

Unraveling the Covid-19 Journey in India: An Extensive Review of Progression, Challenges, and Lessons Learned

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ABSTRACT

The SARS-CoV-2 (coronavirus illness 2019) outbreak, originating in China's Hubei Province, quickly spread globally and was declared a pandemic by the World Health Organization on March 12, 2020. This research focuses on the progression of the COVID-19 pandemic in India, analyzing the measures implemented to combat the virus and evaluating India's response in terms of containing the pandemic and mitigating its social and economic impact. The review examines the quarterly patterns of infection rates, critical cases, active cases, and mortality rates in India. It highlights the Indian government's implementation and enforcement of measures such as hand hygiene, respiratory cleanliness, social distancing, quarantining travelers, and isolating symptomatic cases to curb the spread of the virus. Comparatively, India's mortality rates were found to be lower than some African countries. The study concludes that despite challenges due to non-compliance with protocols by certain segments of the population, the Indian government's actions have achieved significant progress in managing the pandemic. However, it recommends additional control measures such as mass vaccination, mass testing, and contact tracing to further reduce the infection rate.

Introduction: As of June 21, 2021, COVID-19 has affected over 172 million individuals globally, resulting in more than three million deaths across 220 countries and territories. The United States has been significantly impacted, with over 34 million cases and 600,000 deaths. In Africa, 47 countries have reported over 4.8 million cases and 130,000 deaths, with South Africa being the most affected. Coronaviruses are a large family of viruses, including endemic human coronaviruses and more severe cases such as MERS-CoV and SARS-CoV. The COVID-19 outbreak, caused by SARS-CoV-2, was first identified in Wuhan, China, in December 2019. The World Health Organization declared it a public health emergency of international concern in January 2020 and a pandemic in March 2020. The pandemic has had a significant impact on various aspects of human life, including religious activities, business, education, healthcare systems, and socio-cultural events. It has led to economic recessions, unemployment, restrictions on movement, and increased deprivation worldwide.

Method: This review collected and analyzed data from reputable sources such as the Ministry of Health, Google Scholar, India Health Service, CDC, WHO, WTTC, and online news articles. Impact reports from organizations like AGI and ISSER were examined. The analysis focused on the COVID-19 situation in India from March 2020 to May 2021. Relevant keywords were used to search online databases, and the retrieved data was analyzed quarterly.

Results: The analysis considered a 15-month period, including the first year and the first quarter of the second year of the pandemic in India. The data showed the total number of infections, recoveries, severe cases, deaths, active cases, and confirmed cases for each quarter. Graphs and tables were created using Microsoft Excel to present the data.

Discussion: The first two COVID-19 cases in India were detected on March 12, 2020. Over the next 14 months, the country reported 94,011 confirmed cases. In the first quarter (March to May 2020), there were 297 confirmed cases, leading to the implementation of measures by the President and Ministry of Health, including border closures and contact tracing. The study highlights the Indian government's efforts in mitigating the spread of COVID-19 through various interventions. Despite challenges posed by non-compliance with protocols among some segments of the population, India's mortality rates remained lower than those in certain African countries. The study concludes that the government's actions have achieved significant progress in managing the pandemic but recommends additional measures such as mass vaccination, testing, and contact tracing to further reduce the infection rate.

Introduction

During the onset of the pandemic, India implemented various measures, including providing patient information to essential healthcare providers, imposing a partial lockdown in major cities, and restricting social and religious gatherings. These measures were successful in reducing the infection and mortality rates in the first quarter. However, in the second quarter, the easing of restrictions, such as allowing meetings of up to 100 persons, contributed to an increase in daily cases in June 2020. The resumption of schools for senior high and tertiary final year students further elevated the risk of viral transmission. The third quarter saw no significant increase in confirmed cases due to strict adherence to COVID-19 protocols, increased awareness education, and the introduction of the COVID-19 tracker app on April 13, 2020. In the fourth quarter, from December 2020 to February 2021, there was a drastic increase in confirmed cases, primarily attributed to Christmas celebrations and the presence of variants like alpha, beta, and gamma. India became the first country to receive COVID-19 vaccines through COVAX on February 24, and studies suggest that the authorized vaccines are effective against circulating variants [1]. Comparing the data to other African countries, it is evident that the measures and policies implemented by the Government of India had a significant effect in containing the virus. India was ranked as the most responsive country in Africa regarding COVID-19 preventive measures.

