Chapter 1
COVID-19 Pandemic Trajectory: Challenges and Opportunities for India

R. B. Singh and Mukunda Mishra

Abstract The COVID-19 pandemic exemplified how an urban health risk can rapidly spread to become a global health emergency. Throughout history, cities have been the sites of infectious disease outbreaks that present unique challenges to those leading response, as was evident in Ebola, SARS, MERS, and presently, the COVID-19. As the opening chapter of this present volume this chapter takes the role to present the detailed trajectory of the present pandemic. In the introductory section, we tried to portray the present pandemic as a member in the chain of evidences where the spillover of the virus from the animals to humans invited the health emergency situation. We tried to present a vivid discussion about the propagation of the disease epicenter. And, the last section of the chapter is devoted to explore the opportunities arising out of this pandemic, especially for the developing nations for whom India is a representative.

Keywords Spillover · Urban health emergency · Economic shock · Stigma · WHO regions

1.1 Introduction

The history of the outbreak of virus borne diseases for the last two decades reveals that a series of infectious diseases have been transmitted to the human bodies from the animal kingdoms. These incidences are not unusual from the standpoint of biological sciences. However, the recurring intervals of such incidences are unprecedented in the recorded history of human civilization. The list is more or less, not unknown. Still, we feel that this discussion needs them to mention to understand the sequence

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M. Mishra and R. B. Singh, COVID-19 Pandemic Trajectory in the Developing World, Advances in Geographical and Environmental Sciences, https://doi.org/10.1007/978-981-33-6440-0_1
in which the latest one is the *severe acute respiratory syndrome coronavirus* 2 (i.e., SARS-CoV-2).

We believe that the readers could memorize the Bird’s deadly strain (Avian) Flu H5N1 that continued to spread among poultry in Egypt and certain parts of Asia. Technically, the H5N1 is a *highly pathogenic avian influenza* (HPAI) virus, which is deadly to most birds. Moreover, it is deadly to humans and to other mammals that catch the virus from birds. The first human case was detected in 1997, and, since then, the H5N1 had become fatal to nearly 60% of the people who had been infected (WHO 2006). However, the fact is that unlike the human flu pathogens, H5N1 bird flu does not spread easily from person to person.¹ There are very few human-to-human transmission cases observed, and these rare transmission cases have been reported to have occurred between the peoples with exceptionally close contact, such as a mother who caught the virus while caring for her sick infant.² The recurring history is fascinating. The *aviation influenza* was initially called as ‘fowl plague’. The beginning of the ‘recorded’ history of that fowl plague is very often referred to as ‘1878’. It was the first time when this particular disease was ascribed as ‘different’ kind from the other diseases that caused high mortality rates in birds (Alexander and Brown 2009). Interestingly, between 1959 and 1995, there were 15 recorded occasions of the emergence of HPAI viruses though they cause minimal losses. However, the same disease outbreaks at least 11 times between 1996 and 2008 in poultry; and, 4 of these outbreaks have infected millions of birds (Alders et al. 2014).

If the damage is concerned, the wake of H5N1 pandemic affected mostly the small-scale commercial farms and backyard poultry producers due to the culling of huge numbers of birds due to HPAI infection and control attempts (Porter 2012). In Vietnam alone, over 50 million domestic birds were killed (Hiromoto 2000). The total economic losses in Southeast Asia were estimated as US$10 billion. It affected the lower incoming strata in Vietnam severely. There was an average loss of 2.3 months of production and US$69–108 for households where most had an income of $2 per day or less (McLeod et al. 2005). The loss of food security for vulnerable households was reflected by the stunting of children under 5 in Egypt and the decreased enrollment of girls in school in Turkey (Alders et al. 2014). Research shows that the women were at risk as in most regions of the world, as the H5N1 pandemic-induced food insecurity stuck the low incoming households (Bagnol 2012).

With a risk of fatality as around 1 in 1,000, the Chikungunya has now been identified in nearly 40 countries in Asia, Africa, Europe, and, most recently, the Americas (Caglioti et al. 2013). It is a viral disease transmitted to humans through the bites

¹National Institute for Occupational Safety and Health (NIOSH) published this document entitled ‘Workplace Safety and Health Topic’ which is available in the website of the Centre for Disease Control and Prevention. URL: https://www.cdc.gov/niosh/topics/avianflu/.

²The article entitled ‘Recommendations for Worker Protection and Use of Personal Protective Equipment (PPE) to Reduce Exposure to Highly Pathogenic Avian Influenza A H5 Viruses: Avian Influenza (Flu)’ was published by the Center of Disease Control and Prevention and it is available in their official website under the URL: https://www.cdc.gov/flu/avianflu/h5/worker-protection-ppe.htm.
of *Aedes albopictus* and *Aedes aegypti* mosquitoes infected with the chikungunya virus (CHIKV). The virus may circulate within several animals, including birds and rodents (WHO 2016). The word ‘chikungunya’ has been derived from the Makonde language (or Kimakonde), which is spoken by the Makonde, an ethnic group in southeast Tanzania and northern Mozambique. It was first described during an outbreak in southern Tanzania in 1952, and Symptoms usually begin 4–8 days after a mosquito bite but can appear anywhere from 2–12 days (CDC 2006). ‘Chikungunya’ means ‘something that compels to bend up’, which has been due to the controlled posture of people affected with the severe joint pain and arthritic symptoms associated with this disease (Robinson 1955).

