



An Analysis of the Emergence and Consequences of Covid-19 In India

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ABSTRACT

The COVID-19 pandemic, which began in Wuhan, China, has rapidly disseminated to other nations, resulting in numerous documented cases globally. As of May 8th, 2020, India has recorded a total of 56,342 confirmed cases. India, with a population exceeding 1.34 billion, the second biggest globally, would have challenges in containing the spread of severe acute respiratory syndrome coronavirus 2 within its population. Various tactics are important for managing the ongoing outbreak, including as employing computer modelling, statistical tools, and quantitative analytics to contain the spread, as well as expediting the development of a new cure. The Ministry of Health and Family Welfare of India has disseminated information on the latest epidemic and has implemented requisite measures to mitigate the transmission of Covid-19. To attain this objective, both the national and state governments are implementing several steps and developing various wartime protocols. In addition, the Indian government enforced a nationwide lockdown lasting 55 days, commencing on March 25th, 2020, with the aim of mitigating the spread of the virus. This epidemic is closely connected to the nation's economy, since it has significantly hindered industrial sectors due to global apprehension about conducting business in the impacted regions.

Keywords: COVID-19, SARS-CoV-2, India, economy, safety measures

THE PRESENT SITUATION IN INDIA

SARS-CoV-2, the virus responsible for COVID-19, was initially discovered in December 2019 in Wuhan, China, and then spread to several regions inside the country. On May 8th, 2020, the World Health Organisation (WHO) recorded a total of 3,759,967 confirmed cases of COVID-19, with a global death toll of 259,474 (1). Currently, there have been confirmed instances of SARS-CoV2 infection in over 212 countries and territories. COVID-19 was officially designated as a Public Health Emergency of International Concern by the World Health Organisation on January 30th, 2020 (2). The initial detection of a positive case of SARS-CoV-2 in India occurred in the state of

Kerala on January 30th, 2020. Afterwards, the number of instances increased significantly. The Indian Council of Medical Research (ICMR) news statement on May 8th, 2020, said that a cumulative total of 14,37,788 samples suspected of being infected were forwarded to the National Institute of Virology (NIV), Pune, and an associated testing facility (3). Out of the total number, 56,342 patients were found to be positive for SARS-CoV-2 (4). The distribution of positive cases by state until May 8th, 2020, is presented in Table 1, and the cases are illustrated on an Indian map (Figure 1). A total of 197,192 Indians have been brought back from affected areas, and 1,393,301 passengers have undergone screening for SARS-CoV-2 at Indian airports. Among foreign nationals, 111 positive cases have been detected. As of May 8th, 2020, Maharashtra, Delhi, and Gujarat states have been identified as hotspots for COVID-19, with confirmed cases numbering 17,974, 5,980, and 7,012, respectively. As of now, India has recorded 16,540 recoveries and 1,886 fatalities (5). The "Janata curfew" was implemented on March 22nd, 2020 to enforce social separation measures. A subsequent lockdown was implemented for a duration of 21 days, commencing on March 25th, 2020. This lockdown was then prolonged until May 3rd, 2020. However, due to a rising number of confirmed cases, the lockdown has been further extended for the third time until May 17th, 2020. Presently, among the 32 states and eight union territories in India, a total of 26 states and six union territories have officially documented instances of COVID-19. Furthermore, the health ministry has categorised 130 districts as hotspot zones or red zones, 284 districts as orange zones (with a small number of SARS-CoV-2 infections), and 319 districts as green zones (with no SARS-CoV-2 infection) as of May 4th, 2020. These hotspot districts have been identified as the regions that have reported over 80% of the cases nationwide. There are 19 districts in Uttar Pradesh that have been recognised as hotspot districts. Maharashtra has 14 hotspot districts, while Tamil Nadu has 12 hotspot districts (7). The implementation of a comprehensive lockdown was enforced in these



confinement zones with the aim of halting or restricting community transmission (5). As of May 8th, 2020, a total of 421 labs, consisting of 310 government laboratories and 111 commercial laboratories, were engaged in conducting SARS-CoV-2 testing nationwide. According to the ICMR study, a total of 14,37,788 samples have been analysed so far, which corresponds to a testing rate of 1.04 per thousand individuals (3).

