### **Review Article**

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# Second wave COVID crisis, social responsibility and social stigma in India

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#### **ABSTRACT**

India, the second most populous country in the world and home of 1.30 billion population sees sudden emergence of Coronavirus disease 2019 (COVID-19) since 2020. Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) is the virus that is responsible for this global pandemic. The origin of this virus is still unknown. This pandemic causes heavy impact on its health infrastructure. Although this pandemic hit at global level, this review is particularly highlight the pandemic situation and how it is being tackled in India. During April and May 2021, due to the high surge of cases, India had reported several million numbers of COVID-19 affected people. During this course of tackling this pandemic, India sees a huge surge of vaccine hesitancy due to various factors. Data suggests that the virus affects younger age groups as well. This review tends to highlight the actual situation and major factors contributed to COVID-19 pandemic in India, also to highlight India's vaccine policy. To shed light on what went wrong and what can be learned from COVID-19 crisis in India. This data presents important results regarding the COVID-19 pandemic in India.

Keywords: COVID-19, India, Vaccination, Pandemic, Policies

#### INTRODUCTION

Since 2020 the world has been under the grip of novel corona virus also known as Coronavirus disease 2019 (COVID-19). It is causing catastrophic damage to both public health and economic growth of nations across worldwide. As of June 6, 2021, the pandemic of COVID-19 had already affected over 174 million people and taken over 3.46 million lives according to the Coronavirus Resource Center of John Hopkins University. COVID-19 vaccine campaigns are going on full swing in most countries. Especially USA is doing very well that they have been vaccinated almost 50% of its population with either bother doses of Pfizer or Moderna and single dose Non replicating viral vector Janssen developed by Johnson and Johnson. While vaccination campaigns are going on full scale in developed nations, Health organizations in developing countries around the world are still struggling to control the spread of COVID-19. As of June 08, 2021 India, has recorded 29,055,508 cases among these 12,58,768 active cases and 3,52,876 fatalities because of pandemic. Many states and union territories are facing struggle in confining diseases and providing treatments to critical vulnerable patients.

#### **CORONA VIRUSES**

Human corona viruses were first observed in 1960.¹ Due to their crown like structure of spike proteins on their surface they have been names as corona virus, from current resources and databases all human corona viruses have been traced to animal origins.² There are seven types of coronaviruses relevant to humans, four of which are human coronaviruses (HCoV-NL63, HCoV-229E, HCoV-OC43, and HKU1), causing limited mild upper respiratory symptoms in immunocompetent populations, while the other three are highly pathogenic coronaviruses - Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV),

Middle East Respiratory Syndrome Coronavirus (MERS-CoV) and novel Coronavirus (SARS-CoV-2), all causing severe respiratory disease in humans.<sup>3</sup> Since 2002 world has seen smaller outbreaks that were related coronaviruses family. According to World Health Organization (WHO) statistics in 2002, SARS-COV was first identified in Guangdong, China which caused 8,096 cases and 774 deaths worldwide.4 Again in 2012, Middle East Respiratory Syndrome (MERS) caused by MERS coronavirus (MERS-CoV) was reported in Saudi Arabia and spread it across middle eastern countries which caused 2,494 cases and 858 deaths according to WHO reports.<sup>5</sup> A MERS outbreak was also reported in South Korea in 2017.4 In December 2019, the first cases of novel coronavirus was reported in Wuhan city, Hubei province, China which is ongoing global pandemic.<sup>6</sup> Bats and camels are identified to be source for SARS-CoV and MERS-CoV, respectively. While the zoonotic aspect of novel coronavirus is still being worked out, bats appear to serve as its animal reservoir as well.7

#### **SARS-COV-2: THE VIRUS**

The first case of novel coronavirus was first reported in Wuhan city, Hubei province, China during end of December. It was initially names as 2019-nCoV (2019 novel coronavirus) and later International Committee of Taxonomy of Viruses named it SARS-CoV-2.8 Initial investigation suggested that the SARS-CoV-2 infection