The transmission of the CHIKV is worth mentioning as it brings to fore a typical interaction between the vectors (i.e., mosquitoes), their environments, and human behavior. The adaptation of mosquitoes to the changing climate of North Africa around 5,000 years ago made them seek out environments where humans stored water (Powers et al. 2000). The proximity of the human and mosquito habitation has been making the human bodies susceptible to be used as the reservoirs of CHIKV during periods of epidemics, incubating high amounts of virus in the human blood with acute infection. The virus can be spread from a viremic human to a mosquito, and back to a human (Morrison 2014). During the non-epidemic times, monkeys, birds, and other vertebrates have served as reservoirs (Lee and Hapuarachchi 2010).

The next on the list is the Swine Flu pandemic that lasted from January 2009 to August 2010. Interestingly, it was the second of those two pandemics involving H1N1 influenza virus. The first one being the 1918–1920 Spanish flu pandemic. Trifonov et al. (2009) confirm that the Swine Flu virus appeared to be a new strain of H1N1, which resulted from a previous triple reassortment of bird, swine, and human flu viruses that further combined with a Eurasian pig flu virus. Though, in August 2010, WHO declared the swine flu pandemic officially over, the controversies regarding the casualties still loom large. The number of lab-confirmed deaths reported to the WHO is 18,449, though the CDC estimates about 284,000 (range from 150,000 to 575,000) deaths. A follow-up study by Roos (2012) under the aegis of the Centre for Infectious Disease Research and Policy (CIDRAP) claims that the risk of serious illness resulting from the 2009 H1N1 flu was no higher than that of the yearly seasonal flu.

The Crimean-Congo hemorrhagic fever (CCHF) is caused by infection with a tick-borne virus (Nairovirus). The disease was first occurred in Crimea in 1944 and later in

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3Dr. Margaret Chan, Director General, WHO announced on 10 August 2010 that the H1N1 influenza virus has moved into the post-pandemic period. See the official websites under the URL: https://www.who.int/csr/disease/swineflu/en/.

4WHO reported in its official website under the headline ‘Pandemic (H1N1) 2009—update 112’, published on 6 August 2010 which is available under the URL: https://www.who.int/csr/don/2010_08_06/en/.

5CDC report entitled ‘First Global Estimates of 2009 H1N1 Pandemic Mortality Released by CDC-Led Collaboration’ was published on 25 June 2012 in its official website which is available under the URL: https://www.cdc.gov/flu/spotlights/pandemic-global-estimates.htm.
Congo during 1969. The infection causes fever and hemorrhage (i.e., hemorrhagic fevers), which results in the current name of the disease. The CCHF is found in Eastern Europe, particularly in the former Soviet Union, throughout the Mediterranean, in northwestern China, central Asia, southern Europe, Africa, the Middle East, and the Indian subcontinent. Ticks are both ‘environmental reservoir’ and vector for the virus. It carries the virus from wild animals to domestic animals and humans (Mehravaran et al. 2013). Wild animals and small mammals, mainly European hare, Middle-African hedgehogs, and multimammate rats are the ‘amplifying hosts’ of the virus. Researchers observe that the birds (except ostriches) are generally resistant to CCHF. Domestic animals and cattle can develop high titers of virus in their blood, but they do not fall ill (Ergönül et al. 2004).

India witnesses sporadic confirmed cases of CCHF, and the first human case was reported in Sanand of Gujarat during January 2011. Unfortunately, that emergence became fatal for four persons, including that index patient, treating physician, and nurse. The re-emergence occurred in Gujarat in July 2013, reaching the fatalities to seven persons in Kariyana village of the Amreli district. Again, in 2014, confirmed cases had been reported from Bhuj, Amreli, Sanand, Idar, and Vadnagar in Gujarat. A doctor and a laborer in north Gujarat were tested positive for the disease in November 2014. In the following weeks, three more people died from CCHF. In March 2015, one more person died of CCHF in the same province. Against this backdrop, the CCHF was recognized as ‘widespread’ in India, only four years after the first human case had been diagnosed.

The Ebola outbreak during 2014–2016 in West Africa and during 2018 in the Democratic Republic of Congo remains the deadliest attack in terms of mortality. The Ebola virus was first identified in the then Zaire Republic by a team of researchers, including the Belgian microbiologist Peter Piot in 1976. The virus was named after the Ebola River, a tributary of the Congo River in central Africa (Brown 2014). There are six species of Ebola virus, four of which have caused disease in humans—Zaïre ebola virus (EBOV), Sudan ebola virus (SUDV), Tai Forest (TAFV) which was formerly known as Ebola Ivory Coast, and Bundibugyo ebola virus (BDBV). Between 1976

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6CDC listing in the official website under the URL: https://www.cdc.gov/vhf/crimean-congo/index.html.

7Indian daily newspaper, the Indian Express covered the news on 19 January 2011, which is available in their archive under the URL: http://archive.indianexpress.com/news/deadly-virus-makes-first-appearance-in-india-kills-three-in-gujarat/739292.

