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NEWS ANALYSIS

Why is India having a covid-19 surge?

India's infections set new pandemic records in April, with more than 300 000 positive tests each day for a week. **Kamala Thiagarajan** looks at the many unanswered questions

Kamala Thiagarajan

On 26 April India saw the highest daily tally of new SARS-CoV-2 infections ever recorded in the world, 360 960, taking its pandemic total to 16 million cases, second only to the US, and more than 200 000 deaths.

The devastating second wave comes a year after the country imposed one of the most rigid lockdown restrictions in the world—and just three months since its health ministry declared that infections and mortality were at an all time low.¹

What is causing India's second wave, and why is it so much worse than the first?

After the first wave people dropped their guard, said Chandrakant Lahariya, an epidemiologist who helped write India's national covid vaccine policy. "In some of the most badly hit states, like Delhi and Maharashtra, community transmission was so rampant that there have been several localised waves," he said. Media reports have blamed lax social distancing and mask wearing, alongside mass political rallies for recent elections and religious events such as the Kumbh Mela, in which hundreds of thousands of Hindus gather at the Ganges river.

"The government was easing restrictions by what seemed to be the end of the first wave," said V Raman Kutty, an epidemiologist and honorary chairman of the non-profit organisation Health Action by People in Thrissur, Kerala. "Malls and theatres opened; there were sporting events, elections, and religious events. Politicians even made the unsupported claim that India had beaten the pandemic."

A report published in the *International Journal of Infectious Diseases* in December 2020 concluded that the transmission rate fell significantly during the first lockdown but warned that lockdown was only a temporary measure to quell outbreaks.² The authors recommended ramping up testing and self-isolation to prevent secondary infections, yet India's testing rate remains among the lowest in the world. Comparisons are difficult, as India doesn't release daily test numbers for the country as a whole, but the health ministry said that a total of 1.75 million samples had been PCR tested by 27 April. The UK performs 500 000 PCR tests a day.³

Then there is India's health infrastructure, already troubled before the pandemic and now overwhelmed.

On 11 May 2020, soon after the first lockdown was lifted, the government's policy think tank NITI Aayog analysed the country's covid-19 response.⁴ It found a severe dearth of medical equipment such as the testing kits, PPE, masks, and ventilators. It also noted

the long running shortage of emergency healthcare and lack of professionals: the ratio of doctors to patients was recorded as 1:1445 and of hospital beds to people 0.7:1000, with a ventilator to population ratio of 40 000 to 1.3 billion.

In the latest crisis, medical supplies and oxygen are being shipped in from 15 countries and international aid organisations such as Unicef. Devi Prakash Shetty, a cardiac surgeon and chairman and founder of the Narayana Health chain of medical centres, has estimated that India would need about 500 000 ICU beds and 350 000 medical staff in the next few weeks. At present it has only 90 000 ICU beds, almost fully occupied.⁵

India is also struggling to vaccinate its population of 1.36 billion, despite boasting one of the largest pharmaceutical manufacturing capacities in the world.⁶

Why did India's covid-19 infections drop at the start of 2021?

This remains unknown, but Kutty says it was likely to have been the true tapering off of the first wave. He noted that the "test positivity rate was falling by January-February, so we could safely assume that there was a drop in infections."

But the testing numbers themselves may not tell the whole story. "Official statistics in India are often doctored to suit the political bosses, and there was tremendous pressure to report less," Kutty told *The BMJ*, adding that there is a lack of transparency in the figures for infections and mortality too. "One hardly knows who is responsible for them. It is definitely dependent on the number of tests done, and in many states it could be argued that not enough tests were done. However, the numbers of deaths are a more robust indicator, and in the first wave deaths seem to have been less compared with other countries. The second wave is a totally different story."

With a reported 16 million infections, the official figures in India are likely to be much lower than the actual numbers, Lahariya says. "Testing was limited, and so many who weren't tested were admitted [to hospitals]. When these patients die, their deaths are not recorded as covid-19 deaths," he said, adding that death can also occur much later after discharge.⁷

How does the second wave differ from the first?

“Earlier, individuals were affected, but today whole families are contracting covid,” said Lahariya. As the world’s second most populous country, and with multigenerational households common, clusters were likely to occur.

A study in *Lancet Global Health* in February indicated that the first wave infected up to 50% of people in urban areas.⁸ The second wave seems to be spreading more to rural areas, where people travel far to get to the nearest health centres. In the state of Punjab health records show that over 80% of patients have severe symptoms once they arrive, because of the delays caused by travel.⁹

People in the 30-50 year age group who go out to work seem also to be particularly affected by the new wave, at least in New Delhi. Anecdotal reports suggest a distinctly greater number of deaths among younger people this time, said Kutty. But it is not clear yet how much more younger people are being infected, because many may be without symptoms.