started from Huanan seafood market where both aquatic and non-aquatic animals that includes exotic animals were on sale for food.<sup>9</sup> By January 2, 2020, 41 people in Wuhan province were admitted in hospitals with viral pneumonia symptoms and chest congestions.<sup>6</sup> A novel, humaninfecting coronavirus provisionally named 2019 novel coronavirus (2019-nCoV), was identified with use of nextgeneration sequencing and found to be human to human transmission. 10,11 As of January 28, 2020, China reported more than 5900 cases and more cases were suspected in various provinces of China. In addition, SARS-CoV-2 has been reported in Asian countries like Thailand, Japan, South Korea, Malaysia, Singapore and the USA. 11 Several human to human transmission has been confirmed that includes frontline medical workers and sanitation staffs. 12 WHO declared this outbreak of SARS-CoV-2 as a Public Health Emergency of International Concern (PHEIC) on 30th January 2020, and on 11th March 2020 it was declared a pandemic.13 By end of January 2020, the outbreak has hit Europe. The first identified cases of COVID-19 infection in Europe were in France on 24 January, Germany on 27 January, Finland on 29 January, and Italy on 31 January.<sup>14</sup> In less than three months, the virus has reached most countries and started spreading all around the globe. Since then cases rises rapidly in European countries particularly in Spain, Italy, France, Germany and the United Kingdom. According to Johns Hopkins Coronavirus Resource Center as of May 2021, it has been confirmed that 210 countries are affected by SARS-CoV-2.

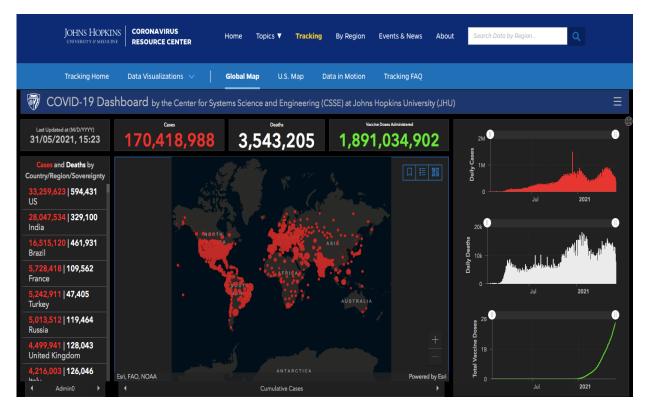


Figure 1: The Johns Hopkins Coronavirus Resource Center webpage. COVID-19 cases and fatalities across the globe real time.

#### STRUCTURE OF SARS-COV-2

SARS-CoV-2 is a single stranded enveloped mRNA virus with spike proteins expressed on surface forming a crown like 'corona' structure. Recent studies show that these envelope bears club-shaped glycoprotein projections and contain a hem agglutinin-esterase protein. 15 SARS-CoV-2 contains four structural proteins (S, E, M, and N) and sixteen non-structural proteins. 16 Non-structural proteins involve in RNA processing, RNA replication, cell signaling and metal binding affinity, etc. 17 These nonstructural proteins involve in protein trafficking to inhibit host defenses during its progression.<sup>18</sup> Generally metal binding sites serve as antiviral target sites based on their structures and its characteristics. The coronavirus enters into host cell by mediating through spike glycoprotein S.<sup>19</sup> The S protein has two subunits S1 and S2. The function of S1 subunit is bind to the receptor of host cell and the function of S2 subunit is to fuse the membranes of viruses and host cells. 16 The membrane M protein is an integrity component of the viral membrane, nucleocapsid N protein binds to the viral RNA and involves in the nucleocapsid formation, assisting in virus budding, RNA replication, and mRNA replication.<sup>20</sup> The envelope E proteins function is least understood because of its complex structure, but this protein seems to play a vital role in SARS-CoV-2 pathology.<sup>21</sup>

#### **CLINICAL ASPECTS**

As the virus enters the body it binds with host cells and starts replicating. It is known that symptoms slowly appear over an incubation period of 10 to 14 days. During this time virus starts replicates in respiratory tract, forming lesions.<sup>22</sup> The common symptoms associated with SARS-CoV-2 are

fever, cough, dyspnea and lesion in the lungs. In advanced stage, the symptoms worsen and progressed into severe pneumonia and acute respiratory distress syndrome which results in need for life support to treat critically ill patients. COVID-19 is divided into three levels according to the severity of the disease: mild, severe, and critical. <sup>23</sup> Medical history suggests that only half the patients show full symptoms while remaining are febrile at the time of admission. <sup>24</sup> Apart from these symptoms like anorexia, nausea, vomiting and diarrhea are reported. <sup>25</sup> Most patients reported taste and olfactory disorders and some patients exhibited ocular manifestations and conjunctivitis.