8Indian electronic media India TV telecasted the news on 15 July 2013, which is archived as India TV News under the URL: http://m.indiatvnews.com/news/india/congo-fever-seven-die-in-amreli-in-a-week-25097.html.

9Indian daily newspaper, the Times of India reported on 26 January 2015, which is archived under the URL: http://m.timesofindia.com/city/jaipur/Health-officials-confirm-congo-fever-death-of-Jaisalmer-man/articleshow/46017452.cms.

10Indian daily newspaper, the Indian Express reported on 29 March 2015, which is achieved under the URL: http://indianexpress.com/article/india/gujarat/kutch-resident-dies-of-congo-fever/.

11Reported by the Outbreak New Today on 09 October 2015 which is available under the URL: http://outbreaknewstoday.com/crimean-congo-hemorrhagic-fever-spreads-across-india-82283/.
and 2014, Ebola infections have been primarily reported from the remote villages near tropical rain forests in Central and West Africa. The largest outbreak occurred in West Africa between March 2014 and June 2016, affecting people in Guinea, Liberia, and Sierra Leone, trapping 28,600 people under confirmed infection and causing fatal for 11,325 with an average mortality rate of around 40%. 12

Experts opine that the 2018’s outbreak in Congo was the second-deadliest ever, behind only the 2014–2016 West Africa epidemic. The Democratic Republic of Congo’s Ministry of Health reported an Ebola outbreak in North Kivu province on 1 August 2018. 13 This was the 10th Ebola outbreak in the region since the virus was discovered (Feleke and Scutti 2018). As of 17 December 2018, the new cases brought the outbreak total to 539, of which 491 were confirmed, and 48 were probable; and with an utter worry, the official record confirmed 315 deaths with the mortality rate reaching the new record ever (64%) (Soucheray 2018).

2015–2016 Zika virus epidemic has its newer dimension in terms of the rapidly spreading territories of mosquito-borne disease. The Zika virus (ZIKV) belongs to the virus family Flaviviridae, which is spread by daytime-active Aedes mosquitoes (Malone et al. 2016). Scientists conducting routine surveillance for yellow fever in the Zika forest of Uganda isolated the Zika virus in samples taken from a captive, sentinel rhesus monkey in 1947, and it got nomenclature accordingly (Dick et al. 1952; Sikka et al. 2016). Where, since the 1950s, Zika infections were reported from the areas surrounding a narrow belt along the equator in Africa and Asia, the virus started spreading eastward across the Pacific Ocean to the Americas between 2007 and 2014 to ultimately burst into the form of 2015’s epidemic (Mehrjardi 2017). Zika virus infection appears to have changed in character while expanding its geographical range. The change is witnessed from an endemic, mosquito-borne infection causing mild illness across equatorial Africa and Asia, to an infection causing large outbreaks from 2007 onward. From 2013 onward, the outbreaks are linked with neurological disorders, including Guillain-Barré syndrome 14 and microcephaly 15 across the Pacific region and the Americas (Kindhauser et al. 2016). WHO’s factsheet confirms that a total of 86 countries and territories have reported evidence of mosquito-transmitted Zika infection to date. 16 WHO, in its podcast episodes 2017 17 introduced the Zika virus outbreak as:

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12UK Government factsheet available under the URL: https://www.gov.uk/government/publications/ebola-origins-reservoirs-transmission-and-guidelines/ebola-overview-history-origins-and-transmission.

13CDC Report entitled ‘2018 Eastern Democratic Republic of the Congo Outbreak’ which is available under the URL: https://www.cdc.gov/vhf/ebola/outbreaks/drc/2018-august.html.

14A rapid onset of muscle weakness caused by the immune system damaging the peripheral nervous system.

15Microcephaly (my-kroh-SEF-uh-lee) is a rare neurological condition in which an infant’s head is significantly smaller than the heads of other children of the same age and sex.

16See WHO Factsheet about Zika virus disease which is available under the URL: https://www.who.int/en/news-room/fact-sheets/detail/zika-virus.

17The WHO podcast 2017 is available under the URL: https://www.who.int/mediacentre/multimedia/podcasts/2017/en/.
Zika virus has been reported in dozens of countries around the world from 2015 onwards. WHO’s experience over 2016 has shown that the Zika virus and the associated neurological complications represent a long-term public health challenge.

One of the most recent outbreaks involves the Nipah virus (NiV). This virus is a member of the Paramyxoviridae family and Henipavirus genus. NiV was initially isolated and identified in 1999 during an outbreak of encephalitis and respiratory illness in Malaysia and Singapore. The name ‘Nipah’ originated from Sungai Nipah, which is a village in the Malaysian Peninsula where the disease was spread among pig farmers and people in close contact with pigs. The relatedness of NiV to Hendra virus directed the virologists to single out bat species for investigation. The flying foxes of the Pteropus genus were subsequently identified as the reservoir for NiV.18 Nipah virus is a zoonotic virus, which means it is transmitted from animals to humans. It can also be transmitted through contaminated food or directly between people. Nipah virus has been reported to cause only a few known outbreaks in Asia. However, WHO warns that NiV could infect a wide range of animals and cause severe disease and fatalities among people, making it a public health concern.19

The Nipah virus outbreak is not a new incidence in India; instead, the 2018’s Nipah outbreak in the state of Kerala is the third outbreak, which is technically traced to the fruit bats in the area.20 The previous outbreaks caused the fatality to 45 (during 2001) and 5 (during 2007), respectively. The 2018’s outbreak was localized in Kozhikode and Malappuram districts of Kerala and claimed 17 lives.21 The outbreak was declared over on 10 June 2018 (Sharma 2018).

