

## Defeating dengue: a difficult task ahead

Dengue has reemerged in Latin America, but in Venezuela it never really went away. The health ministry has launched a new prevention campaign, but will it be enough?

As the developing world's cities and mega-cities grow, the female *Aedes aegypti* mosquito that spreads dengue among humans has become part of the urban landscape. Found in tropical and sub-tropical climates, the dengue vector lays its eggs anywhere clean water accumulates, including uncovered water storage drums, used car tyres, and discarded food and drink containers.

In July and August this year, the World Health Organization (WHO) Regional Offices for the Western Pacific (WPRO) and South-East Asia (SEARO) issued alerts about the increase in dengue cases. Indonesia reported that dengue cases doubled this year compared with the same period in 2005.

In Latin America, only Brazil had more total dengue cases in 2004 and 2005 than Venezuela, but the latter had a higher incidence per 100 000 inhabitants. Small countries like Costa Rica and Honduras as well as the small French overseas department of French Guiana had the highest rates of dengue.

After its 2001 dengue epidemic, which counted 83 180 cases, Venezuela had 30 693 cases in 2004 and 42 198 in 2005. Venezuela's health ministry reported 28 119 dengue cases in the period up to 21 July this year, up 15% from the same period last year and on track to continue the upward curve.

A campaign, led by the Pan American Health Organization, WHO's regional office for the Americas, helped to eradicate *Aedes aegypti* (also the urban vector of yellow fever) from most of South and Central America and some islands of the Caribbean by the early 1970s. These gains were not sustained, however, and the mosquito subsequently reinfested most of the region. This led to increasing transmission of

the dengue virus and, in 1981, the first epidemic of dengue haemorrhagic fever (DHF) in the region occurred in Cuba with 24 000 reported cases and 158 deaths. DHF produces internal bleeding and circulatory failure, and can be fatal. Venezuela had the region's second major DHF epidemic in 1990, amounting to 3108 reported DHF cases and 78 deaths.

Experts say that dengue's re-emergence in the region, is closely linked to the widespread presence of the mosquito vector and the circulation of all four of the distinct, but closely related, viruses

or serotypes (groups of closely related microorganisms). In 1970, when Latin America lived largely dengue-free, the region only had the DEN-2 serotype. Then DEN-1 entered the scene in 1977, followed by DEN-4 and a new strain of DEN-2 in 1981, this last virus

triggering the Cuban epidemic. DEN-3 was the most recent virus to reappear, after many years absence.

While infection by one dengue virus provides lifelong immunity to that serotype, it increases the risk of severe illness when an individual is later infected by any of the other dengue serotypes. As a result, hyperendemicity – the circulation of multiple serotypes – produces more DHF cases and more deaths.

Rampant urbanization and contemporary lifestyles have contributed to dengue's spread. "We have a much more consumer-oriented society with discardables, which when filled with rainwater breed *Aedes aegypti*," said Dr Michael Nathan, a dengue expert at the WHO's Geneva headquarters.

While heavy rains help create breeding grounds for the dengue vector by filling tyres and other discarded containers with water, scant rain also serves the mosquito well by forcing slum dwellers to store more water. Water drums without mosquito-proof lids are the perfect breeding ground for the *Aedes aegypti*. A regular supply of

“We have a much more consumer-oriented society with discardables, which when filled with rainwater breed *Aedes aegypti*.”

Dr Michael Nathan, a dengue expert at the WHO's Geneva headquarters.



Dengue is transmitted by the bite of various day-feeding mosquitoes. Without a bednet, this girl inside the crib is exposed.

Irene Bosch/Anthony Guimaraes

drinking water would limit the need to store water around the household and thereby reduce vector density.

International trade and travel have accelerated dengue's recovery and spread, adds Nathan, "offering fantastic possibilities for the movement of the virus by infected travellers and of mosquito populations into new areas or back to areas where they had been eliminated". That explains how dengue was introduced on remote Easter Island where now it threatens to establish itself.

"In Venezuela people spend a lot of time outside," said Dr Renato Gusmao, the WHO Representative in Venezuela, "or inside but without protection.

The easy access to blood increases the vector population."

Public health experts recommend the permanent screening of buildings or the temporary use of air-conditioning in homes to reduce contact with the day-biting mosquito.

“In Venezuela people spend a lot of time outside or inside but without protection. The easy access to blood increases the vector population.”

*Dr Renato Gusmao, WHO Representative in Venezuela.*

A dengue vaccine still seems far off. For one, dengue remains a neglected disease for which there isn't much research funding, said Dr Irene Bosch, a Venezuelan researcher at the University of Massachusetts Medical School. Instead of seeing a vaccine as a panacea, however, argues Bosch, vector control and dengue prevention have to continue in parallel.

Recently, Venezuela's health ministry held a public event promoting its dengue and malaria prevention plan. For the plan's first stage, the ministry will invest US\$ 13 million, including the purchase of 128 vehicles, 550 fumigation tanks and 24 000 gallons (90 000 litres) of insecticide.

Minister Jesus Mantilla said the plan was novel for Venezuela as it had been developed jointly with the communities. "As the community gets educated and changes their water, the vector will reproduce itself less," said Mantilla.



Irene Bosch/Anthony Guimaraes

The principal vector of dengue fever is the female *Aedes aegypti* mosquito. Once infected, a mosquito remains infective for life.

The government's public health policies are often blamed for the high incidence of dengue in Venezuela.

"Public policies are circumstantial and improvised," said Dr Julio Castro, a researcher at the Central University of Venezuela's Institute for Tropical Medicine. "I don't see any public policies regarding dengue. What are the logistics of dengue control for the next two years?"

The health minister promised there would be results within a month of launching the dengue and malaria prevention plan, and a substantial reduction in the two diseases within two to three years. ■

José Orozco, *Caracas*