#### FIRST WAVE OF COVID-19 IN INDIA

India is the seventh largest country with a geographic area of 3,287,240 square kilometers and a total population of about 1.3 billion.<sup>26</sup> India comprises of 28 states and 8 union territories. Most of the Indian states are quite large in geographic area and population.<sup>27</sup> Indian states are densely populated which makes people are at high risk for SARS-CoV-2 infection. Covid-19 transmission has been classified in to four stages. These four stages are categorized based on the types of virus transmission.<sup>28</sup> During the first stage, a country experiences imported infected case with travel history from virus hit zone. During second stage a country or region gets new infections from persons who did not have a travel history but came in contact with persons defined in stage 1. Stage 3 is community transmission; in this period, new infection occurs in a person who has not been in contact with an infected person or anyone with a travel history of virus-hit countries. At stage 4, the virus spread is practically uncontrollable, and the country can have many major clusters of infection.<sup>27</sup>

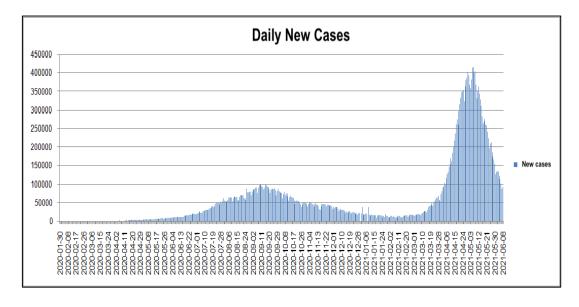


Figure 2: Total number of cases since 30th January 2020 to June 2021 (Source: ICMR).

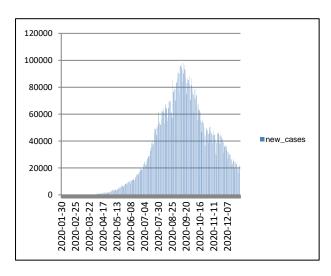


Figure 3: Daily cases during first wave in India (Source: ICMR).

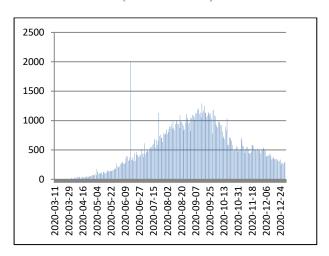


Figure 4: Daily deaths during first wave (Source: ICMR).

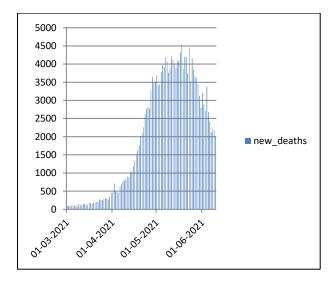


Figure 5: Daily deaths during second wave (Source: ICMR, Mygov.in).

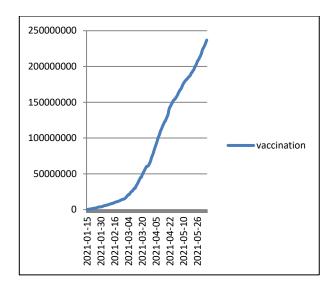


Figure 6: Vaccination coverage in India (Source: ICMR, Mygov.in).

India reported its first case on January 30, 2020 when Indian national evacuated from China.<sup>29</sup> India did some initial preventive measures like health screenings at airport during February 2020. India even introduced quarantine policies for passengers returning from different countries. Most of the European countries entered lockdown during first and second week of March 2020. In order to prevent stage 2 transmission India imposed border closure and flight suspensions by Mid-March 2020. Indians living in those countries started returning back to India. By 25th march India has registered approximately 657 cases that to be imported cases travelling from various other affected countries.<sup>30</sup> Initially body temperature screening was done to verify if the traveller has a fever. However, it has been noticed that asymptomatic transmission of SARS-CoV-2 and travelers successfully passing the symptom based thermal screening but have been tested positive during molecular tests.31 Further to this India has also introduced an additional step of marking the passenger arriving from most affected countries and compelling self-isolation or home quarantine for the 14 days upon arriving in India.<sup>30</sup>

On March 25, 2020 India entered 21-day national wide lockdown and implemented social distancing guidelines as suggested by WHO. However, being densely populated nation like India, it was not possible to maintain adequate social distance.<sup>27</sup> From April 01, 2020, onwards there is an exponential growth in daily number of active cases at the national level. During the nationwide lockdown from March 25, 2020 to May 31, 2021 the results revealed a well-controlled infection rate comparing to India's population. India started recording unprecedented cases right after the national lockdown has been lifted. During July 2020, India crosses one million cases. As you can see from fig 4. during mid-June 2020 India recorded a massive jump in COVID-19 death toll over 2,000 deaths. From fig 2 and fig 3 we can see that cases started increasing from the month of July 2020 and reaches its peak during August-September 2020.