The World Health Organisation (WHO) has indicated that 70% of new viruses originate in animals (Khati 2020). The above discussions have probably made it clear that the virus involved in past pandemic outbreaks mostly originated from the animal world. The Novel Coronavirus is the new virus (for which it is named as ‘Novel’). It probably complies with the hypothesis of ‘animal-to-human’ transmission. The scientific communities have tentatively inclined on the fact that the phylogenetic data obtained so far confirms the SARS-CoV-2 is from a species of bat and entered humans from a secondary host animal, most probably pangolins (Cunningham 2020).

Though all things are not clear so far and the search for ‘patient zero’ (i.e., the ‘index case’) — the first human COVID-19 infection does matter. It is not because any blame lies with this individual, but because discovering how the pathogen entered the human population (Campbell et al. 2020). The statement of Professor Andrew

18Centre for Disease Control and Prevention (CDC) factsheet on Nipah virus which is archived under the URL: https://www.cdc.gov/vhf/nipah/index.html.
19See WHO factsheet on NiV, available under the URL: https://www.who.int/news-room/fact-sheets/detail/nipah-virus.
20Indian English daily the Hindustan Times covered the news under the headline ‘Nipah virus outbreak: Death toll rises to 14 in Kerala, two more cases identified’ on 27 May 2018 which is available under the URL: https://www.hindustantimes.com/india-news/nipah-virus-outbreak-death-toll-rises-to-14-in-kerala-two-more-cases-identified/story-f4QenFxEoJnWhw7NrvawJ.html.
21Indian print media Frontline covered the outbreak on 20 July 2018 with the headline ‘After the outbreak’ which is available under the URL: https://frontline.thehindu.com/the-nation/public-health/article24200872.ece.
Cunningham (2020) who is the Deputy Director of Science Deputy Director of Science in the Institute of Zoology of the renowned Zoological Society of London, is pertinent regarding this:

A paper I co-authored in 2013, for example, identified 137 bat viruses of which 61 were known to be capable of infecting people at that time. The phylogenetic data obtained so far indicate that SARS-CoV-2 (the virus that causes COVID-19) is from a species of bat. The initial progress of the virus is difficult to trace and several other animals – most notably pangolins – have been suggested as intermediary hosts that could have transferred SARS-CoV-2 between bats and humans, although there remains insufficient evidence to support these claims. And while authorities have yet to identify patient zero, the human outbreak most likely began at a wildlife market in the city of Wuhan in China.

It is no coincidence that a city was the origin of its spread. The author of the renowned book *Spillover: Animal Infections and the Next Human Pandemic*, David Quammen (2020) expressed his views as that ‘shaking viruses loose from their natural hosts’ urging them to find new hosts and transmitting to and between people. The renowned disease ecologist, Peter Daszak (2020) explains how humankind has made the virus by disrupting the natural environment’s ecosystems:

> Plagues are not only part of our culture; they are caused by it. The Black Death spread into Europe in the mid-14th century with the growth of trade along the Silk Road. New strains of influenza have emerged from livestock farming. Ebola, SARS, MERS and now Covid-19 have been linked to wildlife. Pandemics usually begin as viruses in animals that jump to people when we make contact with them. These spillovers are increasing exponentially as our ecological footprint brings us closer to wildlife in remote areas and the wildlife trade brings these animals into urban centers. Unprecedented road-building, deforestation, land clearing and agricultural development, as well as globalized travel and trade, make us supremely susceptible to pathogens like coronaviruses.

It is clear from the COVID-19 pandemic that urban health risks can rapidly spread and suddenly become a global health emergency. In 2018, 55% of the world’s population lived in urban areas and the ‘proportion that is expected to increase to 68% by 2050’ (United Nations 2018). Cities are also the places with the highest population densities. Throughout history, cities have been the sites of infectious disease outbreaks (Jones 2020), and outbreaks in cities present unique challenges to those leading response as was evident in Ebola, SARS, MERS, and now Covid-19 (Gatzweiler et al. 2020). However, cities are also the sites of solutions to arrest the spread of infectious diseases and improve population health.

Whatever is the point of origin, the common people from China to Chicago have been getting well acquainted with the terms like ‘lockdown’, ‘social distancing’, ‘quarantine’, ‘vaccine’, ‘immunity’, and ‘isolation’ which are dominating the print and electronic media, scholarly articles, and discussions across the globe. The health crisis is now the ‘nightmare’ for the developed nations and it is a ‘war-like’ situation for the developing world.

However, beyond the health, the income, economy, livelihood, education, social structure, power-order—almost all aspects of humankind are on the verge of facing unprecedented challenges. Against this backdrop, the present chapter will make the commentary on the present crisis of the COVID-19 pandemic in the world in general
and India in particular. We extend our efforts to exploring the emerging challenges arising out of the present pandemic. However, the prime focus of this chapter is not only to elaborate on the ‘dejection’. Instead, the chapter will shed light on the opportunities as well that will pave the way for a sustainable economy and livelihood to fuel the forthcoming development process, emerging as new dawn after the darkness of the pandemic trapped world.