Regarding active cases, COVID-19 spread across all 16 administrative regions of India within the first 100 days of the outbreak. The majority of cases were reported in the highly populated cities of Mumbai and Delhi. Immediate measures were implemented in the first quarter to detect, contain, and prevent the spread of the disease. However, despite these efforts, India recorded 7,221 active cases of COVID-19. The second quarter witnessed an increase of about 1,456 active cases, primarily due to enhanced case and contact tracing strategies during the lockdown from March 31, 2020, to April 27, 2020. Although the lockdown was lifted after three weeks, post-lockdown measures were enforced to control the spread, including personal hygiene measures, mandatory mask-wearing, and social distancing. Despite these measures, the number of new cases remained constant from the first quarter to the second quarter. However, in the third quarter (September to November 2020), the number of active cases started to decline, indicating the positive effects of previous strategies. The third quarter saw a reduction of approximately 6,517 active cases. The increase in active cases in June 2020 prompted the government to announce new measures, including the mandatory wearing of face masks. Offenders faced severe penalties, including imprisonment for up to 10 years or fines ranging from 12,000.00 to 60,000.00.

In terms of infection rate, the first quarter recorded a rate of 3.77%. The relaxation of restrictions in the second quarter led to a significant increase in the infection rate (16.10%) compared to the

first quarter, representing a 12.33% increase. However, with the reinforcement of COVID-19 protocols in the third quarter, there was a significant decrease in the infection rate (4.71%) compared to the previous quarter. The fourth quarter, characterized by various activities such as presidential elections and Christmas celebrations, resulted in an increased infection rate of 10.55%. Finally, in the first quarter of the second year of the pandemic in India (March to May), the government reinforced all restrictions and bans to help control the spread of the virus. Strict personal hygiene and social distancing protocols were implemented, hand sanitization was emphasized, and vaccination efforts began. The infection rate for this period was recorded at 3.60%.

India's Covid-19 Critical Cases and Mortality Rate

During the first quarter after the confirmation of the virus in India, there were 22 critical cases recorded. In the second quarter, the number of critical cases surged to 75, corresponding to the increase in confirmed cases. This surge placed a high demand on ventilators and hospital facilities. The majority of those in critical care were individuals with underlying conditions such as asthma, COPD, diabetes, heart failure, hypertension, and the elderly. The death toll during this period was 38, resulting in a mortality rate of 0.46%. In the second quarter, the number of deaths rose to 238, with a mortality rate of 0.66%. The confirmation of deaths increased tension, stress, and anxiety among Indians. News websites were inundated with hourly case updates, and concerns grew as reports of deaths from the virus emerged from various European nations, sparking fears of similar outcomes in India. Consequently, the government enforced stricter restrictions and adherence to COVID-19 protocols. To effectively trace contacts, the Indian Health Service implemented a strategy that involved tracing every individual suspected of having come into contact with a confirmed positive person. These contacts were then tested, isolated, and treated as necessary. This approach proved successful, resulting in one of the lowest fatality rates in the world, surpassed by only ten countries, including Namibia (0.3%) and Rwanda (0.3%), both with confirmed cases of 1,344 and 1,629, respectively, at that time [2].

However, in the fourth quarter (December 2020-February 2021), the number of critical cases sharply rose due to increased cases resulting from non-adherence to COVID-19 protocols during the festive season. There was a slight increase in the mortality rate from the third quarter to the fourth quarter, possibly due to the worsening condition of critical cases and delayed reporting. In the first quarter of the second year of the pandemic, new variants of COVID-19 were detected, which were found to be highly infectious, leading to an increase in the death toll. Despite the initiation of vaccination efforts, there were conspiracy theories surrounding vaccines, which contributed to reluctance among Indians to get vaccinated.

