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Understanding the Risks Posed by COVID-19: A Public Health Perspective

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ABSTRACT Four months since the outbreak of COVID-19, some vital unknowns about the pandemic remain, including IFR (Infection Fatality Rate) and immunity from reinfection. A clearer understanding of the risks posed by COVID-19, informed by science and data in the Indian context, will help the country in mustering an effective strategy to hurdle the crisis. The government must undertake mass antibody testing and scale up healthcare capacity across the country to better manage some of these critical uncertainties. Meanwhile, a well-crafted strategy aimed predominantly at the high-risk populations will help alleviate the impact of the pandemic in the coming months. The overall approach should be to move from managing uncertainties to managing risks.

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INTRODUCTION

Lasting for nearly two years, the 1918 Spanish Flu pandemic infected 500 million people – a third of the world's total population at that time.[1] A little over one hundred years since, the world faces another health crisis in the form of a pandemic of COVID-19 caused by the SARS-CoV-2 virus. One-third of the global population has gone under lockdown, as COVID-19 has infected more than 4.58 million people across the globe; there have been 306,000 deaths at the time of writing.[2] To be sure, there are other diseases that cause a multitude of deaths every year. Tuberculosis (TB), for instance, killed 1.5 million people globally in 2018,[3] and HIV/AIDS caused nearly 770,000 deaths.[4] However, TB is not only preventable but also curable, with an estimated 58 million lives saved between the years 2000 and 2018. On the contrary, there is no known cure yet for COVID-19.

As governments across the world attempt to mount an effective response strategy, the global economy has suffered unprecedented negative impacts as a result of the nationwide lockdowns enforced by many countries to help flatten the infection curve. The Indian government responded to the pandemic by imposing a 21-day nationwide lockdown from 25 March, which was later extended for another 19 days. Another two-week extension was subsequently announced, making room for flexibility at the sub-national level, based on the local infection situation. Data released during the initial phases of the lockdown depicted relatively modest figures for India (1,173 infections and 25 fatalities as of 30 March).[5] However, a surge in the month of May has seen these numbers increase to nearly 82,000 positive cases and 2,650 fatalities by 15 May.[6] The Case Fatality Rate (CFR)[a] for India is estimated at 3.23 percent, and the recovery rate is 34 percent.[7] These rates are better than those of most western countries.

In the United States (US), for instance, the CFR is pegged at 5.97 percent;[8] other western countries with high CFRs are the UK (14.36 percent) and France (15.33 percent). Despite having relatively more advanced healthcare systems, these countries found themselves ill-prepared in arresting the pandemic. Many analysts have observed that this was a result of these governments' lack of decisive action during the early days of the pandemic.[9]