1.2 The Pandemic Trajectory Around the Globe

WHO Member States are grouped into six WHO regions—African Region (AFRO), Region of the Americas (AMRO), South-East Asia Region (SEARO), European Region (EURO), Eastern Mediterranean Region (EMRO), and the Western Pacific Region (WPRO).22 This grouping is not merely a geographical clustering of countries around the globe (though they are grouped and named on this basis); instead, the regions bring to fore crucial public health differentials as well. The health crisis in the form of COVID-19 exhibits a typical contagious chain of disease transmission across the globe. In this discussion, we will focus on understanding the COVID-19 trajectory, keeping the WHO Regions in the background.

This discussion will visualize the world COVID situation for the span of 24 February to 15 August 2020 (174 days), based on datasets available at WHO’s Coronavirus Disease (COVID-19) Dashboard.23 We have used two basic variables for the visualization of the world scenario—(1) Numbers of confirmed cases of COVID-19 infection and (2) Numbers of death reported due to COVID-19. The number of confirmed cases of infection in a day within a particular region is one of the key indicators to assess the status of the outbreak in the given region. Involving the WHO Regions in the present discussion brings to fore a fascinating trend.

On 31 December 2019, the cluster of cases of ‘pneumonia of unknown cause’ was first reported prevailing in Wuhan province in the People’s Republic of China. WHO’s official website has recorded the information as:

WHO’s Country Office in the People’s Republic of China picked up a media statement by the Wuhan Municipal Health Commission from their website on cases of ‘viral pneumonia’ in Wuhan, People’s Republic of China. The Country Office notified the International Health Regulations (IHR) focal point in the WHO Western Pacific Regional Office about the Wuhan Municipal Health Commission media statement of the cases and provided a translation of it.24

WHO, on 9 January 2020, reported that the Chinese authorities have determined that the outbreak is caused by a ‘novel’ coronavirus and the first case of fatality due to

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22WHO website: https://www.who.int/healthinfo/global_burden_disease/definition_regions/en/.
23WHO’s dedicated COVID-19 dashboard is available under the URL: https://covid19.who.int/.
24See WHO website: https://www.who.int/emergencies/diseases/novel-coronavirus-2019.
that ‘unknown virus’ was reported in the Chinese electronic media on 11th January.\textsuperscript{25}

It took only two more days for the first case to be reported outside the People’s Republic of China. On 13th January, the Ministry of Public Health in Thailand reported ‘an imported case of a lab-confirmed novel coronavirus from Wuhan’.\textsuperscript{26}

However, the most worrying fact regarding the ‘novel coronavirus disease’ came under the light of the day when, WHO in a press briefing, on 14th January, stated that, based on experience with respiratory pathogens, the potential for human-to-human transmission existed in the 41 confirmed cases in the People’s Republic of China. The statement clarified, ‘it is certainly possible that there is limited human-to-human transmission’.\textsuperscript{27} Within those acute confusions prevailing due to the mutually contradicting statements about ‘to what extent the novel coronavirus causes human-to-human transmission’, the first confirmed case in the WHO European Region (EURO) was reported on 24th January. Officials from France informed the WHO of three cases of the novel coronavirus infection, all of whom had traveled from Wuhan.\textsuperscript{28} On 30 January 2020, WHO declared the novel coronavirus outbreak a public health emergency of international concern (PHEIC), which is WHO’s highest level of alarm for humankind.\textsuperscript{29}

The highly contagious nature of the novel coronavirus and particularly its person-to-person spreading efficiency along with a sustained spreading capability has posed havoc for humankind. CDC has recorded their observations\textsuperscript{30} about the transmission, and they have pointed out that the virus is thought to spread mainly from person to person along the following channels:

\begin{itemize}
  \item Between people who are in close contact with one another (within about 6 feet).
  \item Through respiratory droplets produced when an infected person coughs, sneezes, or talks.
  \item These droplets can land in the mouths or noses of people who are nearby or possibly be inhaled into the lungs.
  \item COVID-19 may be spread by people who are not showing symptoms.
\end{itemize}

\textsuperscript{25}See WHO statement on 9th January 2020. Available under this URL: https://www.who.int/china/news/detail/09-01-2020-who-statement-regarding-cluster-of-pneumonia-cases-in-wuhan-china.

\textsuperscript{26}See WHO statement on 13th January 2020. Available under this URL: https://www.who.int/news-room/detail/13-01-2020-who-statement-on-novel-coronavirus-in-thailand.

\textsuperscript{27}See WHO briefing on 14th January 2020 via tweet: https://twitter.com/UNGeneva/status/1217146107957932032.

\textsuperscript{28}See WHO’s News Released on “2019-nCoV outbreak: first cases confirmed in Europe”, available under the URL: https://www.euro.who.int/en/health-topics/health-emergencies/pages/news/news/2020/01/2019-ncov-outbreak-first-cases-confirmed-in-europe.

\textsuperscript{29}See the statement released by the Director, WHO on 30th January 2020, entitled “WHO Director-General’s statement on IHR Emergency Committee on Novel Coronavirus (2019-nCoV)”, available under the URL: https://www.who.int/dg/speeches/detail/who-director-general-s-statement-on-ihr-emergency-committee-on-novel-coronavirus-(2019-ncov).

