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## 7. COVID-19 Pandemic: India's Initial Pandemic Struggle

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### **Abstract:**

We investigate the impact of COVID-19 through screening and surveillance methods adopted in India, as well as the potential health system, social, political, and economic consequences. The research was done in a chronological manner, and data was collected Between 30 January 2020 till 12 June 2020. Initial containment measures, including point of entry screenings and testing protocols, appeared insufficient. However, testing capacity was gradually expanded after the commencement of a nation-wide lockdown. Modeling predictions have shown varying results on the emergence of cases depending on the infectiousness of asymptomatic individuals, with a peak predicted in mid-July having over two million cases. The country also faces risks of the economic plunge by losing approximately 4% of its gross domestic product, due to containment measures and reduction in goods importation.

### **Keywords:**

COVID-19; India; social disruption; economic impact; health systems; global health; case study; coronavirus.

### **7.1 Introduction:**

In December 2019, COVID-19 was first identified in Wuhan, China, as a respiratory tract infection causing symptoms, such as fever, chills, dry cough, fatigue, and shortness of breath. This atypical viral pneumonia has disabled the world, causing catastrophic health and economic losses. The novel coronavirus belongs to the family of SARS and MERS-CoV, but the impact of the former is more crippling as illustrated by the exponential increase in infectious cases. The incubation period of COVID-19 is between 1–14 days, a mean period of 6 days, during which asymptomatic carriers of the virus can transmit the disease to healthy people, as proven by the evidence of human-to-human transmission via droplets or contact. COVID-19 was declared as a Public Health Emergency of International Concern by the end of January, according to the standards of International Health Regulations (2005) by the World Health Organization. Due to the unprecedented spread of the virus, the world has gone into a virtual lockdown as several countries have initiated strict screening of potential cases introduced in their territory [1-5]. We investigate the medical, social, political, and economic impact of COVID-19 in India by conducting literature reviews, as well as sourcing information from articles, media reports, and other publicly available documents to contextualize relevant information.

The study is a literature overview and part of a case series on various countries' initial experiences on the COVID-19 pandemic. Data and literature were collected covering the period from the first case detected in India, 30 January 2020, until 12 June 2020. India is the country of interest for this research to examine the proposed containment measures and their efficacy, given the potentiality of an extensive transmission at the national level in accordance with the current health management system and a population rivaling China. The study will inspect the current health system capacity of India, the epidemiological situation, and how screening and surveillance of patients can immobilize the spread of the contagion. The study will be conducted chronologically, according to the timeline following the first COVID-19 case introduced in India to the subsequent transmission of the disease throughout the country.

## **7.2 Re-Presentation:**

### **a. Characteristics:**

India's predominant climatic conditions are influenced by the Himalaya, and the monsoons create a tropical climate with hot and humid temperatures in summer. With a registered birth rate of 20.2 per 1000 people and a death rate of 6.3 per 1000 people, India has a positive growth rate. More than half of India's population is under age 30. The country is governed in a multi-party parliamentary democracy that operates on a constitution adopted in 1949. Through its federal power division between union and state, governments on a local level have the autonomy to legislate concerning law and public health. The country's constitution recognizes 22 languages for state-official correspondence—a snippet of India's multi-ethnicity. Almost 80% of the Indian population are Hindu. Other religious groups are Muslim (~14%), Christian (2.3%), Sikh (1.7%), and others/unspecified (2%) [6,7].

### **b. Health Care System:**

The Indian healthcare system is divided between the Union government and State governments, according to the federal system. The Union Ministry of Health and Family Welfare heads the programs to be implemented, which can be eventually adopted by the state government, while the state government overlooks the public health system within the state. A national-level health quality and control are done jointly by the union and state governments. National Health Policy 2017 has made primary health centers a major focus, committing 2/3rd of its resources for building and maintaining the centers as the first point of contact with individuals. India received an overall rating of "CCC" and was placed the furthest amongst the nine countries weighted in the Laura Miller ranking system, presenting a health system needing definite improvements in its capacity [10-14].

