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## India grapples with second wave of COVID-19



For numbers of COVID-19 cases and deaths in India see <https://coronavirus.jhu.edu/data/cumulative-cases>

India's devastating second wave of COVID-19 has overwhelmed its health system and the country. In several cities and states, oxygen supplies have been critical, hospitals have turned patients away, and crematoriums have run out of space. As of May 18, India had reported more than 26.4 million confirmed cases and over 274 000 deaths from COVID-19.

The country's surge in cases started in mid-March 2021 and rose rapidly in April. After 10 consecutive days of recording more than 300 000 new infections, on May 1, India reported just over 400 000 new COVID-19 cases in a single day. The country had been lulled into a false sense of security by low COVID-19 case numbers in February. "Functions, marriages that had been delayed for a year were suddenly held day, after day, after day", Anurag Agrawal, Director of the CSIR Institute of Genomics and Integrative Biology (New Delhi, India) told *The Lancet Microbe*. Large public festivals and election rallies also went ahead, attended mostly by people not wearing masks or physically distancing. "Laxity was clearly increased all over the country at every level because there was a feeling of getting on with life", said Agrawal.

Variants of SARS-CoV-2 are also probably contributing to the second wave. In late March, the Indian health ministry announced that a new variant, now known as B.1.617, had been identified in the state of Maharashtra. B.1.617 and the variant first identified in the UK, B.1.1.7, are linked to the surge in cases, said Agrawal: "March was a time of B.1.1.7 dominating in India and April the time when B.1.617 really started to rise...From India's point of view, B.1.617 is a variant of concern."

Andrew Rambaut, professor of Molecular Evolution at University of Edinburgh (UK) and a co-investigator

in COVID-19 Genomics UK (COG-UK), said that three mutations in B.1.617—causing substitutions E484Q, L452R, and P681R—are worrying. Three global variants of concern, including those first reported in Brazil (P.1 variant) and South Africa (B.1.351 variant), have substitutions at position 484, but these variants contain E484K. E484Q meanwhile has been "shown to have reduced neutralisation by some but not all convalescent plasma samples from people who have had natural infection with SARS-CoV-2 using an experimental system", wrote Sharon Peacock, Director of COG-UK, and Professor of Public Health and Microbiology, University of Cambridge, UK, in a UK Science Media Centre statement on April 19.

L452R is present in several variants of interest, including B.1.429, which is linked to COVID-19 outbreaks in California. "This mutation has been associated with weaker neutralisation of the virus by convalescent plasma from people who have been infected with SARS-CoV-2", noted Peacock. Agrawal said that on the basis of data from the USA on L452R and the presence of E484Q, Indian scientists thought "moderate increased transmissibility" might occur, "not highly increased transmissibility as we really saw in April". As for the P681R substitution, it "is located adjacent to the furin cleavage site of the spike protein, which could mean a change in spike protein processing or other changes in biology", said Peacock. Rambaut noted that all three sublineages of B.1.617 have the P681R mutation.

WHO's epidemiological update on April 27 noted that multiple other variants are also circulating in India. However, "preliminary modelling by WHO based on sequences submitted to [global database] GISAID suggest that B.1.617 has a higher growth

rate than other circulating variants in India, suggesting potential increased transmissibility, with other co-circulating variants also demonstrating increased transmissibility." Rambaut cautioned against attributing India's second wave to a single variant: "It's very premature to say that any one of these variants is the predominant reason for the surge. The fact that multiple variants are seen to be going to quite high prevalence possibly indicates a more complex picture than simply a new transmissible variant."

Another factor behind the crisis in India has been its struggle to immunise its large population against SARS-CoV-2. India launched its vaccination drive in January, 2021, with a focus on vaccinating front-line workers and adults older than 45 years. On May 1, all adults older than 18 years became eligible for vaccination. During India's first wave of COVID-19, "young people were simply not getting infected or having much of a severe disease at all" but that is "not what we are seeing this time", said Agrawal.

Vaccine supply has been an issue, with several states reporting shortages of COVID-19 vaccines in early May. As of May 3, just over 9% of India's 1.4 billion population had one dose of a COVID-19 vaccine and only 2% were fully vaccinated. The Serum Institute of India, the world's largest vaccine manufacturer, is set to deliver 220 million doses of Covishield, a version of Oxford-AstraZeneca's COVID-19 vaccine, to India's federal and state governments over the next few months. Still, that amount will only cover 8% of the country's population.

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