During this time Indian Council of Medical Research (ICMR), under the Ministry of Health and Family Welfare, has recommended chemoprophylaxis, chloroquine, hydroxychloroquine, ivermectin, remdesivir, ribavirin and azithromycin for asymptomatic health-care workers treating patients with suspected or confirmed SARS-CoV-2 cases.<sup>32</sup> Chloroquine, and hydroxychloroquine are cheap and relatively safe antimalarial that has been used for decades in India and other malaria-endemic countries. Despite lack of scientific evidence Indian doctors widely used these two drugs to treat SARS-CoV-2 patients. During the time of breakout, it has been widely believed that Indian summer weather may not be favorable for virus to spread out by defying all the odds the cases are clustered at temperature and humidity ranging within 27-32° respectively.<sup>33</sup> 72% of the cases during first wave are recorded at cities and towns were the temperatures are hot.33 Therefore, hot weather did not stop the spread of SARS-CoV-2 pandemic in India. As you can see from Fig 3 and Fig 4 first wave started flattening during the month of November 2020. During first wave cities and urban areas were mostly affected. Lockdowns helped in confining diseases, but it affected vulnerable populations and migrant workers who were working in various cities. There has been a mass exodus of migrant workers and concerns are rising about starvation among people who work in the informal economy.<sup>34</sup> During the first wave state governments were struggling to implement public health measures as it was difficult in places with overcrowding conditions and places which lacked hygiene and sanitation. Even though government's efforts to provide financial support and food tokens were inadequate and insufficient to meet the demand. For a country with 130 billion population it was very tough for Indian government to manage and monitor passengers arriving from various international airports. Many passengers failed to quarantine themselves and effective screening facility was not implemented properly, and this particular reason played a massive role in COVID-19 first wave in India.

#### VACCINES IN INDIA

SARS-CoV-2 is highly contagious and affects people widely and globally. There are no specific and evident based treatment to cure COVID-19 and the treatment focused to manage and reduce symptoms. Generally, vaccine development takes years but unprecedented time like this required unprecedented measures. formulation of a successful COVID-19 vaccine was a great leap for humankind.<sup>35</sup> Most of the vaccines are developed in USA. Europe and China. In India there were two home grown vaccines are being in mass production Non-Replicating Viral Vector vaccine developed by Serum Institute of India, in collaboration with Oxford University and Astra Zeneca and the other one is Inactivated virus vaccine developed by Bharat Biotech in collaboration with ICMR and National institute of Virology, Pune, India. By January 15, 2020 India started world largest vaccination drive and the first preference were given to 30 million health workers who were directly dealing with patients. Along with frontline workers people above 50 with underlying medical conditions were given priority to take vaccines jabs.

#### **SECOND WAVE OF COVID-19 IN INDIA**

As cases started dripping down during January and February COVID-19 guidelines were ignored and social distancing policies were flaunted. Face masks were rarely seen during this time. Despite ignoring warnings from ICMR, Indian government declared that they have defeated COVID-19. Mass gatherings were permitted. Even though India started its mass vaccination program during this period the government and policy makers failed to create awareness campaigns over safety and efficacy of vaccination. India government failed to tackle anti vaccine movement lead by few political leaders which caused vaccine hesitancy among public. One member of parliament openly urged the Tamil Nadu state government to avoid the use of home grown Covaxin, COVID-19 vaccine manufactured by Bharath Biotech.<sup>36</sup> Meanwhile another state government blocked the use of Covaxin despite having enough scientific evidences. Anti-vaccine rumors caused wastage of vaccines in several states like Jharkhand, Chhattisgarh and Tamil Nadu. 37,38 In March 2021 an opinion was widely circulated and propagated by lawmakers and certain sections of media that India had overcome the pandemic and herd immunity was acquired. India's vaccination plan soon fell apart after this falsely claimed herd immunity theory. Indian Prime minister Mr. Modi even took "vaccine diplomacy", exporting more jabs than were administered in India by March. March 2021 became period of crisis because of the falsely claimed herd immunity theory. Public gatherings were sanctioned by government officials. Elections were held in Tami Nadu, Assam, West Bengal, Kerala and Puducherry. During Mid-March 2021experts and scientist warned about double mutant variant. WHO names this double mutant variant as B.1.617 is behind India's second wave. Despite scientists warning about this variant many politicians including Prime minister of India and several other political party leaders hold several rallies and massive campaigns around India. The Indian government took no steps to prevent public gatherings, religious festivals and protests that caused the rapid spread of new variant as new cases started spiking by end of March 2021. As you can see from figure 2. Country sees a huge surge of cases from April 2021. As soon as the crisis started disturbing images were started coming out. Many states and regions were unprepared for the second wave rather call it as tsunami that would be an apt term for the crisis. Hospitals were running out of beds, running out of medical oxygen, hospitals were overwhelmed, funeral pyres were burning 24×7 and shortage of medicines like remdesivir. During this time remdesivir was considered as lifesaving drug among patients and it was the only drug approved so far for treating patients in critical conditions. Though there was no scientific proof and definitive cure, the anti-viral drug has been used for patients.