COMPARISONS BETWEEN COVID-19 AND PREVIOUS CORONAVIRUS OUTBREAKS

The current global spread of COVID-19 in several nations has resemblance to the earlier occurrences of SARS and Middle East respiratory disease (MERS) in 2003 and 2012, respectively, originating from China and Saudi Arabia (8–10). The coronavirus is the causative agent of both SARS and COVID-19, two viruses that primarily impact the respiratory system and have resulted in significant global epidemic outbreaks. SARS is a respiratory illness caused by the SARS-CoV virus, whereas COVID-19 is caused by the SARS-CoV2

virus. Currently, there is no specific therapeutic intervention available for the treatment of SARS or COVID-19. Amidst the ongoing quest for a COVID-19 remedy, there is compelling data suggesting that SARS-CoV-2 has similarities with the HKU1 and 229E strains of human coronavirus, although belonging to a distinct family of coronaviruses. These results indicate that people lack protection to this virus, facilitating its effortless and fast transmission throughout human populations by contact with an infected individual. SARS-CoV-2 has a higher level of transmissibility compared to SARS-CoV. There are two potential explanations for this phenomenon. Firstly, COVID-19-positive patients tend to have a higher amount of the virus in their nose and throat shortly after symptoms appear. Secondly, the SARSCoV-2 virus has a stronger ability to attach to host cell receptors compared to the SARS-CoV virus. The remaining comparisons between SARS and COVID-19 are organised in Table 2, and the corresponding references may be found here (1, 15, 16).

TABLE 1 | Current status of reported positive coronavirus disease cases in India (State-wise).

S.	State name/UT no.	Confirmed cases*	Cured/ discharged/ migrated	Death
1	Andhra Pradesh	1,847	780	38
2	Andaman and Nicobar Islands	33	33	0
3	Arunachal Pradesh	1	1	0
4	Assam	54	34	1
5	Bihar	550	246	5
6	Chandigarh	135	21	1
7	Chhattisgarh	59	38	0
8	Delhi	5,980	1,931	66
9	Goa	7	7	0
10	Gujarat	7,012	1,709	425
11	Haryana	625	260	7
12	Himachal Pradesh	46	38	2
13	Jammu and Kashmir	793	335	9
14	Jharkhand	132	41	3
15	Karnataka	705	366	30
16	Kerala	503	474	4
17	Ladakh	42	17	0
18	Madhya Pradesh	3,252	1,231	193
19	Maharashtra	17,974	3,301	694
20	Manipur	2	2	0



21Meghalaya	12	10	1
22Mizoram	1	0	0
23Odisha	219	62	2
24Puducherry	9	6	0
25Punjab	1,644	149	28
26Rajasthan	3,427	1,596	97
27Tamil Nadu	5,409	1,547	37
28Telengana	1,123	650	29
29Tripura	65	2	0
30Uttarakhand	61	39	1
31Uttar Pradesh	3,071	1,250	62
32West Bengal	1,548	364	151
Total number of positive cases reported in India	56,342*	16,540	1,886

THE COVID-19 PANDEMIC HAS HAD A SIGNIFICANT IMPACT ON BOTH INDIA AND THE GLOBAL ECONOMY

India is taking measures in accordance with the official government instructions to combat the COVID-19 outbreak. Neglecting particular crisis activities or underestimating its significance would result in grave consequences. India's adjacent nations have all confirmed positive instances of COVID-19. In order to safeguard against the lethal virus, the Indian government has implemented essential and stringent measures, such as setting up health check points at national borders to conduct tests on individuals entering the country to ascertain if they are infected with the virus (17). Various nations have implemented rescue operations and monitoring protocols to facilitate the repatriation of their nationals from China. The SARS pandemic taught us that China's worldwide reputation and economic growth were negatively affected by the absence of clear information about the disease (10, 18-20). The occurrence of SARS in China was disastrous and has resulted in modifications to healthcare and medical systems (18, 20). India's capacity to effectively respond to a pandemic appears to be significantly inferior when compared to China. A recent investigation indicated that those who were impacted did not attend the Wuhan market in China, indicating that SARS-CoV-2 might be transmitted without showing symptoms (21). Scientists argue that this occurrence is typical for several viruses. India, with a population over 1.34 billion, the second biggest in the world, would have challenges in providing adequate treatment for severe COVID-19 patients due to its limited supply of just 49,000 ventilators. An escalation in the number of COVID-19 cases

will have dire consequences for India (22). Identifying the sources of infection and the individuals who have been in contact with them would provide a challenging task. To effectively manage the epidemic, it would be necessary to employ several approaches such as computational modelling, statistical analysis, and quantitative analysis. These methods would enable the quick development of new vaccinations and medical treatments. India's medical system is very insufficient for its large population. A study has revealed that India experiences an annual death toll of approximately 1 million individuals due to insufficient medical care systems (23). India actively participates in trade with its neighbouring nations, including Bangladesh, Bhutan, Pakistan, Myanmar, China, and Nepal. In FY2017–18, Indian regional commerce reached around \$12 billion, representing a mere 1.56% of its entire world trade value of \$769 billion. The occurrence of such viruses and their spread will have a substantial impact on the Indian economy. The epidemic in China has the potential to significantly impact the Indian economy, particularly in the domains of electronics, medicines, and logistical operations, due to the closure of trade ports with China. This assertion was reinforced by Suyash Choudhary, the Head of Fixed Income at IDFC AMC, who stated that the COVID-19 pandemic might lead to a decline in GDP (24).

