sub-tropical climates, the disease is now endemic in more than 100 countries and can be found on almost every continent.

Roughly half of the world's population is at risk.

Dengue in numbers

- 2 vaccines approved for limited use
- 100 countries where the disease is endemic
- 100 to 400 million estimated infections occur each year
- 3.9 billion people are at risk of infection

What's behind the rise in dengue cases?

In the first two months of 2024 alone, there were reports of more than a million cases of dengue in Brazil. It's a record for this period, with cases normally peaking from March to May.

Nearby, Peru recorded more than 34,000 dengue cases in the first eight weeks of the year. The country declared a state of emergency, and its health minister even resigned in the face of the outbreak.

More than 9,000 miles away from these outbreaks, Bangladesh is also seeing a deadly surge in cases that occur frequently throughout the year. Dengue infections were up fivefold in 2023 compared to 2022.

Countries previously dengue-free or at low risk are also reporting cases. That includes France, Croatia, Afghanistan, Chad and the US. And, in many countries in Africa and Asia where data are limited, the true burden of dengue is unknown.

So, why is dengue spreading across the world? And why are recent outbreaks breaking seasonal trends? There are many interacting factors, including:

Climate change

Warmer temperatures as a result of climate change are making more places suitable for mosquitoes to spread and survive, causing disease transmission seasons to last longer and affecting the behavior and geographical range of Aedes mosquitoes. Increased rainfall can lead to more pools of water forming and droughts can lead to more people storing water, both of which create more breeding opportunities for the Aedes mosquitoes. They lay eggs in water storage containers like water tanks, buckets or even pet drinking bowls.

Urbanization and land use

4.4 billion people, or more than 50% of the world's population, live in cities today. This number is projected to increase to 68% by 2050. Urbanization can intensify dengue spread, as well as make it harder to implement interventions that help control the disease. Land use can also increase the risk of dengue. Bodies of water, neglected wet grassland and certain agricultural practices have all been shown to influence Aedes mosquitoes' habitat.

Social demography

There are many studies investigating the link between socio-economic and demographic factors and dengue incidence. This includes an individual's life expectancy at birth, education, household income and access to broadband. Higher income and better access to health care have been found to reduce the risk of dengue.

Travel

Increased international travel and trade in areas where dengue is present can increase the risk of it spreading to new places. For example, in 2023, England, Wales and Northern Ireland reported 634 dengue cases in returning travelers.

Dengue and Zika co-circulation

Dengue can co-circulate in human populations with Zika virus, another infectious disease that's primarily transmitted by Aedes mosquitoes. They are also cross-reactive, meaning an infection with one virus can affect a person's immune response to the other. But data on how they interact, particularly in the communities most affected, is limited.

How is dengue prevented and treated?

In most cases of dengue, where the main symptoms are fever and joint pain, it is recommended that individuals treat themselves at home using pain medicine. Those with severe dengue often need hospital care.

There is no specific treatment for dengue, but researchers are working hard to change that.

So far two vaccines have been approved for use: Dengvaxia and QDenga. Dengvaxia has a 60% efficacy rate and can help protect people

aged 6 to 45, who have previously been infected, against symptomatic dengue. QDenga has a 73% efficacy rate against symptomatic dengue and can be given to people over 4 years old. A third vaccine, TV003, is currently being tested in Brazil.

There are also several traditional methods to prevent and control dengue. Insecticides, window screens and mosquito nets can help protect against mosquito bites, and covering water storage tanks can help stop mosquito breeding. However, there is evidence that some mosquitoes have become more resistant to insecticides, and the Aedes aegypti and Aedes albopictus mosquitoes move during the daytime when bed nets aren't as effective.

That's why newer methods are in development, like early warning systems which can limit disease outbreaks, house paint made with insecticide and a preventative pill that is being tested in Phase 2 trials. At Wellcome, we're funding some of these novel interventions—from a new digital tool that could help predict outbreaks as early as two months in advance to genetically modified mosquitoes that carry a gene that stops their offspring from developing into adults.

While these vaccines and methods exist, they are failing to meet the needs of everyone affected by and at risk of dengue.

To prevent and control dengue, it's crucial to make sure that the products to detect, prevent and control it are accessible, affordable, available and appropriate for everyone.

For example, there's a need to scale up vaccine production. Although Brazil became the first country to roll out a public dengue vaccination campaign this year, there aren't enough vaccines to protect its population of 214 million people. Individuals need two doses each and there are only six million doses.

There's also a need to address the lack of other resources, including diagnostic kits for early detection, trained clinical professionals, vector control staff and community engagement interventions.

More research, funding, disease surveillance and global collaboration are needed to better understand how dengue spreads, its impact on human health—and how to develop more effective products to prevent and control it.

This needs to be combined with urgent action to mitigate climate change as cutting emissions could significantly reduce disease transmission and help protect billions.

How is Wellcome supporting the fight against dengue?

Infectious diseases like dengue are one of the biggest health challenges the world faces today. Poor and disadvantaged individuals and communities are more impacted than others, yet most advances originate in the global north which often means they reflect the needs of people living in richer countries.

At Wellcome, we want to help change that and help improve the lives of the billions of people at risk. We're funding research to understand how dengue emerges and spreads, and to speed up the discovery and development of solutions to help.

Over the years, we've supported many initiatives including:

- The World Mosquito Program which releases mosquitoes that carry Wolbachia, a bacterium that reduces their ability to transmit dengue and other mosquito-borne viruses. The program,

which we've helped fund since 2014, has protected over 11 million people and prevented more than 600,000 dengue cases in 14 countries. This success has led to regulatory approval for the use of Wolbachia in the U.S., Australia and Brazil.

- The Vaccine Impact Modeling Consortium, which models the public health impact of vaccination programs and the impact of climate change on dengue and other climate-sensitive, vaccine-preventable diseases. These estimates are used to understand impact at both a local and global level, and to inform policy and decision making.
- Funding researchers investigating dengue across three of our research programs: Infectious Disease, Climate and Health, and Discovery Research. Some examples of recently funded projects include ClimateBuzz, a study on the links between climate, land use and mosquito-borne disease risk in Tanzania, and IDExtremes, a modeling tool to predict the probability of infectious disease outbreaks given compound extreme climatic events.

We're also funding teams to generate evidence on the co-circulation and cross-reactivity of dengue and Zika—and to help implement effective interventions that reduce their burden. This funding, which is currently open for applications, will be led or co-led by researchers in an African or Asian country that's currently experiencing a dengue or Zika outbreak, or has experienced an outbreak in the past. We believe that funding research in the places most at risk, as well as generating more data where it is limited, will help ensure that any resulting interventions meet the needs of the communities most affected by dengue and Zika.

Dengue's escalation in recent decades is proof of the pressing action needed to control it. Mosquitoes don't respect borders and it is increasingly likely that the threat of dengue will spread to other communities. Global problems like this require global action. All

countries need to work together to find innovative, effective solutions that are responsive to the longer-term, local needs of people at risk of dengue.

Provided by Wellcome Trust

Citation: Dengue is now endemic in more than 100 countries—here's what you need to know (2024, May 6) retrieved 23 June 2024 from https://medicalxpress.com/news/2024-05-dengue-endemic-countries.html