As you can see from above graph fig 5 second wave was more catastrophic than first wave. The scenario became very catastrophic in India when the daily count started doubling from April 15, 2021. In April 2021, India registered far more COVID-19 deaths than Brazil and Europe. During first ten days of May 2021 India reported more SARS-CoV-2 deaths. One third of SARS-CoV-2 deaths worldwide were recorded in India during this period. Second wave was more catastrophic and devastating which affected both young and older people. During first wave only people above the age of 50 were considered more vulnerable to adverse outcomes but in second wave people above age of 30 were seemed to be vulnerable for this new variant. In southern states nearly 56% of deaths due to SARS-CoV-2 in the age group of 20-49.38 Unlike first wave second wave was spread to rural areas and remote villages as well. Many several media and news channels reported that patients are struggle to find beds in hospitals as hospitals were overwhelmed. Many hospitals and health infrastructures were collapsed due to shortage of medical oxygen and life support ventilators. As a result, many hospitals reported patients died due to shortage of oxygen and life supports.<sup>39</sup> Situation in rural village where worsening as the health-care infrastructure is threadbare and families are poor, and they struggled to cope with deadly second wave. 40 During this time Indian social media was filled with thousands of requests from all over the country asking if there are any oxygen cylinders or hospital beds with oxygen or ventilators available.<sup>40</sup> Many state governments and their lack of coordination with health agencies and federal government this caused a huge exponential rise in cases. Federal government was forced to intervene under disaster management act to build new oxygen plants and allocated oxygen supplies across states and territories with the help of Indian railways. The five states that went to the polls in latest state elections had huge spike of cases that rest of the country. Tamil nadu went on polls during April, political campaigners and election rallies were carried out without following safety protocols. As a result, Tamil nadu was one of the worst affected state in India. Health infrastructure was collapsed. Due to lack of oxygen beds in both private and government hospitals across the state led to ambulance queuing up outside the hospitals.<sup>41</sup>

While India was recovering from second wave India faces new challenge in the form of coronavirus disease-associated mucormycosis. Mucormycosis, caused by a group of moulds called mucormycetes often called as black fungus, which is a rare but potentially fatal infection if inadequately treated. Mucormycosis has risen more rapidly during the second wave of COVID-19 in India, with at least 14,872 cases as of May 28, 2021. The rise of mucormycosis in COVID-19 patients are found in diabetic patients with excessive use of corticosteroids for immunosuppression, and long-term stays in the intensive care unit. According to latest research article India contributed to approximately 71% of the global cases of mucormycosis in patients with COVID-19 from December 2019, to the start of April 2021. Indian government have

undertaken necessary measures to control the situation by issuing guidelines, treatment plans and procuring medicines required for treatment to avoid another crisis.