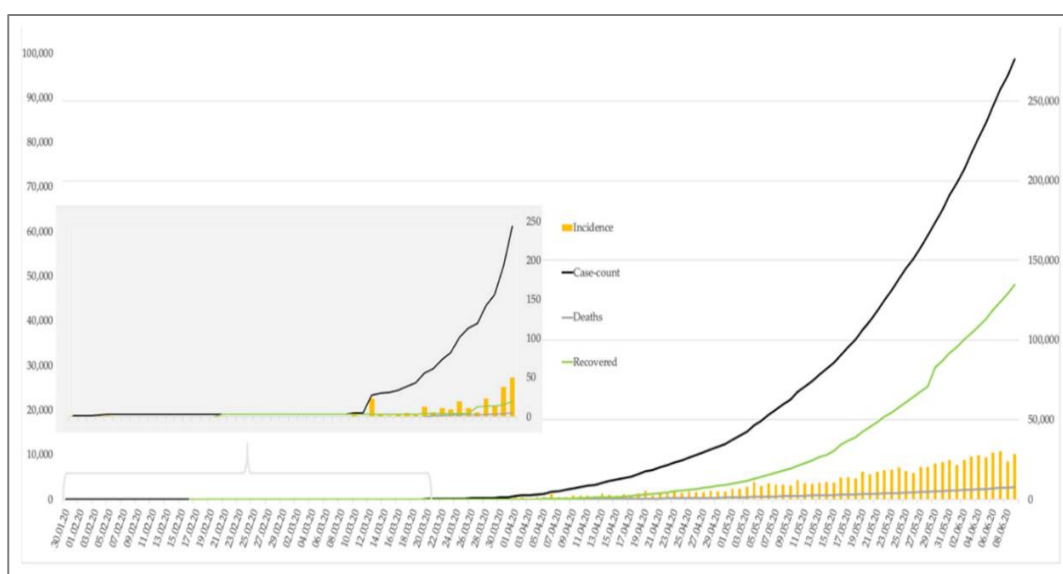
National Health Profile by the Central Bureau of Health Intelligence reported that the government's public expenditure (GPE) for health is just 1.28% of the total government revenue, indicating that private health expenditure and out-of-pocket payment (OOP) is very high. Lack of health care providers is a major concern as there are 35 doctors, nurses, and midwives per 10,000 population, and one allopathic public doctor per 10,000 individuals. Patients are more likely to visit private health facilities than governmental health facilities, due to superior health provision and quality in private providers. Moreover, private health facilities establish a monopoly in rural regions where individuals pay more for services than urban regions.

Indian Council of Medical Research (ICMR) is at the forefront of medical research in India, and research for COVID-19 is primarily coordinated by it. ICMR is looking over test-kit production and purchase, pharmaceutical usage, daily case count, and guidelines for tackling the virus [15-23].

### c. Epidemiological Situation of COVID-19 in India:

The following section presents the epidemiological situation regarding COVID-19 in India based on data retrieved from the Johns Hopkins University Centre for Systems Science and Engineering (JHU CSSE), World Health Organization (WHO), and Government of India (GoI). However, there are minimal deviations in epidemiological data between the three references.

On 30 January 2020, India reported the country's first case of COVID-19 in Kerala. The index case was a student returning from Wuhan and was isolated in a hospital. As of 3 February, a total of three cases were confirmed in Kerala, with all initial cases coming from different cities. By 20 February, they were declared recovered. According to the Ministry of Health and Family Welfare, the transmission of COVID-19 is mainly related to travel and local transmission of imported cases, limited community transmission was first reported on 30 March. Accordingly, both patients were of age >65 years and with comorbidities. Throughout the first weeks after the outbreak onset until mid-May, India's case-fatality ration (CFR) remained stable at a constant 3.2%. As of 9 June, CFR dropped to 2.8% by 0.6 deaths per 100,000 capita. India's CFR resembles the aggregated CFR from the South East Asia Region [27-29]. Prior to the date of submission, India counted more than 300,000 cases, recording a relatively constant increase of daily incidences (cf. Figure 1). This means that India did not yet manage to substantially contain the spread of COVID-19. The doubling time of case-counts steadily decreased currently to eight days (9 June 2020).



