News in focus

EDWRAY/GETTY

Government health workers carry a casket to a cemetery in Jakarta, Indonesia.

DELTA THREATENS RURAL REGIONS THAT DODGED EARLIER COVID WAVES

Data on the coronavirus variant's spread in India spark concern for areas in low-income nations that lack health care and vaccines.

By Smriti Mallapaty

As the Delta variant of SARS-CoV-2 sweeps across Asia, researchers are increasingly concerned about COVID-19 spreading beyond urban centres to rural regions. Many of these were largely spared in earlier waves of the pandemic, and have less access to testing, health care and vaccines.

"If the variants of concern, in particular Delta, reach far-flung areas, it will really challenge the health-care system," says Cynthia Saloma, a molecular biologist at the University of the Philippines Diliman in Quezon City, who heads the Philippine Genome Center. Saloma says that so far, only a few cases of Delta have been sequenced in the Philippines, but the country is preparing for the worst. "The picture that is emerging in our neighbouring countries is really scary. We are all concerned."

Research from India now suggests that during the nation's brutal second wave earlier this year, the virus achieved much greater spread, beyond the urban sprawl, than during the first wave of 2020. This year's surge was largely driven by the Delta variant, which first came to scientists' attention in India in December.

"The variant is so much more transmissible, that health systems get overwhelmed with no time to prepare," says Ramanan Laxminarayan, an epidemiologist at Princeton University, New Jersey, who is based in New Delhi. "The second wave has been absolutely devastating in rural India."

From Indonesia and Malaysia to Thailand and Bangladesh, countries across Asia have detected Delta in their communities, and many are experiencing their largest outbreaks yet. In

Indonesia, where confirmed cases hit 50,000 per day in mid-July, daily deaths surpassed 1,700 later that month. But vaccination rates remain perilously low in many of these nations, leaving them highly vulnerable.

Researchers in India are only beginning to grasp the full scale of their second wave, which hit a peak of 391,000 recorded cases a day in May – but this data could be crucial for understanding the risk to neighbouring nations.

In a nationwide survey of about 28,000 people (two-thirds of whom were unvaccinated and had therefore acquired immunity from infection) in June and July this year, researchers found that 68% had SARS-CoV-2 antibodies in their blood. This represented a huge increase from the 21% with antibodies, recorded in a similar survey in December 2020 to January 2021, before the second wave.

Although the previous survey found higher prevalence in urban areas, the latest estimates saw little difference between the numbers in urban and rural regions, which are home to 65% of India's population. This suggests that infections "have now penetrated very well in rural areas", says Manoj Murhekar, director of the country's National Institute of Epidemiology in Chennai, which co-led the June survey.

The death toll in India has been immense, and is probably much higher than official counts. Studies of excess mortality suggest that up to 4.9 million people could have died in India since the pandemic began[1,2] – much higher than 431,000, the official number of recorded deaths due to COVID-19. Half these deaths probably occurred in just three months over the second wave, say researchers.

Border regions

Researchers now fear that a similar scenario could engulf many low-income nations – in Asia and other regions, such as Africa – that also have large unvaccinated populations in rural regions with limited access to health care.

In Bangladesh, the first cases of Delta were identified in travellers from India in Dhaka and rural western districts in late April. Since then, it has rapidly overtaken other variants. "It is like everything else has just disappeared," says Senjuti Saha, a molecular geneticist at the Child Health Research Foundation in Dhaka.

Daily case numbers in Bangladesh have now hit an average of around 14,000 in August, with daily deaths at a high of more than 220. "The numbers are bonkers," says Saha.

Most surprising to her has been the current outbreak's persistence in rural regions. Previous outbreaks in Bangladesh were largely restricted to cities such as Dhaka and Chittagong, despite people frequently travelling from cities where they work to their families in rural regions, says Saha. This could be due to the lower population density outside cities and the outdoor lifestyle in those places, she speculates. But in this latest surge, rural regions seem to be no barrier to Delta.

"Rather than looking for the virus, now we are looking for solutions to stop the virus."

The trend will make the pandemic harder to control in Bangladesh, where health care is concentrated in large cities, says Saha.

Bimandra Djaafara, an infectious-diseases epidemiologist at Imperial College London who has modelled the pandemic in Indonesia, worries about a "lack of access to health-care facilities and oxygen, especially in rural areas and areas outside Java with poorer facilities".

Henry Surendra, an epidemiologist at the Eijkman–Oxford Clinical Research Unit in Jakarta, is concerned about children in rural regions of Indonesia. Last year, he found that about 10% of young children hospitalized for COVID-19 in Jakarta died of the disease[3] – and those in rural regions who have higher general levels of child mortality could be at even greater risk of death from COVID-19, he says.