# MYTHS BEHIND VACCINE HESITANCY AND VACCINE SHORTAGE

The declining of public confidence in vaccines across worldwide is a cause for concern and a major challenge for public health experts.<sup>44</sup> Vaccine hesitancy is another problem that India is facing right now. During the initial stages of vaccination program political leaders created an anti-vaccine narrative and rumors about vaccines were spread constantly on social media for their political benefits. People who spread vaccine misinformation are social media influencers or political leaders who wants to benefit from the spread of inaccuracies to gain popularity among ordinary citizens. 45 As a result, India saw a sudden spike in cases caused a massive second wave and faces a severe critical challenge. Success in vaccination programs is dependent on a high vaccination coverage rate.<sup>45</sup> Another reason for causing vaccine hesitancy is sideeffects, it only encourages vaccination resistance among masses.<sup>46</sup> Instead of educating people some news media channels played a vital role in vaccine hesitancy drive among ordinary citizens, vaccine side effects and experiences are widely circulated by them in news channels and social media. Anti-vaccine messages are widely circulated via social media apps such as Facebook, Twitter and WhatsApp. Indian government failed to make vaccine awareness among its citizen costed wastage of several doses of vaccine. It has been reported that right before India has wasted more than 4 million doses of vaccines since the vaccine drive was started (Source: Indian Ministry of Health and Family Welfare (MoHFW). During February and March 2021, Indian government's vaccine diplomacy program donated vaccines to 47 countries. When cases started rising many states reported shortage of vaccines. Vaccine diplomacy drive comes at critical time when India itself faces a shortage for its own program. There were several reports that people who received their first dose of vaccine were unable to get their second dose of vaccine at vaccination centers due to shortage. Initially Indian government did not take vaccination program seriously because of the so-called Faux herd immunity and underestimated its domestic demand. Serum Institute of India, the biggest manufacturer of Covishield vaccine (Indian version of AstraZeneca) faced a shortage of raw materials needed for vaccine manufacture.<sup>47</sup> While many states were reporting vaccine shortage, Indian Prime Minister opened up vaccination program for 18 to 44-year olds. United states identified raw materials needed for Covishield vaccine production in Serum Institute of India. Biden administration ensured India will be receiving raw materials at earlier instance. Meanwhile Indian government with its collaborator scaling up vaccine production and allocating to states and union territories. During April 2021, Indian government also approved Russian vaccine Sputnik V for emergency use in India.

India aims to vaccinate all of its citizen by 2021 end. Serum Institute of India and Bharat Biotech ramping up production. India being largest producer of vaccines it has capacity to inoculate its entire population, but India needs a plan and needs to take vaccination program very seriously. Both state and federal government agencies in India started user friendly applications for vaccine registration.

#### SOCIAL STIGMA DURING COVID-19 IN INDIA

Social stigma means a negative association between a person or group of people who share certain characteristics and a specific disease. 48 During this pandemic infected people are labelled, stereotyped, discriminated and linked with this disease to be stigmatized forever. While India battles COVID-19 doctors and healthcare workers were targeted, stigmatized and verbally abused them as COVID carriers just because they are caring for those affected by COVID-19 in close contact. Meanwhile situations were worse in rural areas, villagers with lack of education and misinformation about diseases causes a massive stigmatization. People with COVID-19 were treated as untouchables in rural villages and let them die alone on fear of contracting the virus. There were reports that patients in rural villages committed suicide due to the fear and stigma attached to SARS-CoV-2.

Early in the pandemic, India provided medicines and vaccines to other countries [49]. But in return COVID-19 has led to stigma and discrimination. During the peak of second wave in India even the crematoriums were overflowed with COVID-19 victims and pyres were burning throughout the night. In India funeral of the dead is considered as sacred and private ceremony however a Washington Post journalist referred India devastating crisis as "stunning" and she went to justify her usage of word.<sup>50</sup> The western media was biased in reporting India's COVID-19 mortality and stigmatized India as third world country in discriminatory way. WHO announced a new naming system for variants to reduce the geographical stigma and discrimination for associating virus with a place or a country.<sup>51</sup> Still some news media citing B.1.617.2 variant (first identified in India, is now called Delta) as Indian variant. This Stigmatization carries serious consequences including hatred, anger, and intolerance directed at Indian people.

#### **CONCLUSION**

Currently in India, the number of new cases are going down and recovery rate is increasing yet the battle is not over. Experts warning about a possible third wave. India still needs to vaccinate at least 70% of its population to achieve herd immunity and thereby reducing the transmission of SARS-CoV-2. Meanwhile, the Indian government should educate the common people about vaccines safety and prevent any kind of misinformation about vaccine safety and efficacy. India's vaccine diplomacy helped many developing and poor countries

during the time of pandemic. It is our responsibility to prevent the rise of discrimination and geographical stigma against India or any other country. The world observed the sudden emergence of COVID-19 in 2020. The exact origin of the virus is still a mystery. It is necessary to carry out investigation to find out the exact source of infection. When the virus spreads, it starts to replicate and give rise to a mutation. Today, Delta plus variant triggers a new cause of concern from health experts alarming about possible third wave and it could be vulnerable to kids. Instead of easing down regulations abruptly, Indian government needs to implement stricter social protocols and prepare for possible third wave. India needs to vaccinate its people faster to prevent third wave.

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