**Figure 7.1. Epidemiological progress of the COVID-19 outbreak in India. Incidence is scaled according to the left axis. Data were derived from Johns Hopkins Center for Systems Science and Engineering (JHU CSSE).**

#### **d. Public Health and Economic Response:**

India faces particularly challenging circumstances when dealing with these twin crises. To mention just two, its large population (1.3 billion people) and the crowding of people in cities and towns all over the country provide ripe conditions for an explosion of the health crisis. Its large informal sector makes it difficult to design social safety nets since most workers are not in the formal sector.

Faced with these circumstances, the government adopted what has been called a modified form of the barbell strategy from the theory of investment, which recommends investment in the most risky and the least risky assets. The modification to the barbell strategy is that the most risky outcomes are insured against first. Thus, there is a cushion for the very worst outcomes, and feedback determines the response to the rest. The worst outcomes in the case of the pandemic would be mass starvation and deaths following from disruption of supply chains and mass bankruptcy. The adopted strategy protected the economy from the worst manifestations of the crises and yet was flexible enough to respond to evolving circumstances.

This lockdown brought much of economic and social activity to a halt. However, this had a salutary effect on cutting down the mortality from COVID. It has been estimated that without the lockdown and containment strategies in place, by April 15, there would have been more than 820,000 corona virus cases in the country instead of the 7,447 cases that actually occurred. On 8 July, India had recorded 742,417 cases with a recovery rate of nearly 63% and 20,642 deaths. Had the lockdown not taken place the number of infections would have been 30 times higher, according to some estimates. By 8 July 2020, the pandemic infection curve had been nearly flattened, and the recovery rate was rapidly improving. Furthermore, 'green shoots' for economic growth had appeared after the first unlock. In a major speech, the RBI governor has indicated that the economy is nearly on track.

#### **e. Recovery Strategy:**

India adopted a three-pronged strategy to combat the economic crisis resulting from the pandemic: a demand component, a supply support component and a structural reforms component. These are discussed below in no particular order. A key element of this strategy has been that state governments have had a major role to play in both the imposition and the lifting of lockdown restrictions. In turn, state governments have often relied on inputs from district administrations. Indeed, the requirements of India's federal structure have been consistently met throughout this period. No national-level emergency was declared. The reasoning behind this was that the state governments would know local conditions better than the central government, and this method would also honour the rights of state governments within India's federal constitution.

Domestic flights were suspended and have only recently (partially) resumed. International flights have all but ceased although Air India ran a number of flights to bring back home large numbers of Indians stranded in various parts of the world. Train and lorry services for essential commodities such as food, fertilisers, liquefied petroleum gas (LPG) cylinders and the like have proceeded unimpeded throughout, but passenger services have only recently resumed and that too partially. Other forms of public transport including buses and metro services are gradually being restored.

An important implication of the crisis was that millions of migrant workers living and working in different parts of the country faced increasing hardship as they became unemployed and the lockdown dragged on. The initial advice by the Prime Minister was for everyone to stay where they were in order to minimise the spread of the virus. Had this advice been followed to the letter, the recent spike in corona cases may not have taken place. However, starting in late March, migrant workers grew restive because they had lost their jobs, financial help was tardy, and they wanted to return to their places of origin (mostly villages and small towns in Eastern India). This was difficult to organise as permission was needed from state governments for trains carrying passengers to pass through during the pandemic. There was also the risk that transporting such large numbers of people by train or bus could risk an explosion of corona cases. By 30 June, almost all the workers (nearly 40 million) wanting to return home have been able to do so (largely) by special trains. 3.5 million Workers have been returned to Uttar Pradesh alone.

