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The third wave of Covid 19 is imminent in India. In an article published in Nature in September 2020, it was mentioned that a typical SARS-CoV-2 virus accumulates only two single-letter mutations per month in its genome — a rate of change that is half that of influenza and one-quarter that of HIV. Despite the virus's sluggish mutation rate, researchers have catalogued more than 12,000 mutations in SARS-CoV-2 genomes so far.

Scientists can spot mutations faster than they can make sense of them. Many mutations will have no consequence for the virus's ability to spread or cause disease, because they do not alter the shape of a protein. Scientists have claimed that a steady trickle of immune-evading mutations could help SARS-CoV-2 to develop a new power to infect a human body. Our immune responses to coronavirus infections, including to SARS-CoV-2, aren't strong or long-lived enough to generate selection pressure that leads to significantly altered virus strains.

Manaus, a Brazilian city of more than two million populations, was one of the world's leading Covid hotspots in the first wave. Brazil's president Jair Bolsonaro had promoted the idea of letting the pathogen move throughout the population until most people had been infected, to attain herd immunity. Manaus was the first city in the world to reach a point at which enough people were considered immune to a virus, as they had already been infected by it. Preliminary preprint study of researchers at the University of São Paulo estimated that 66 percent of the population had been infected with SARS-CoV-2 (they later revised their figure to 76 percent as of October).

In December 2020 a second wave hit the city of Manaus. By January the city's health system, had collapsed. ICUs were full to bursting, and oxygen supplies had been exhausted. Some patients were airlifted to other regions of Brazil, and many died of asphyxiation on makeshift beds in hospital corridors or their home.

More severe than the first one, the new wave took Manaus by surprise. The discipline of masks and social distancing practise had been discarded in the belief that the city had reached herd immunity. The month of January saw a surge of caseloads and death rate.

The Manaus variant, or more formally P.1, caused re-infections in people, who had earlier bouts, while at the same time transmitting infection to those who had been spared in the first wave. William Hanage, an epidemiologist at the Harvard T. H. Chan School of Public Heath said that herd immunity through infection, instead of a vaccine, only comes with an enormous amount of illness and death.

The Manaus experience holds a cautionary message for the rest of the world, about maintaining basic public health strictures even as vaccination campaigns progress. Manaus got hit really hard because they dropped all of their mitigations, and they didn't have an adequate state of herd immunity, as was assumed. The more the virus spreads, the more it is able to find vulnerable groups in which mutations can arise. And it underlines why only a global approach to immunizations will work.

The P.1 mutation is believed to have emerged in Manaus in early November 2020, but by January it made up three quarters of all variants detected in the city and had spread to Japan. It has since been detected in at least 34 other countries and regions, including the U.S. and the U.K. Like other variants first detected in the U.K. and South Africa, P.1's 17 mutations occurred unusually quickly, and many of them are in the spike protein, which is used to penetrate the cells of an infected person. Fiocruz researchers discovered that the level of SARS-CoV-2, or viral load, in patients infected with the variant was 10 times higher. CADDE study estimated that P.1 dodges 25 to 61 percent of protective immunity gained from infection with earlier variants.

Immunity gained through vaccination appears to be more robust than immunity achieved from infection. Johnson & Johnson's jab proved 85 percent effective against severe disease in trials in Brazil—no less than it did in the U.S. Experts say that the situation is worrying—because of the virus's track record of acquiring mutations in areas where it abounds.

The above mentioned facts derived from a number of studies done internationally bring home two facts in Indian context–

1. The probability of a third wave would be higher if the virus cannot be controlled quickly in the second wave as it will get more opportunity to mutate.
2. Immunity gained through vaccination will provide a better security against a mutating virus but vaccinating a large population is difficult.

3. Public Health measures like masks, social distancing and lockdowns seem to control the spread of the virus, and indirectly control the processes of development of viral variants in the future, which are more infectious and fatal.

International understanding on vaccination is required. Accelerating the vaccine campaign throughout the world will be helpful in controlling the pandemic. If COVID is somewhere, it has the potential to be everywhere. Thus, vaccination of the entire population in the world is required.

With vaccination a dire attention should be focused on the other aspect – Public Health. The success of Public Health measures depend entirely on data. Restricting viral spreads to limited geographies would be much easier if data related to disease is provided to researchers, epidemiologists and statisticians.

Let us take an example. Data related to patients who have been hospitalised and those who have died, disaggregated on the basis of those who have or have not received vaccine, number of doses of vaccine, co morbidities, age, gender, rural-urban, place of residence, collected on a real time basis and flashed on a dashboard would be so helpful in developing targeted vaccination drives, testing for affected populations, taking public health measures and creating awareness.

If it is found that hospitalisation of patients is increasing in one city from nearby areas, care could be taken close to them by establishing make-shift COVID centres or care units. If vaccine hesitancy or casual attitude towards social distancing measures is found, targeted awareness campaigns could be launched. In a country which has robust IT infrastructure, it is not difficult to create dashboards and easily accessible databases. If data can save lives, doctors and data scientists should work together.

While the Indian Council of Medical Research has granular data on all residents who've been tested so far, it restricts access and this database. 300 scientists have asked PM Modi to give access to data for charting Covid-19 spread. Their petition says - "The ICMR database is inaccessible to anyone outside of the government and perhaps also to

many within the government," they wrote. "While new pandemics can have unpredictable features, our inability to adequately manage the spread of infections has, to a large extent, resulted from epidemiological data not being systematically collected and released in a timely manner to the scientific community."

State Governments should heed a request for data on an urgent basis. Recording of real time data at the hospitals, vaccination centers too and transferring it to a centralised database, which is made publicly available would help the researcher analyse the data and derive useful inference about the spread of the disease, effectiveness of vaccination, and correlation with co-morbidities. Digitising patient data at the hospitals would not take much time with the help of technological tools like scanners and spreadsheets.

Vaccine Hesitancy is reducing in the cities where Covid second wave spread has happened. But it is still prevalent in the smaller towns and villages. In the early stage of vaccination, even in major cities, vaccines were wasted because people did not show up in adequate numbers for vaccination. A data check on foot-falls at vaccination centers would eliminate the wastage of vaccines, which is almost criminal in the present scenario. Only with vaccination will we be able to control the pandemic and stop the emergence of new viral variants. For a densely populated country like India, a third, fourth or fifth wave may occur. In the second wave virus has moved to small towns and villages. Tracking is imminent and essential.

Numerous examples can be given where systemic data management and analytics can help make hospital supply chains robust, prediction of demand for resources like equipments, medicines, and beds is possible. in the wake of new wave, Data from the earlier wave can be extrapolated for the purpose of predictions and that would help in controlling the pandemic better. If only the government responds to the call of providing the data. There is a possibility that the virus weakens itself during multiple mutations. In spite of the anguish, pain and agony that is prevalent around, there is a hope of virus dying its own death. Yet, data collected during the current pandemic will go a long way in managing the future ones.