There have been high profile reports of reinfections. For instance, the chief minister of the southern state of Karnataka, B S Yediyurappa, tested positive for SARS-CoV-2 twice in nine months. In a study of 1300 people who had tested positive, published in March 2021 in *Epidemiology and Infection*, the Indian Centre for Medical Research found a reinfection rate of 4.5%,¹⁰ with a large proportion of these people having shown no symptoms the first time. “Reinfections were earlier considered rare, but [in this second wave] we’re now realising that these numbers are higher than we originally thought,” said Lahariya.

Are new variants to blame?

Variants first identified in South Africa (known as 20H/501Y or B.1.351), Brazil (P.1), and the UK (B.1.1.7) are circulating in India, alongside a newly identified distinct Indian variant (B.1.617) first identified in October. All are likely to be a factor, but the extent of involvement of each is as yet unknown.

“The B.1.617 variant has spread rapidly in parts of India, apparently dominating over previously circulating viruses in some parts of the country,” said Ravi Gupta, professor of clinical microbiology at the University of Cambridge, who is studying these variants. “B.1.1.7 is dominating in some parts, and B.1.617 has become dominant in others, suggesting both may have an advantage over pre-existing strains.”

Scientists are concerned about two mutations in B.1.617 (E484K and L452R), which have led it to be dubbed a “double mutant.” Gupta said that the L452R mutation is in a key area of the spike that is recognised by antibodies after vaccination or infection. E484K also has this effect. “The worry is that the two may have additive effects in making the virus less sensitive to antibodies,” he said, though adding that this is just a possibility at this stage, with no confirmation.

The Indian SARS-CoV-2 Genomics Consortium (INSACOG), a group of 10 national laboratories, was set up in December 2020 to monitor genetic variations in the coronavirus, particularly B.1.1.7, but the lack of testing and sequencing capacity is hindering efforts. Government data show that India has sequenced less than 1% of its positive samples, whereas the proportion is 4% in the US and 8% in the UK.¹¹

What do we know about the Indian variant’s spread in the UK?

Public Health England has identified several cases of B.1.617 in the UK,¹² mostly linked to travel. This led the UK government to add India to its travel red list and the prime minister to cancel a high profile diplomatic visit to the country.

The number of B.1.617 genomes detected in the UK has risen in the past few weeks, Sharon Peacock, professor of public health and microbiology at the University of Cambridge and director of the Covid-19 Genomics UK Consortium, told the Science Media Centre. “Even though this is at or less than 1% of the genomes sequenced in the UK overall, the upward trend in cases warrants action while ongoing uncertainties over the level of threat posed by this variant are evaluated.”

How will the crisis affect India’s vaccine rollout?

India launched its vaccine drive on 16 January 2021, mostly relying on Covishield, a version of the Oxford-AstraZeneca vaccine produced by the Serum Institute of India. A smaller number of people get India’s domestically developed Covaxin, manufactured by Bharat Biotech.¹³ The government had set a target of vaccinating 250 million people by July. So far India has vaccinated about 117 million people, according to Oxford University’s Our World in Data, and around 17 million have received the full two doses of a vaccine.

The government has stopped exports of Covishield, a decision that has affected vaccine rollouts all over the world, including the global COVAX initiative. Reports allege that the government has approved a \$610m (£440m; €503m) grant for the Serum Institute of India and Bharat Biotech to ramp up production in the days ahead, which some critics said should have been done before the second wave.¹⁴

Approval and import of other vaccines has been slow, with the likes of Pfizer facing requests for further domestic clinical trials. The government could have allowed more vaccines to be imported, for the large segment of the urban population who may be willing to pay the price, said Kutty. “It would ease the pressure on the public infrastructure, which is under great strain.”

In the face of the crisis the government has approved the use of Russia’s Sputnik V. The Russian sovereign wealth fund that is marketing the vaccine globally has signed agreements with five Indian manufacturers for more than 850 million doses a year, with the first doses due to be available on 1 May.¹⁵

As infections have risen, hospitals in hotspots have been running out of vaccines.¹⁶ Kutty said that shortages were one thing; another is how fast India is able to vaccinate. “I think our [health] infrastructure at present may not be able to do it fast enough even if there were enough supplies of vaccines. The government has to plan a real campaign to cover as much of the population in as short a time as possible.”

And although vaccines for people above the age of 45 and frontline medical workers have been paid for by the federal government, doses for other age groups will have to come out of local budgets. State governments have been asked to negotiate with vaccine manufacturers directly to purchase the stocks they need, a move criticised as arbitrary and discriminatory between states, as they have widely different budgets and healthcare systems.¹⁷

Correction: On 4 May we corrected the 12th paragraph to read “16 million infections” (not 16 million deaths).

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