Economists anticipate that the economic repercussions of COVID-19 will be substantial and adverse in comparison to the impact of SARS in 2003. For example, it has been approximated that the influx of visitors to China exceeded the number of tourists that visited during the period when SARS erupted in 2003. This demonstrates the



impact of COVID-19 on the tourist sector. According to estimates, there was a 57% decrease in yearly rail passenger traffic and a 45% decrease in yearly road passenger traffic for SARS (25). Furthermore, in comparison to the global economy 15 years ago, present-day international economies exhibit far higher levels of interdependence. COVID-19 is projected to have a negative effect on developing market currencies and oil prices (26-28). From the standpoint of the retail business, consumer savings appear to be substantial. This might also have a negative influence on consumption rates, since all supply networks are likely to be disrupted, leading to a decrease in the availability of critical products relative to the demand for them (29). These estimates demonstrate that the losses caused by SARS on tourism were around USD 12-18 billion in retail sales and USD 30-100 billion at a worldwide macroeconomic level. Therefore, it is now impossible to determine the effects of COVID-19. This will only be feasible until the transmission of Covid-19 is completely controlled. Prior to that point, any approximations will be rather unclear and lacking in accuracy (19). The OECD Interim economic assessment has issued briefing materials that emphasise China's position in the global supply chain and commodities markets. Japan, South Korea, and Australia are the nations most vulnerable to

negative consequences because to their strong connections with China. According to estimates, automobile sales in China had a 20% decrease in January 2020, accounting for 10% of the overall monthly fall. This demonstrates that the impact of COVID-19 has extended to industrial output as well. Thus far, several factors have been identified as having a significant economic impact. These include labour mobility, reduced working hours, disruptions in the global supply chain, decreased consumption and tourism, and reduced demand in the global commodity market. It is crucial to analyse these factors thoroughly, taking into account the specific industry. Corporate executives must give priority to analysing supply chain and product line economic developments based on customer demand. During the discussions on sustainable economy prior to the COVID-19 outbreak, it has been projected by the International Monetary Fund that India's GDP for the fiscal year 2021 has been reduced from 5.8% to 1.9%. The global financial crisis, caused by the worldwide lockdown, has had a detrimental impact on several businesses and the global supply chain. As a result, the GDP for FY20 has decreased to 4.2%, which is lower than the prior projection of 4.8%. However, it has been approximately calculated that India and China would be undergoing significant economic expansion compared to other big economies (31).