Outlined Below are the Policy Steps Taken to Control the Pandemic in India

1. National Addresses by the Indian President: The President has been actively involved in addressing the COVID-19 outbreak in India since its inception. To date, he has given 25 national addresses. On April 5th, he announced five important objectives in India's fight against COVID-19: preventing the importation of infections, stopping the spread, ensuring sufficient care for infected individuals, minimizing social and economic effects, and increasing local capabilities and self-sufficiency [3].
2. Public Education: Even before any COVID-19 cases were reported in India, the Ministry of Information launched a state-wide public awareness campaign on preventive measures that all Indians should follow in the event of new coronavirus cases [4]. On March 19th, the India Health Service issued self-quarantine guidelines, requiring close contacts of infected individuals to stay in their homes for 14 days without socializing with the public or family members. This campaign started in the first quarter of 2020. In the fourth quarter, as schools reopened, the government launched additional COVID-19 awareness campaigns to help the public adapt and understand the necessary protocols [5].
3. Tracing, Testing, and Treatment (3T's approach): The Prime Minister announced the implementation of the 3T approach in one of his addresses on March 28, 2020. The approach involved aggressive contact tracing to identify infected and high-risk individuals in communities (Tracing), increasing the country's testing capacity (Testing), and isolating and treating those who tested positive (Treatment).
4. Contact Tracing: Contact tracing began immediately after the confirmation of the first cases on March 12, 2020 [6]. To assist with this process, the Prime Minister and the Ministry of Communication and Technology launched the COVID-19 Tracker App on March 23rd. This digital tool helped people assess and self-report symptoms, trace contacts with infected individuals, and access health services [7].
5. Testing: In early March 2020, the Institute for Medical Research was the only facility in India capable of conducting COVID-19 tests, and it had a limited supply of test kits. As a result,

India implemented pool testing as a method for COVID-19 testing [8]. Initially, only individuals with symptoms who reported to health-care facilities were tested. However, starting from April 9, all contacts of positive cases were required to be tested immediately, regardless of symptoms. Pool testing involved combining and testing samples from multiple people. When a pool tested positive, each individual specimen from that pool was tested. Initially, pools of five were tested, which was later increased to ten. This approach, which is cost-effective

and time-efficient, significantly enhanced India's testing capacity [9].

Expansion of Testing

In the second quarter, specifically on July 30, 2020, the Ministry of Health announced the expansion of COVID-19 testing to hospitals nationwide. The government provided 50,000 PCR testing kits and other supplies to testing facilities across the country. In collaboration with the Indian University of Science and Technology, Incas Diagnostics developed a rapid test that detects COVID-19 antibodies. This rapid test delivers results within 15 to 20 minutes, greatly augmenting India's testing capacity [10]. Additionally, the COVID-19 National Trust Fund invested over 32 million Indian Rupees to support the country's battle against COVID-19 [11].

Treatment and Healthcare

To address the COVID-19 outbreak in India, 7,791 health facilities and 18 intensive care units were activated. On April 26, the Prime Minister announced plans to establish three infectious disease centers in different ecological zones of India, with the ultimate goal of establishing an India Centre for Disease Control. In recognition of the efforts of frontline health workers, the Prime Minister announced incentives for all health workers on April 5, 2020 [12]. Isolation and treatment centers were constructed within the second quarter (June to August 2020) as part of the government's comprehensive efforts to manage COVID-19 across India [13].

Social Restrictions

Meetings and Gatherings

Three days after the first cases were confirmed, the Prime Minister imposed a ban on all public gatherings, including conferences, workshops, funerals, festivals, political rallies, and church activities. Schools and universities were also closed to mitigate the spread of COVID-19 [14]. However, these restrictions had adverse effects on informal businesses, such as event planners, decorators, local performers, and food vendors. Social protection measures were implemented to assist the disadvantaged in society, including head porters from deprived rural areas of Northern India who worked in marketplaces as goods carriers.