#### **f. India's Struggle with COVID-19:**

In a large country like India, no blanket policy will do exactly what it is supposed to do. But an early lockdown is a very expensive weapon that we used after a lot of thought. It has surely bought us time, but we have also lost time within lockdown, which could have been used much better mapping the spread of the virus using wider testing. The health ministry operates under severe constraints stemming from the very little money that we invest as a country in health. However, this is just part of the problem. From the beginning, the ministry has been admittedly trying to allay fear and panic, often at the cost of not offering evidence-based solutions.

Ensuring supply of affordable medicines will be another challenge. Given the overdependence on China for bulk drugs and the disruption of certain supply channels, alternative arrangements may have to be made and PMBJP (Pradhan Mantri Bhartiya Jan Aushadhi Pariyojana) outlets need to be leveraged to ensure that essential medicines are available in ample supply.

The Union Ministry of Health is currently working with partners to establish an "Interfaith Corona Coalition" to engage religious communities in action against COVID-19. Given the polarised situation in many regions, such measures can potentially save many lives, and should be strengthened and mainstreamed. The huge and expanding network of Health and Wellness Centres (HWCs) within the Ayushman Bharat programme should become centres of health promotion as well as prevention-related activities.

These should also have a key role as the hub of community surveillance, as well as the gatekeeper of PMJAY. Furthermore, India's disease reporting framework needs to be expanded and strengthened tremendously and the private sector that caters to two-thirds of the population needs to be brought into the surveillance system with a more active role.

### **7.3 Management and Results:**

#### **a) Mathematical Projections of COVID-19 in India:**

Ray et al. operated an eSIR-Model to predict future case counts in India. In addition to the three components susceptible, infected, and removed (recovered or deaths) of SIR-Models, the authors incorporated time-varying transmission rates.

Based on an SEIR-Model, Mandal et al. analyzed the effectiveness of point-of-entry screening of symptomatic and asymptomatic travelers at an airport. Derived from a simulated epidemic in Wuhan, the authors estimated the number of COVID-19 cases being introduced into the community in India, accounting for cases being detected prior to leaving China. A second model projected the mitigation of COVID-19 in the four most populated metropolitan areas Delhi, Mumbai, Kolkata, and Bengaluru. Based on the assumption that 50% of symptomatic cases would be identified and quarantined ( $R_0 = 1.5$ ), the cumulative incidence and peak prevalence could be reduced by 62 and 89 per cent, respectively. Ambikapathy and Krishnamurthy modeled the impact of various lockdown scenarios and predicted future cases to a period of 110 days, starting from 2 February 2020 (lockdown was implemented on day 45).

Chatterjee, K et al. projected case-counts based on an SEIR model, including epidemiological data from March 2020. Accordingly, the model predicted 2,979,928 cases by 25 May 2020 with peak prevalence by mid-July. Implementing quarantine measures could reduce cases by 90%. [31-34].

#### **b) Testing:**

Generally, studies modeling the projection of case-counts in India tend to overestimate the epidemiological magnitude in comparison to the officially reported numbers. Nevertheless, the current epidemiological development resembles (at lower counts) the scenario modeled by Rey et al., with a lower transmission rate through travel ban and social distancing [31]. In the optimistic scenario, Klein et al. projected the peak prevalence by mid-June [29]. However, given the current daily incidence trends (mid-June), India might not have reached peak prevalence, yet. Furthermore, the deviation of modeled projections and the current development of the outbreak might be explained by the low test capacity, and therefore, the Indian Government has been criticized for reporting suspiciously suppressed data. According to Narayanan et al., extensive testing is needed to better target public health interventions. Pooling testing samples can detect COVID-19 prevalence cost-effectively, and thus, is suitable in resource-limited environments.