\textsuperscript{30}See CDC newsletter entitled “How COVID-19 Spreads”, available under the URL: https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/how-covid-spreads.html.
However, before the fact about the rapid contagion effect caused by the novel coronavirus confirmed and the international borders could be sealed, and the international flights seized, the migrating humans carried the virus to all the continents through their networks of travels and trades. The world witnessed the contagion effect of the disease when the numbers of confirmed cases of COVID-19 infection took only seven days to reach the figure from $10^3$ to $10^4$ (i.e., between 25th February and 2nd March, with an average caseload of 1285 per day); 16 days to $10^5$ (i.e., between 2nd and 17th March, with an average of 5625 per day); 20 days to $10^6$ (i.e., between 17th March and 5th April, with an average of 45,000 per day) and 87 days to $10^7$ (i.e., between 5th April to 30th June, with an average caseload of 103,448 per day) (Fig. 1.1a). On 15th August, the total infection caseload in the world was reported by WHO as ‘297326’.

The percentage of the daily confirmed infection caseload by WHO regions exhibit four distinct phases that speculate the propagation of the disease clusters from the ‘index case’ or the ‘ground zero’ (Fig. 1.1b). This observation is valuable from the standpoint of spatial epidemiology. The information on the ‘locale’ of the ‘epicenter’ of an outbreak helps in examining a disease and map its geographic variations to analyze its outreach in consideration of the demographic, environmental, behavioral, socioeconomic, genetic, and infection risk factors (Elliott and Wartenberg 2004).

Phase 1 (The frenzied Wuhan): The ground zero of the present pandemic is within the WPRO region. Hence the infection caseload in the WPRO region dominates since the beginning of the pandemic due to the outbreak in Wuhan. This phase is considered to have ended when the percentage of the caseload of the EMRO region (41.80%) overtakes that of the WPRO region (31.39%) on 2 March 2020. The daily infection caseload maxima (1st cycle) for WPRO (WPRO Max1) occurred within this phase on 29th February (1278 new infections were reported) (Fig. 1.2).

Phase 2 (The bridging Eastern Mediterranean): The EMRO region shows the highest share of caseload among the WHO regions for only two days—2 and 3 March 2020. It was overtaken by the EMRO region later to start the epidemic in Europe, which the continent experiences after the Spanish Flu event occurred there from February 1918 to April 1920.

Phase 3 (The European epidemic): Worlds most trusted and most sophisticated healthcare system faced the challenge of the devastating manifestation of the COVID-19 as the EURO region started to lead the share of the caseload consistently from 4th March to 5th April. The daily infection caseload maxima for EURO (EURO Max) occurred within this phase on 1st April (42,803 new infections were confirmed).

Phase 4 (The devastation in the New World): The present pandemic brings the deadliest blows for the Americas, especially the USA, in terms of the infection and the fatality. This pandemic is unprecedented in the ‘New World’. The USA has been experiencing a shocking number of caseloads per day and the death toll, which has never been happened in the recorded history of the state. This phase was started with the dominating caseload percentage of the AMRO region (49.10%), which to overtake the EURO region (41.84%) on 6th April. The AMRO region has been experiencing an uncontrolled outbreak of infection in most of its member states, accompanied by a higher mortality rate than any other WHO region (Fig. 1.3).
The daily COVID-19 infection caseload sorted by WHO Regions for the period of 24 February to 15 August 2020 as (a) absolute number with the markers for total cases of infection and death in the world and (b) percentage share by regions.

The daily infection caseload maxima (2nd cycle) for WPRO (WPRO Max$_2$) on 5th August (8,412 reported new infections) is remarkable. It is an indication of the new cases emerging from the WPRO member states other than the People’s Republic of China. Besides, within this present span of observation, the daily infection caseload maxima for AMRO (AMRO Max) on 24th July (173,187 new infections), for AFRO (AFRO Max) on the next day, i.e., 25th July (20,614 new infections) and for SEARO (SEARO Max) on 13th August (72,582 new infections) occurred. Since the beginning of August, the caseload share curve shows a slightly recessing trend for AMRO and AFRO (though none of them to be considered as recessing consistently as yet), whereas, the SEARO caseload share is showing a growing trend (Fig. 1.1a). The
Fig. 1.2 *The European Epidemic*: showing the world distribution of confirmed cases of infection (equal numbers of countries in each class) and death toll due to COVID-19 as on 30 March 2020 *(Data Source WHO 2020)*

![Map of Europe showing COVID-19 cases and deaths as of 30 March 2020.](image)

Fig. 1.3 *The devastation in the New World*: World distribution of confirmed cases of infection (equal numbers of countries in each class) and death toll due to COVID-19 as on 15 June 2020 *(Data Source WHO 2020)*

![Map of the Americas showing COVID-19 cases and deaths as of 15 June 2020.](image)

states of Brazil in Latin America and India in Southeast Asia have been experiencing expedited caseloads and growing fatality (Fig. 1.4). The forthcoming surge of health hazard in AFRO and SEARO region has possibly different manifestations. This section will end with that discussion.