India's Dilemma

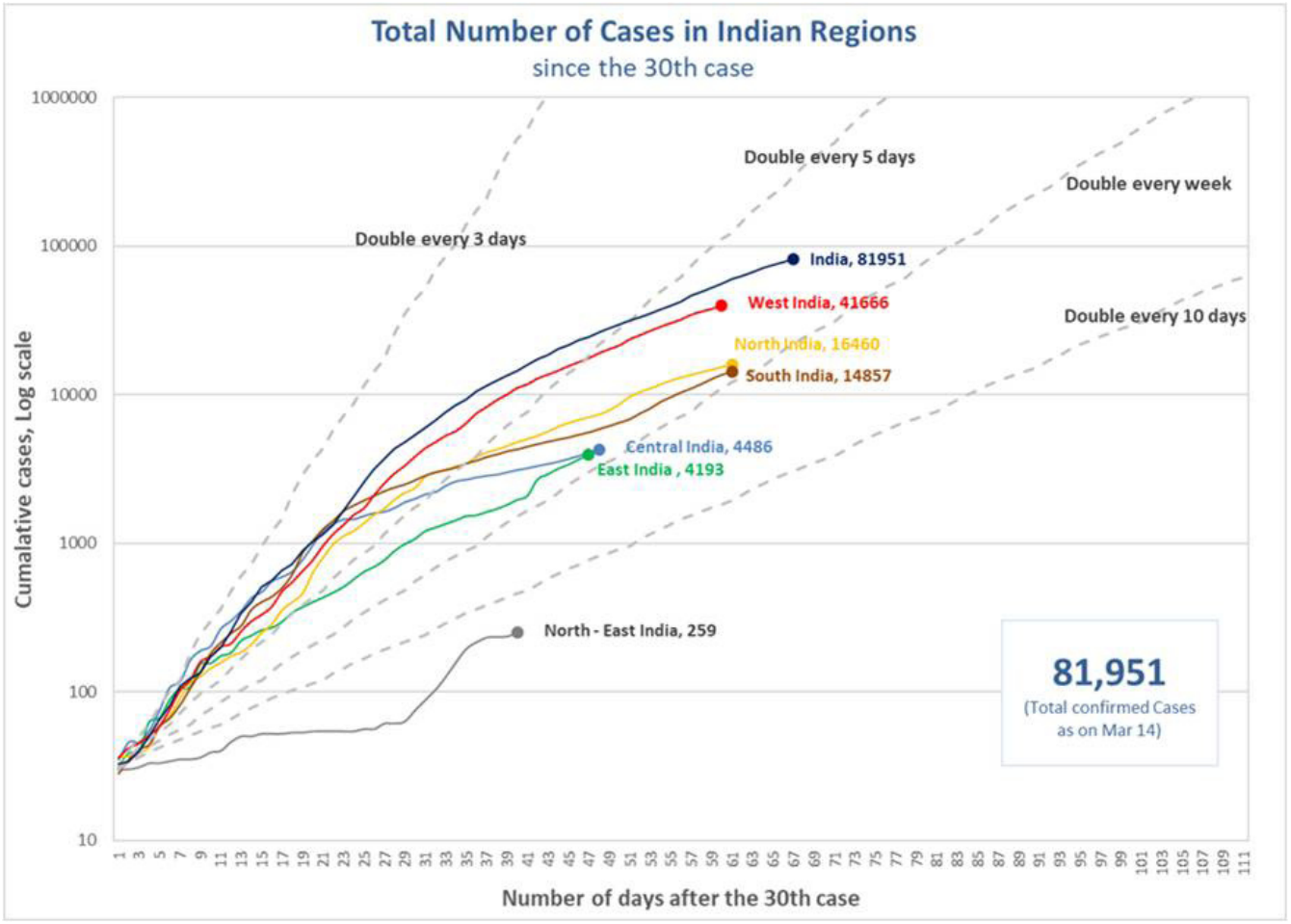
India entered the third successive national lockdown from 4 May for two weeks; word about a fourth lockdown has already been given out by Prime Minister Narendra Modi, details of which are yet to be promulgated at the time of writing this brief. The dilemma facing the decision-makers at this juncture is how to begin reopening the economy without endangering the health of the people. Latest data shows that the numbers of COVID-19 infections in the country continue to intensify

a The Case Fatality Rate (CFR) is the percentage of deaths from a disease compared to those diagnosed with it.

(See Figure 1). Without adequate measures in place in the highly dense urban centres, these engines of growth can quickly turn into pandemic hotbeds and put further pressures on already-constrained resources.