Delta has been detected in almost every province in Indonesia, and now makes up more than 80% of all sequenced samples (see 'Delta's rise in Indonesia'). However, with limited genomic sequencing – especially in rural areas – tracking its spread has been challenging, says Safarina Malik, a molecular biologist at the Eijkman Institute for Molecular Biology in Jakarta.

The large majority of Indonesia's more than 5,000 fully sequenced genomes – a fraction of the confirmed cases – are from Jakarta and surrounding Java, with only one sample from the northeastern province of Maluku Utara. Sending samples to Java for sequencing can be tricky, says Malik, as airlines sometimes refuse to carry live virus.

Other nations have even more limited sequencing. In Bangladesh, Delta accounted for 90% of the 258 samples collected since June, says Marufur Rahman, a biologist at the Center for Medical Biotechnology in Dhaka.

Vaccination is crucial

The Delta variant isn't the only reason for the pandemic's spread beyond urban centres, say researchers. Djaafara found that strict travel restrictions in Indonesia during Ramadan and Eid in 2020 helped to contain the spread of COVID-19 to rural parts of Java[4]. But cases were higher and movement was much less restricted during this year's Eid holidays in July, he says.

In Bangladesh, too, a huge number of people this year travelled for the Eid holidays despite restrictions, says Rahman.

The rise of Delta in India, and now in other nations across Asia, highlights the crucial role of vaccination, says Laxminarayan.

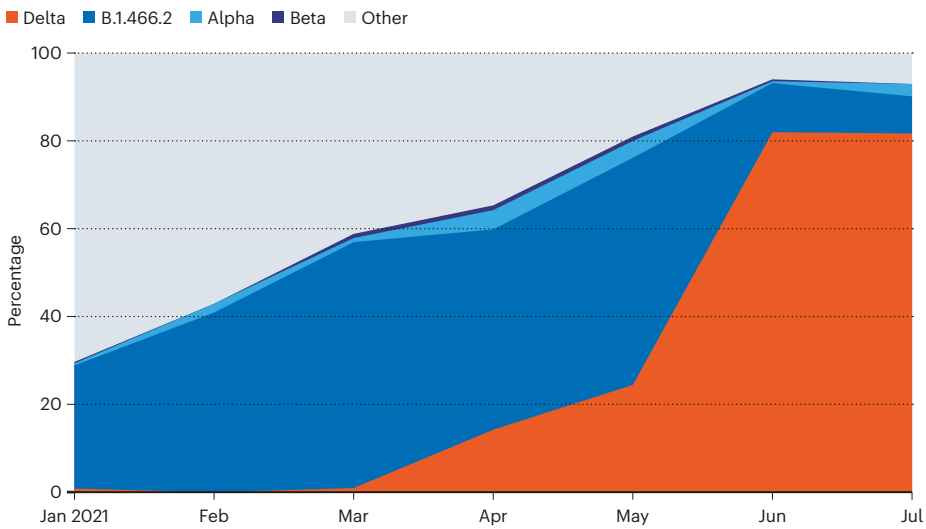
In Bangladesh, 9% of the population has received at least one dose. In the Philippines, that figure is 13%. Indonesia has vaccinated 20%, but most doses have gone to Java and Bali, and getting doses to the nation's thousands of smaller islands is difficult, say researchers.

Malaysia, where there are 20,000 or more new cases each day, is slightly better off. Yoke-Fun Chan, a virologist at the University of Malaya in Kuala Lumpur, says the nation is "aggressively vaccinating": so far, 52% of people are at least partially vaccinated. "Rather than looking for the virus, now we are looking for solutions to stop the virus," she says.

1. Deshmukh, Y. *et al*. Preprint at medRxiv https://doi.org/10.1101/2021.07.20.21260872 (2021).
2. Anand, A., Sandefur, J. & Subramanian, A. CGD Working Paper 589 (Center for Global Development, 2021).
3. Surendra, H. *et al*. *Lancet Reg. Health West Pac.* **9**, 100108 (2021).
4. Djaafara, B. A. *et al*. *BMC Med.* **19**, 146 (2021).

DELTA'S RISE IN INDONESIA

The highly transmissible Delta variant accounted for some 80% of the 1,225 samples sequenced in Indonesia since June. Alpha and Beta have also been detected, and so has B.1.466.2. That variant was first identified in Indonesia in November 2020.



SOURCE: SAFARINA MALIK/GISAID