Estimating the dengue burden in India

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Dengue is the most rapidly spreading vector-borne viral disease globally, with an increasing number of areas at risk.[1] Reliable estimates of the burden of dengue are important to inform policy and research. However, quantifying the true burden globally remains elusive because surveillance systems are notoriously poor at capturing all symptomatic dengue infections, resulting in gross under-reporting. Often higher quality health systems have better reporting. Cartographical and modelling efforts estimated the global disease burden of dengue to amount to 96 million cases in 2010.[2] Samir Bhatt and colleagues[2] showed a discrepancy between reported versus modelled dengue incidence, a discrepancy which was particularly high for India. According to their estimates,[2] India contributed 34 of 96 million apparent global dengue infections, a number which stands in stark contrast to the 12 484 reported cases from India to the WHO in the same year. Such a mismatch was also reported for India in another study,[3] in which the actual number of dengue cases were 282 times the number reported by the national vector-borne disease control programme. Furthermore, a study[4] of expatriates living in Delhi, India, had a very high incidence of dengue acquired in Delhi, unmasking substantial dengue transmission that was not reported as such in the local population.

We therefore welcome the well designed, nationally representative survey to estimate age-specific seroprevalence of dengue infections in India by Manoj Murhekar and colleagues published in *The Lancet Global Health*.[5] A large study team did a community-based survey in 240 clusters (118 rural, 122 urban) selected from 60 districts of 15 Indian states from five geographical regions—a huge undertaking. 12 300 individuals aged 5–45 years were tested for IgG antibodies against the dengue virus with the use of indirect ELISA, and catalytic models were constructed to estimate force of infection. The overall seroprevalence of dengue infection in India was 48·7% (95% CI 43·5–54·0); increasing from 28·3% (21·5–36·2) among children aged 5–8 years to 41·0% (32·4–50·1) among children aged 9–17 years and to 56·2% (49·0–63·1) among individuals aged 18–45 years. The results are quite similar to neighbouring Bangladesh[6] but are much lower than the seroprevalence in most southeast Asian countries where seroprevalence is often documented as above 70% already by the age of 9 years.[7]

The estimated number of dengue infections among individuals aged 5–45 years from 30 Indian states in 2017 was 12 991 357 (12 825 128–13 130 258) based on constant force of infection models. This number is lower than Bhatt and colleagues' modelling study (about 13 million based on real seroprevalence data *vs* 34 million based on modelling), but because it is based on nationally representative data, Murhekar and colleagues' number is more reliable.

Given the size of and vast geographical differences within India, it is not unsurprising that seroprevalence differed greatly between regions: the highest seroprevalence was in southern regions (76·9%), followed by western (62·3%), and northern (60·3%) regions. The seroprevalence was also higher for urban (70·9%) versus rural areas (42·3%), which is in keeping with the observation that urbanisation appears to be one of the main drivers for the increase in dengue incidence.[6,8] Urbanisation in India is occurring at a dazzling rate, and hence India is poised to see further upsurges of dengue.

Evidence on age-stratified dengue seroprevalence is useful for taking informed decisions about the introduction of upcoming dengue vaccines in India. Several dengue vaccine candidates are in different phases of development. The first licensed dengue vaccine, CYD-TDV (Dengvaxia), developed by Sanofi Pasteur, was only recommended in geographical settings with high burden of disease, as indicated by dengue seroprevalence of 70% and higher by the age of 9 years;[9] hence India would not meet the criteria for introduction. Given the serostatus-dependent performance of CYD-TDV,[10,11] WHO's position was further revised in 2018 to recommend a prevaccination screening strategy whereby people are tested for past dengue exposure and only those tested seropositive would be vaccinated.[9]

Murhekar and colleagues provide a true novel contribution to the existing knowledge on the dengue burden in a subcontinent as vast as India. The study was well done with a state-of-the-art research design, including modelling the force of infection. Although the dengue burden in India at this stage is lower than that of most other southeast Asian countries, their data show that dengue does pose a substantial public health

risk. Such evidence should act as an impetus for India to invest more in addressing the dengue burden. At the same time, it is important to study related flaviviruses, such as Zika virus, which could also potentially have a devastating effect in India.[12]

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We declare no competing interests.

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