Moreover, the country is soon going to face the challenge of mitigating the pandemic during the monsoon, which is also the annual flu season. Every year, numerous lives are lost in India from diseases that are prevalent during the monsoon season; these include dengue, malaria and chikungunya, which are all mosquito-borne, as well as influenza, cholera and typhoid fever.[11] Many of these monsoonal diseases have symptoms that are similar to those of COVID-19, and mounting appropriate response strategies would require extraordinary efforts under these circumstances. Depending on how rigorously the containment measures are followed in the coming days, experts project a massive increase in India's COVID-19 numbers during the months of July and August, with meteorological officials predicting a normal monsoon this year.[12] There are other analysts, however, who estimate that these figures are likely to plateau in the coming weeks, and thereafter experience a resurgence during the winter season, which is the annual flu season in many parts of the world.[13]

Figure 1: Total Number of COVID-19 Cases in India (Region-wise)



Source : *ORF Covid Tracker*[10]

FROM MANAGING UNCERTAINTIES TO MANAGING RISKS

The government is trying to strike a balance between lives and livelihood, as any attempt to revitalise the country's economy will expose people to the pandemic. Understanding and quantifying the risks involved can help devise a better strategy to deal with it. Two factors are critical:

1. Identifying the high-risk population: India is a relatively young country with a median age of 29 years.[14] According to the 2011 Census data,[15] 75 percent of India's total population are below 40 years, four percent are between 65 and 79, and only 0.8 percent are above the age of 80. Experts believe that this largely young population helped India avoid the COVID-19 trend seen across Europe and the US.[16] However, recent developments contradict this assumption. While the fatality rate for 45–75 year-olds is 39.1 percent in the US[17] and 29.9 percent in the UK,[18] corresponding figures in India stand at 76 percent.[19] Amongst people over 75, the fatality rate is 58.3 percent in the US and 70.1 percent in the UK, but only 9.2 percent in India. The high fatality rate amongst 45–75 year olds in India is primarily due to rampant co-morbidities such as diabetes, hypertension, heart disorders and chronic kidney ailments.[20] The pandemic has exacerbated the existing burden of non-communicable diseases (NCDs), which present themselves almost a decade earlier in India (≥45 years of age) than in most developed countries (≥55 years or older).[21] The data from the Ministry of Health shows that people with pre-existing medical conditions have accounted for 78 percent of the total COVID-19 deaths in India.[22]

2. Quantifying the Infection Fatality Rate (IFR): The high CFR across countries is a frequently quoted statistic. However, this is considerably inflated since it does not account for asymptomatic cases or those who remain undiagnosed. Compared to this, the IFR (i.e. percentage of the population infected with a disease who die of it) is a more accurate reflection of the spread of a disease within a region and is, therefore, more crucial from an epidemiological perspective. The IFR for COVID-19 in India can help formulate a well-suited strategy to deal with the subsequent waves. So far, three reliable preliminary studies have been conducted (in Germany and the US) to ascertain the manner in which COVID-19 spreads and its likely IFR. The German study was carried out in Gangelt, in the district of Heinsberg, bordering Netherlands.[23] Approximately 80 percent of its population of 12,446 was tested for the presence of antibodies, out of which more than 14 percent were found infected. Based on the total deaths reported, researchers calculated the IFR for COVID-19 in Gangelt to be 0.37 percent. Further, the study also concluded that those who recovered from the infection possessed some form of immunity from reinfection. The IFR for the 1918 Spanish Flu, which killed nearly 50 million people worldwide, was 2.6 percent, while that for the seasonal flu is 0.1 percent. The two other studies conducted in the US—one by Stanford University and another by the University of South California in the Californian counties of Sara Clara (Silicon Valley) and Los Angeles—also

deployed antibody blood tests to determine the IFR.[24] The second study found the IFR to be 0.12–0.2 percent in Santa Clara County and 0.1–0.3 in Los Angeles County. However, many experts have criticised these studies for their inherent bias due to exceedingly high false positives. It is also argued that the study conducted carried a "respondent bias"—i.e., it involved mostly participants with higher possibility of being exposed to the virus.[25] Nonetheless, the findings must be treated as merely suggestive, not all-encompassing. India can extrapolate from these findings to arrive at indicative figures for the country.