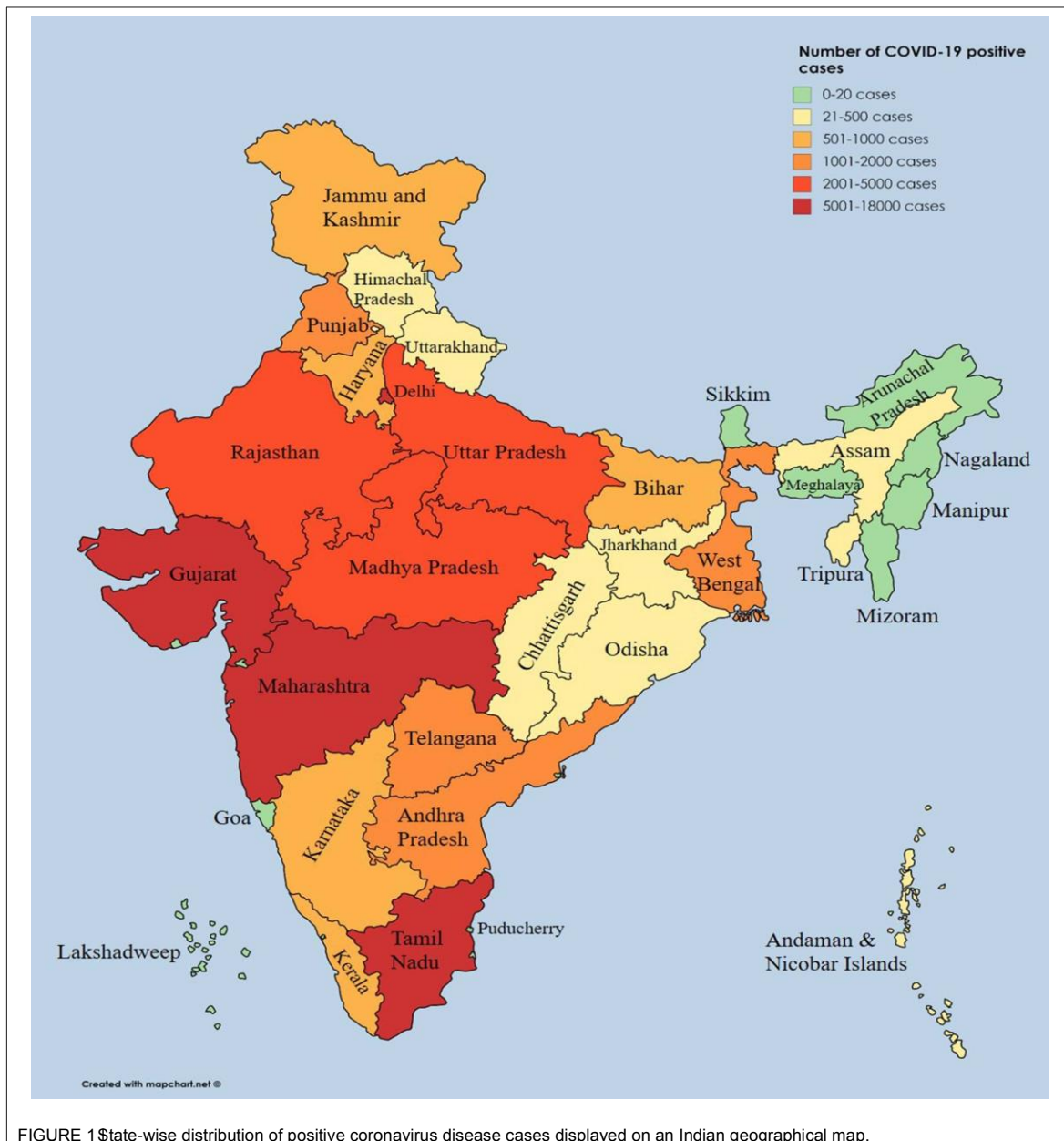


FIGURE 1 State-wise distribution of positive coronavirus disease cases displayed on an Indian geographical map.

PREPARATIONS AND PREVENTIVE MEASURES IN INDIA

To mitigate SARS-CoV-2 infection rates, it is advisable to minimise exposure to the virus. Individuals from India should refrain from visiting nations that are heavily impacted by the virus, adhere to strict cleanliness practices, and abstain from ingesting non-homemade food. It is essential to adhere to preventive measures, including the use of masks, frequent hand washing, and avoiding close contact with individuals who are sick. The Ministry of Health and Family Welfare (MOHFW) in India has disseminated information and

implemented measures to mitigate the spread of COVID-19. In addition, the Ministry of Health and Family Welfare (MOHFW) has established a disease warning helpline that operates 24 hours a day, 7 days a week. The helpline can be reached at +91-11-23978046 and 1800-180-1104. Furthermore, the MOHFW has developed policy guidelines pertaining to surveillance, clinical care, infection prevention and control, sample collection, transportation, and the release of suspected or confirmed cases (3, 5). Individuals who arrived from China or other countries and had symptoms such as fever, respiratory distress, sore throat,



cough, and shortness of breath were instructed to promptly seek medical evaluation at the nearest hospital. Authorities have instructed officials from seven airports, including Chennai, Cochin, New Delhi, Kolkata, Hyderabad, and Bengaluru, to conduct screening and surveillance of Indian travellers arriving from China and other countries affected by the outbreak. Furthermore, a travel alert was issued to urge the discontinuation of travel to nations that have been impacted. Additionally, anyone who have visited China after January 15th, 2020, will be subjected to quarantine. The Delhi government has established a centralised control centre at the Directorate General of Health Services, and 11 other districts have followed suit. India has enforced COVID-19 travel guidelines for both domestic and international flights, imposing restrictions on passengers. For further details on supplementary travel advise, please refer to the attached link:

<https://www.mohfw.gov.in/pdf/Traveladvisory.pdf>. India is renowned for its ancient medicinal practices, collectively referred to as AYUSH (Ayurvedic, Yoga and Naturopathy, Unani, Siddha, and Homoeopathy). The polyherbal powder NilavembuKudineer shown significant efficacy in combating dengue and chikungunya fevers in previous studies (32). In response to the COVID-19 epidemic, the ministry of AYUSH has issued a press notice titled "Advisory for Coronavirus," which provides information on beneficial drugs that might enhance patients' immunity (33). Presently, as per the ICMR guidelines, medical practitioners recommend a combination of Lopinavir and Ritonavir for severe cases of COVID-19 and hydroxychloroquine for the prevention of SARS-CoV-2 infection (34, 35). ICMR will undertake a treatment study for COVID-19 in India in conjunction with the WHO (3). The ICMR suggests utilising closed real-time RT-PCR systems that have been authorised by the US-FDA, such as GeneXpert and Roche COBAS-6800/8800. These systems are often employed for diagnosing chronic myeloid leukaemia and melanoma, respectively (36). Furthermore, the TruenatTM beta CoV test, which has been certified by the ICMR and is conducted on the TruelabTM workstation, is highly recommended as a screening test. Confirmation of positive results acquired on this platform is required by confirmatory assays for SARS-CoV-2. No more testing is necessary for any negative results. The antibody-based rapid tests underwent validation at NIV, Pune, and were deemed adequate. The quick test kits are as listed: The following SARS-CoV-2 antibody tests are

available: (i) Guangzhou Wondfo Biotech and Mylan Laboratories Limited offer a test using the lateral flow method, which is approved by CEIVD. (ii) BioMedomics offers the COVID-19 IgM&IgG Rapid Test, also approved by CEIVD. (iii) Zhuhai Livzon Diagnostics offers the COVID-19 IgM/IgG Antibody Rapid Test, approved by CEIVD. (iv) Voxtur Bio Ltd in India offers the New coronavirus (COVID19) IgG/IgM Rapid Test. (v) VANGUARD Diagnostics in India offers the COVID-19 IgM/IgG antibody detection card test. (vi) HLL Lifecare Limited in India offers the MakesureCOVID-19 Rapid test. (vii) CPC Diagnostics offers the YHLO SARS-CoV-2 IgM and IgG detection kit, which requires additional equipment. In addition, the Union Health Ministry has introduced a mobile application named "AarogyaSetu" that is compatible with both android and iOS mobile phones. This programme creates a user database to form a network that may notify individuals and governments about potential COVID-19 cases (37).

PROSPECTS FOR THE FUTURE

These viruses provide a significant worldwide health risk due to the infections they produce.

They are a significant contributor to mortality and have ongoing negative socio-economic impacts that are continuously worsened. Hence, it is imperative to formulate prospective therapy initiatives and procedures. India is implementing essential preventative steps to minimise viral transmission. Furthermore, the Indian Council of Medical Research (ICMR) and the Ministry of Ayurveda, Yoga & Naturopathy, Unani, Siddha, and Homoeopathy (AYUSH) have issued guidelines recommending the use of traditional preventative and therapeutic methods to enhance immunity against COVID-19 (3, 38). Implementing these rules may mitigate the intensity of the viral infection in older individuals and enhance their overall lifespan (39). The latest report from the head of ICMR said that India would conduct randomised controlled studies utilising convalescent plasma from fully recovered COVID-19 patients. Convalescent plasma treatment is strongly advised because to its modest efficacy in treating SARS and MERS (40). Currently, this therapy is being implemented in 20 healthcare facilities and is expected to be expanded further this month (May 2020) (3). India possesses advanced capabilities in specialised medical and pharmaceutical sectors, including state-of-the-art production facilities. The government has implemented expedited research initiatives to



generate affordable quick diagnostic test kits and vaccinations (41). Furthermore, the Serum Institute of India initiated the development of a vaccine targeting SARS-CoV-2 infection (42). In order to prevent further spread of the virus, it is strongly advised that we conduct screenings in the regions designated as red zones until a suitable vaccine is developed. In Kerala, India, clinicians from a medical college successfully deployed a cost-effective solution called the Walk-in Sample Kiosk (WISK) to collect samples without any direct exposure or interaction (43, 44). Following Kerala, the Defence Research and Development Organisation (DRDO) has created walk-in kiosks for the purpose of collecting COVID-19 samples. These kiosks have been given the term COVID-19 Sample Collection Kiosk (COVSACK) (45). Following the collection of the sample, the testing of SARS-CoV2 may be conducted using the current diagnostic facilities available in India. This capability may be utilised for extensive screening, particularly in high-risk regions, without requiring personal protective equipment kits (43, 45). India has endeavoured to expand its research facilities and transition towards doing mass population testing, as advised by medical professionals in India and beyond (46).

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