As the COVID cases are beginning to spike in the AFRO and SEARO regions, the spatial distribution pattern of population and the share of the urban population are becoming two vital points of concern. Basically, the disease outbreak is in the transition phase, when the positive cases are rising by leaps and bound in Sub-Saharan Africa and the subsistence economic areas of Southeast Asia. Most of the countries in the AFRO and SEARO regions are characterized by more than half of the population living in rural areas, unlike the previous outbreak centers in EMRO, EURO, and AMRO regions (Fig. 1.5). As the COVID-19 infection spreads through person-to-
person transmissions, the virus is imported primarily by the airways travelers, flying in a country from the previous outbreak areas. The AFRO region finds ample advantages to control the disease outbreak, despite the poor health infrastructure prevailing in the major part of the continent except for some urban centers. The advantages of the low population density, smaller numbers of million cities, low air-based connectivity with the other continents have overridden the disadvantages of low per capita health financing by the domestic government and paucity of the healthcare facilities in this continent (Table 1.1; Fig. 1.4). In spite of the AFRO region, suffering from a long history of the highest mortality rate among all the regions, the COVID-19 infection and fatality count takes the recessing curve since mid-July. On the other hand, the
### Table 1.1 Health expenditure and mortality rate across WHO regions

| WHO region | Domestic general government health expenditure (GGHE-D) per capita in PPP int$ in 2017 | Domestic general government health expenditure as a percentage of gross domestic product (GDP), in 2017 | Probability of dying between 15 and 60 years per 1000 population, in 2016 | Mean Population density of the region (Person/Sq. Km) |
|------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------|
| EORO       | 1986.9                                                                              | 4.9                                                                                 | 155                                                                                 | 70 110                                            |
| WPRO       | 835.3                                                                              | 4.2                                                                                 | 104                                                                                 | 69 109                                            |
| AMRO       | 816.8                                                                              | 4.0                                                                                 | 162                                                                                 | 89 82                                             |
| EMRO       | 956.1                                                                              | 2.6                                                                                 | 172                                                                                 | 125 112                                           |
| SEARO      | 253.3                                                                              | 2.1                                                                                 | 206                                                                                 | 134 239                                           |
| AFRO       | 138.3                                                                              | 1.9                                                                                 | 306                                                                                 | 248 79                                            |

Data Source WHO (2016, 2017), World Bank (2018)

‘rice-producing countries’ of Southeast Asia, particularly India, and Bangladesh, are experiencing the ‘boom’ of COVID-19 pandemic, though receiving the surge lately, being at the rear in the outbreak chain (Fig. 1.5).

### 1.3 COVID-19: The Challenges for India

The COVID-19 has been emerging as a crisis for India. This is obviously a crucial manifestation of the public health care and emergency clinical and medicinal support system under the aegis of the public welfare system of democratic governance. However, this section will not be confined within the discussion of the public health challenges during the pandemic. Instead, it will bring the discussion to explore the multifaceted challenges, incorporating the political, economic, institutional, technological, and sociocultural system to which the surge of the pandemic puts its ‘ominous’ footprint.

#### 1.3.1 The Acute Health Crisis

India counts the highest numbers of confirmed cases of COVID-19 infection per day and the largest numbers of total cases in Asia (WHO data, as on 15 August 2020). The first COVID-19 case in India was reported on 30th January in Thrissur of Kerala, and two other cases were reported by 3rd February. The initial spreading of the diseases at the multiple clusters at different corners of the country is clearly evidenced by the first 50 COVID-19 cases which were reported in a span of 41 days and were spread in 12 states (Kerala, Tamil Nadu, Telangana, Karnataka, Maharashtra, Uttar
India started experiencing a steady growth in the count of COVID-19 infection since mid-April. The number of confirmed cases of COVID-19 infection took only fifteen days to reach the figure from $10^2$ to $10^3$ (i.e., between 15th and 30th March, with an average caseload of 60 per day); another 16 days to $10^4$ (i.e., between 30th March and 14th April, with an average of 580 per day); 35 days to $10^5$ (i.e., between 14th April and 19th May, with an average of 2594 per day) and 68 days to $10^6$ (i.e., between 19th May and 17th July, with an average caseload of 13,275 per day) (Fig. 1.6). On 15th August, the total infection caseload in the world is reported by WHO as ‘69239’ to make the total confirmed cases ‘3044940’.

Indian COVID scenario has been exhibiting the general trend that over 60% caseloads are in 5 cities, evidenced by the highest caseloads in the districts of Mumbai, Delhi, Chennai, Ahmadabad, and Thane. Over 75% of caseloads are reported from 10 cities or districts, which includes Pune, Indore, Kolkata, Hyderabad, and Aurangabad in addition to the five above. Furthermore, over 80% of the total infection has occurred in 10 states—Maharashtra, Tamil Nadu, Delhi, Gujarat, Rajasthan, Telangana, Karnataka, West Bengal, Bihar, and Uttar Pradesh (as on 15th August 2020). The National Capital of Delhi, getting threatened by the initial surge, has shown effective responses to mitigate the public health challenges successfully, which is evidenced by the receding trend of the caseload graph of the state (Fig. 1.7). The

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31 See English daily India Today, dated 12th March 2020, available under this URL: https://www.indiatoday.in/india/story/coronavirus-in-india-tracking-country-s-first-50-covid-19-cases-what-numbers-tell-1654468-2020-03-12.
eastern Indian states of Uttar Pradesh, Bihar, West Bengal, Odisha, and Assam in North East India have been experiencing a higher caseload at a later stage.