IFR in the Indian Context

Consider the Indian megacities of Delhi (population: 30.2 million)[26] and Mumbai (population: 20.4 million).[27] Based on the infectivity of COVID-19, up to 60 percent of the population would have to be infected to develop protective immunity[28] from further infections (also referred to as "herd immunity"). If 20 to 60 percent people from the two cities get infected over the next few months, 6.04 million to 18.12 million people in Delhi and 4.08 million to 12.24 million in Mumbai could contract COVID-19. Based on the data from the German study (IFR: 0.37 percent), a conservative estimate (20 percent infection rate) will mean 22,000 deaths in Delhi and 15,000 in Mumbai. The worst-case scenario (60 percent infection rate) will result in 67,000 and 45,000 fatalities in Delhi and Mumbai, respectively.

Indeed, the findings of another country cannot be directly applied to the Indian context, due to variables such as age profile, density of population, number of people with pre-existing medical conditions, and institutional measures taken. However, the existing studies can serve as a reference point for conducting comparative studies in India to determine region-specific IFR. These results will be invaluable in managing COVID-19 in the country.

Race for Vaccines

Ultimately, a vaccine is the only fail-safe way out of the current crisis. However, the development and testing of a vaccine that is ready to use will take at least 12 to 18 months.[29] Over a hundred trials are already underway; about a dozen of these are in India. Statistics show that less than 10 percent of all drugs that enter clinical trials are approved for human use. Given the severity of the pandemic, governments must consider reducing the number of trials, focusing instead on funding and coordination. Collaborative efforts by way of sharing IPR (Intellectual Property Rights) and patents can help fast-track the process.[30]

Pune-based Serum Institute of India (SII), the world's largest vaccine manufacturer by the number of doses produced, has collaborated with the University of Oxford (supported by the UK government) for the mass production of a COVID-19 vaccine. The SII has also partnered with Codagenix, an American biotech firm, to develop live-attenuated vaccines. Other notable Indian firms involved in developing a vaccine for COVID-19 include Immunologists Ltd. (IIL), Bharat Biotech, Zydus Cadila, Mynvax and Biological E. Ltd.[31]

Prior research on SARS and MERS has proved useful in developing a vaccine against COVID-19, since they belong to the same coronaviruses family. This has allowed for speedy progress through academic research on vaccine development and therapeutics. However, even if the time needed for pre-clinical and phased clinical trials are reduced considerably, manufacturing and regulatory approvals take time. This is exacerbated by other factors such as supply chain bottlenecks, the need to maintain cold chain to conserve potency, and "vaccine nationalism".[b] Even by conservative estimates, the vaccine will take at least a year to reach everyone after it is made available for distribution.

Herd Immunity in India

Some governments have contemplated issuing "immunity passports" or "risk-free certificates" to individuals who have recovered from COVID-19 infection, to allow them to resume work.[32] This is based on the assumption that recovered individuals possess immunity against the virus and aims at creating herd immunity. However, the World Health Organization (WHO) has warned against such a move, arguing that it could lead to recovered persons ignoring public health advice, allowing widespread community transmission through secondary infections.

During the initial days of the outbreak, the UK government seemed to have institutionalised the concept of herd immunity as part of its pandemic response strategy, only to later retract this ill-conceived approach.[33] Considering the basic reproduction number R_0 (number of new infections an infected person generates) for COVID-19 to be around 2.2,[34] to achieve herd immunity, the majority of the population (at least 60 percent) must be exposed to the virus to build mass resistance to it. For diseases such as the Rhinovirus/common cold or chickenpox, some form of immunity already exists within the Indian population—either through naturally developed immunity or via vaccination. However, this is not true for COVID-19, which is a novel pathogen. In a resource-constraint nation such as India, the "herd immunity" approach risks overwhelming the health system with thousands of preventable fatalities. In light of the high prevalence of NCDs amongst the vulnerable section of the population (≥45 years), this strategy can become counterproductive.