#### **c) Travel Restrictions:**

After the announcement of COVID-19 as a public health emergency of international concern (PHEIC) on 30 January 2020, the civil aviation authority began universal health screening of international passengers at the entry point from China by temperature check and filing self-declaration forms [27]. Entry screening expanded for other nations as the virus began spreading globally, in line with the International Health Regulations 2005 for point of entry screening. States with no international airports and/or seaport began monitoring the influx of travelers from rail and road to check for potential cases [27]. On 11 March, when WHO declared COVID-19 as a pandemic, Indian authorities eventually banned visas and non-essential travels from affected countries, listed as China, Iran, Italy, South Korea, France, Spain, and Germany. Although the International Health Regulations advises against reduced mobility in terms of travel, travel restrictions began on 13 March as visas issuance was restricted to essential travel and delegates only. Subsequently, all international passengers entering India were required to go through screening tests. The travel ban expanded to all European countries and nations of the Middle East on 18 March.

**d) Health Recommendations:**

On 30 January 2020, with the advice of WHO, the government of India initiated awareness of proper hygiene and sanitation steps to protect from the spread of diseases. A major focus was put on proper handwashing, covering oneself, while coughing and sneezes, social distancing, thorough cooking of meat and dairy, and avoiding contact from wild or farm animals. WHO country office of India (WCO) worked with ICMR and National Centre for Disease Control for building laboratory capacity and disease surveillance, respectively. By 9 March 2020, WCO, along with the Ministry of Information and Broadcast, directed all telecom operators of India to launch a special COVID-19 caller tune to raise awareness about the prevention strategies as cases began to rapidly rise after Italy's surge of cases.

**e) Impact on Indian Pharmaceutical Industry:**

With Chinese production activities suspended, Indian pharma companies are threatened by goods in short supply. China delivers almost 70 percent of the active pharmaceutical ingredients (API) for medicines produced by Indian companies, leaving them vulnerable in maintaining its supply chain. In addition, hoarding purchases created an artificial shortage of API, leading to a bulge in the price for paracetamol, vitamins, and penicillin. At the same time, as a protective measure, the GoI installed an export ban on essential medicines. Considering the production capacities of Indian pharmaceutical companies, preventing impairments of their production and supply chains will increase the preparedness for large scale production for COVID-19 diagnostic tools and potential vaccines. Consequentially, this will not only support India's economy, but also contribute to the global response in tackling this outbreak.

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**g) Social and Political Disruption:**

As the stringent lockdown began in Wuhan, Indian air fleet Air India evacuated over 700 Indian and foreign nationals stranded in the city by carrying multiple batches of flight. Air India also repatriated Indian crew and passengers trapped in the ill-fated Diamond Princess Cruise ship. Indian Air Force evacuated 112 nationals stranded in Wuhan, 76 Indians, and 36 foreign nationals to Delhi, while also providing 15 tonnes of medical equipment and safety kits to China. Following the subsequent surge of COVID-19 cases in Italy, commercial airlines Air India evacuated Indians from Rome and Milan, as well as Iran. All evacuees were taken to quarantine in Delhi.

#### **7.4 Discussion:**

The spread of COVID-19 rooting from China in December 2019 to a global scale has been categorized as a pandemic by the World Health Organization on 11 March 2020. COVID-19's asymptomatic transmission has turned into a challenge to trace the exact source of viral spread. India's rigorous point-of-entry screening may be infeasible in delaying the epidemic outbreak as the authorities conducted only thermal scanning for symptomatic passengers, thereby disregarding asymptomatic passengers as disease carriers.

#### **7.5 Conclusion:**

India's healthcare system maybe be dented if there is a superfluous hospital admission, due to lack of adequate infrastructure and medical experts in relation to the high number of potential patients needing intensive care, given the already low expenditure on the public health system, standing at 1.28% of the total governmental revenue. Moreover, the catastrophic cost of testing and treatment for patients who are ineligible for insurances and government subsidies will further deepen debt and poverty in the country.

India is presently witnessing a rapid surge in the number of COVID-19 cases. Although the nationwide lockdown has been able to decelerate the spread, the country's ever-increasing population, remarkably high population density and poor socioeconomic conditions are major barriers in India's battle against COVID-19.

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