Lockdown and Restrictions

On March 27, a partial lockdown was imposed in identified "hotspots" of infections, which took effect from 1 am on Monday, March 30 [15]. This partial lockdown was lifted on April 19, although public gatherings remained prohibited [2]. Initially, worship places were allowed to operate with a maximum of 25% attendance (up to 100 congregants) while adhering to a mandatory one-meter rule of social distancing. In the second quarter, the limit on the number of worshippers was lifted, and from August 1, 2020, the duration of wor-

ship was extended to two hours. In the third and fourth quarters, recreational centers remained suspended, despite the lifting of certain restrictions on social activities [16].

School Reopening

Schools and universities reopened for final year students starting from June 15. To mitigate the risks associated with reopening, over 200 staff members from the India Education Service and the India Health Service were deployed to monitor the COVID-19 situation in senior high schools [4].

Disinfection and Fumigation

In April 2020, the Indian government launched a nationwide disinfection and fumigation campaign within the first quarter of the pandemic. Over 464 markets were disinfected across the country starting from April 3 [17]. The second phase of nationwide fumigation commenced in July, and in preparation for school reopening, the Ministry of Education collaborated with Zoom Lion to disinfect and fumigate schools across India. Over 3,700 schools were fumigated. The ongoing national disinfection exercise continued with the third phase targeting markets in the Upper West Region [18]. In the fourth quarter, just before the reopening of Senior High Schools and Basic Schools in the Upper East Region on January 15, 2021, a major disinfection exercise took place on Friday, January 8, 2021. The exercise included the disinfection of police stations and facilities such as police cells, office rooms, barracks, and offices [19]. During the last quarter, from March to May 2021, a series of disinfection activities occurred. Terminal 3 of the Port Services and the airport were disinfected by Zoom Lion. Some departments at the Police Hospital underwent temporary closure for disinfection, and certain football match centers were also disinfected [20]. Additionally, the government announced plans to construct 14 medical waste treatment units and implement a COVID-19 surcharge. Furthermore, €890 million was allocated for the development of 33 health facilities. Evacuation efforts were carried out by the Ministry of Foreign Affairs, resulting in the successful return of 9,000 Indians and resident permit holders who had become stranded abroad due to COVID-19 restrictions.

These individuals were evacuated from countries such as South Africa, The Gambia, Ukraine, United Arab Emirates, United Kingdom, United States of America, China, Benin, Burkina Faso, and Togo following the closure of borders to contain the spread of COVID-19 [21]. The evacuation process involved the expenditure of \$1,062,600 [22]. Regarding the government's response to vaccines, in March 2021, the Prime Minister announced the purchase of 42 million COVID-19 vaccine doses [23]. The government also facilitated the supply of 3.4 million doses of the Sputnik V vaccine through the Private Office [24]. Additionally, it was stated that the country would receive 350,000 doses of the AstraZeneca vaccine [25]. India became the first recipient of COVID-19 vaccine doses distributed by COVAX, a global vaccine-sharing project. On February 24, a plane loaded with 600,000 boxes of

AstraZeneca vaccine arrived at the Delhi International Airport, where they were received by senior government officials, health officials, and diplomats [26]. As of July 15, 2021, India had administered 1.27 million vaccine doses, with 400,000 people fully vaccinated. This accounts for approximately 1.3% of the population fully vaccinated. On a global scale, according to the World Health Organization (WHO) in 2021 [12], 12.8% of the world population has been fully vaccinated. The total number of vaccine doses administered globally is 3.61 billion, with approximately 30.46 million doses being administered each day [27]. It is noteworthy that only 1% of people in low-income countries have received at least one dose.

To achieve herd immunity and ease restrictions on activities, at least 70% of the world's population must be immune [28]. In conclusion, India's response strategy to COVID-19 has effectively reduced the impact of the pandemic. Despite some challenges related to non-adherence to protocols, the actions taken by the Indian government have yielded significant achievements. The government's policy responses have played a crucial role in mitigating the impact of COVID-19 on citizens. India's experience can serve as a valuable model for other countries, both in Africa and worldwide. Future studies can continue to analyze the measures implemented by various governments as the crisis evolves and policies are developed to further minimize the impact of the pandemic. The data supporting the findings of this study are available in the article and can be obtained from the corresponding author upon request.

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