Moreover, data is unclear on how long the immunity from COVID-19 lasts. For example, immunity against SARS lasts for over a year and against MERS for up to four years.[35] Thus, even if temporary immunity is developed against COVID-19, there remains the risk of recurrence in the future.

Several crucial questions regarding naturalised immunity against COVID-19 remain unanswered: Is the immunity

b The race amongst countries to secure the vaccine, driven by selfish national interests.

complete or partial? Which section of the population will develop immunity? How long does the immunity last?[36] Some of these can be addressed by carrying out mass testing for the presence of antibodies using rapid-test kits[c] and monitoring the incidence of reinfection, which can help understand not only the extent of transmission but also the accompanying risk factors.

Risk Management in India

Until pharmacological intervention becomes available, governments across the world must focus on mitigating the risks posed by COVID-19. Defining these risks is key to tiding over the crisis. The infection rate across various age groups must be profiled to formulate age-specific risk-management strategies and mitigating the perceived vulnerabilities. The latest government data reveals that the COVID-19 fatality rate for those over 45 years is 85.2 percent.[37] However, people in this age group account for less than 25 percent of India's total population.[38] The early onset of NCDs in India coupled with challenges posed by infectious diseases result in a double burden of disease, thereby contributing to higher mortality rates in India amongst people with co-morbidities. Indeed, the three leading causes of mortality in India in the age group 30-70 years are cardiovascular diseases (28.1 percent), chronic obstructive pulmonary disease (COPD) and asthma (10.9 percent), and diabetes (3.1 percent).[39] Thus, the intervention strategy must prioritise shielding these high-risk individuals as well as those with co-morbidities.

To reduce IFR, it is essential to track the trajectory of COVID-19 and break the chain of transmission. Measures for this include social distancing, hand hygiene and wearing of masks, early detection, rapid testing, and rigorous contact tracing. Additionally, the government must undertake mass testing to identify people with detectable antibodies. This evidence-based approach will enable the government in making informed decisions to deal with the pandemic.

Existing healthcare infrastructure must be scaled up by expediting the procurement of testing kits, PPEs, masks and ventilators. Dedicated facilities must be created for COVID-19 cases, allowing regular hospitals and healthcare establishments to attend to other critical ailments. This will, in turn, allow the segregation of patients and healthcare personnel, which is necessary to contain hospital-acquired COVID-19 infections and prevent community spread.

Moreover, an effective communication strategy must be formulated with the objective of managing people's expectations, giving out as much information as feasible,

c Rapid test kits are relatively inexpensive and can be speedily administered en mass unlike the RT-PCR test (Reverse Transcription – Polymerase Chain Reaction). Rapid test kits, however, cannot be used for detecting the presence of virus but these can prove effective in ascertaining the extent of transmission within a community.

but with due caution. Relevant data and mathematical models guiding government actions must be available in the public domain for critical review. Most importantly, people should be informed about the exit/risk management strategy to prevent public panic and ensure policy compliance by fostering trust.[40]

CONCLUSION

As the pandemic transcends geo-political boundaries and infects huge populations across the world, governments have been scrambling to mount an effective response strategy. Though India's COVID-19 story began on an innocuous note with a surprisingly benign trajectory primarily on account of decisive leadership during the early days of the pandemic, the numbers took a more dangerous turn in mid-May. Even after a lapse of more than four months since the outbreak of COVID-19, some vital unknowns about the pandemic still persist, including IFR and immunity from reinfection. The government finds itself in a quandary concerning reopening the country's economy and exposing people to the pandemic.

The government must undertake mass antibody testing and scale up healthcare capacity across the country to better manage some of these critical uncertainties. Meanwhile, a well-crafted strategy aimed predominantly at the high-risk populations will help alleviate the impact of the pandemic in the coming months. There is no doubt that only the development of a vaccine will give the world a clear exit strategy. Understanding the risks posed by COVID-19, backed by research and data in the Indian context, will help mount an effective strategy to arrest the ongoing crisis. ORF

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