

The lowdown on the dengue epidemic

The National Vector Borne Disease Control Programme (NVBDCP) records show that 1,29,329 people fell sick with dengue this year, while 200 died. India's official numbers are well known to be gross underestimates, with private hospitals often not reporting the disease.

In fact, a 2014 study calculated that the actual number of cases between 2006 and 2012 was 282 times the NVBDCP number.

But even if one were to factor in the undercounting, 2017 is an extraordinary year. This is due to three reasons. First, India is getting better each year at reporting dengue, leading to more cases being counted. Second, dengue itself is becoming more endemic due to urbanisation.

The dengue mosquito thrives in urban habitats, in water pooled under a flower pot for example. As population explodes in rural areas, what was initially an urban disease has moved to these regions too, says Arunkumar Govindakarnavar, a virologist at the Manipal Centre for Virus Research who runs a surveillance project for febrile illnesses in 10 States. Third, dengue epidemics follow a natural cycle as population immunity waxes and wanes. But given our patchy data collection, it has been hard to glean out such cycles.

As dengue burden rises in the country, says Mr. Arunkumar, the likelihood of more people becoming severely ill grows.

This is because more infections raise the chances of the virus mutating to a more virulent form. It also raises the risk of a phenomenon called antibody-dependent enhancement.

The dengue virus has four serotypes, or types that are classified by the type of antigen (a molecule on the viral surface which human antibodies recognise) they have.

These serotypes are DENV-1, DENV2, DENV-3 and DENV-4. When a person is affected by one dengue serotype, she develops antibodies against it, which protect her for the rest of her life. If the same person is then infected by a different serotype, she is likely to develop severe disease.

This is because, in some cases, antibodies against the first serotype worsen the second infection, instead of protecting against it.

This phenomenon is called antibody-dependent enhancement (ADE) and results in a more dangerous illness called dengue haemorrhagic fever (DHF).

Severe dengue haemorrhagic fever causes blood vessels to leak, which leads to a loss of blood pressure. If this isn't treated quickly by replacing bodily fluids, the person can go into shock and can die. But treating a patient of DHF is a delicate balance, and hard to do in the high-pressure environment of an outbreak, says Mr Arunkumar. First, doctors must learn to spot severe cases and avoid indiscriminate admission of mild cases. For this, they need to look beyond easily-measured parameters like platelet counts, to symptoms that need careful observation.

Haemorrhagic fever shows up as a puffy face, loss of blood pressure, low pulse rate and a range of other symptoms. Once it develops, fluids need to be given with care. It often happens, says Mr Arunkumar, that doctors give patients too much fluid, which too has dangerous consequences.

Given the burden of dengue, the economic cost for India is huge. One calculation based on data from Madurai estimated the 2012 medical cost of dengue for India to be \$548 million. According to the study, a hospitalised person spent an average of \$235.20, usually out of her own pocket.

Costs like this are a blow to daily-wage earners, because hospitalisation also means a loss of income. The good news is that, across the world, early treatment keeps mortality levels as low as 2%. India is still pondering over introducing the world's first dengue vaccine, Dengvaxia, and for good reason. Studies show that people who have never been exposed to dengue can develop severe disease if they get dengue a few years after vaccination. This is thought to be due to ADE. So, for vaccination to be helpful, between 50 and 70% of the population needs to have been exposed to the virus. India is conducting seroprevalence studies to calculate exposure rates before it takes a call.

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