1.3.2 The Economic Recession

The sharp nosedive of the global economy is reflected by the declining growth rate and the lowering of GDP in all the countries. ‘The year 2020 could see the worst global economic fallout since the Great Depression in the 1930s, involving more than 170 countries likely to experience negative per capita GDP growth due to the COVID-19 pandemic’, warned by Kristalina Georgieva (9 April 2020), the Chief of International Monetary Fund (IMF).32 Parallelly, Oxfam, the UK-based charity organization, issued the alarming statement that the economic fallout could force more than half a billion more people into poverty. According to their assessment, ‘by the time the pandemic is over, half of the world’s population of 7.8 billion people could be living in poverty’.33 Simply, India becomes not an exception to this global trend.

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32 See the Time Magazine’s coverage on 9th April 2020, available under the URL: https://time.com/5818819/imf-coronavirus-economic-collapse/.
33 See BBC Report on 9th April 2020, available under the URL: https://www.bbc.com/news/business-52236936.
With an increasing number of COVID-19 infections, the government locked down transport services, closed all public and private offices, factories, and restricted mobilization. The Government of India announced the nationwide lockdown, starting from 25 March 2020, initially for 21 days, which continued for about two months. In his second address to the nation on the pandemic outbreaking across the world, the Prime Minister of India, while announcing the government’s mandate of lockdown, admitted that ‘the decision would have an economic cost, but saving people’s lives is of the paramount interest to the government’. However, the Government of India stepped forward toward the ‘bold decision’ of the ‘complete lockdown’ when this was the most far-reaching measure undertaken by any government in response to the pandemic. It remains the world’s biggest lockdown to date, in the context of COVID-19. Travel restrictions and quarantines affecting hundreds of millions of people have left Indian factories short of labor. It poses havoc in the production system.

The disruption in the channels of the import of raw materials remains another issue. Import–export data, given by the Department of Commerce, Government of India, shows that the People’s Republic of China remained the largest import source for India for the consecutive years in the last decades. Records show that India imported 13.7% of the total imports in the FY 2018-2019 (Fig. 1.8). China contributes as the leading suppliers of electrical machinery and equipment (40%), machinery and nuclear reactors (31%), organic chemicals (38%), fertilizers (31%), and plastics (18%). The COVID-19-induced shutting down of factories results in the delay in the supply of goods in China. It has caused a shortage of raw materials and intermediate goods for several Indian companies, who depend on China’s supply chain.

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34See the Indian daily, Times of India’s news report dated 24th March 2020. URL: https://www.indiatimes.com/news/india/india-put-under-a-complete-lockdown-starting-march-25-to-control-deadly-coronavirus-pandemic-509188.html.
All these parameters acted cumulatively to cause an unprecedented negative growth of GDP as ‘$-23.9\%$’ during the first quarter of the Financial Year 2020–2021,\textsuperscript{35} reflecting the devastation of the COVID-19 pandemic on the country’s economy (Fig. 1.9). It highlights an extremely challenging outlook for the Indian economy with only one sector, namely agriculture (+3.4\%), showing positive growth on the output side, and only one demand segment, namely, government final consumption expenditure, showing positive growth. The emergence of the agricultural sector as the only sector to witness positive growth can be attributed to an increase in agricultural produce owing to good monsoon rains and targeted government spending.

The manufacturing sector faced a sharp nosedive amidst lockdown, as reflected by the output falling 39.3\% in the June quarter after falling 1.4\% in the previous consecutive quarter. Moreover, India’s fiscal deficit in the four months to the end of July stood at INR 8.21 lakh crore (i.e., $111.7$ billion), or 103.1\% of the budgeted target for the current fiscal year.\textsuperscript{36}

The economic recession directly affected the unorganized sector and semi-skilled jobholders, mostly as they have a greater likelihood of losing their employment. Consequently, there is the possibility for a large volume of the population living just above the poverty line to get drowned below the Poverty Line (BPL). It will

\textsuperscript{35}See the Times of India news coverage dated 31 August 2020, available under the URL: https://timesofindia.indiatimes.com/business/india-gdp-data-live-updates-indian-economy-q1-2020/liveblog/77846410.cms.

\textsuperscript{36}See the Times of India dated 31 August 2020, available under the URL: https://timesofindia.indiatimes.com/business/india-business/fiscal-deficit-crosses-full-year-budget-target-in-4-months/articleshow/77851470.cms.
cause undue pressure on the national economy due to the public schemes’ financial involvement for the newly added population below the poverty line.

The informal workforce significantly contributes to the Indian economy, contributing more than 45% to its overall GDP to place itself as the largest informal economic contribution in the world. Around 37% of regular wage-based employees in urban India are nonagricultural informal workers. Among the Indian States, Rajasthan (54.8%), Punjab (51.8%), Andhra Pradesh (51%), Chattisgarh (49%), and Gujarat (48.4%) involved the higher volume of nonagricultural informal workers in urban areas (Periodic Labour Force Survey 2017–2018). These workers faced uncertain income following the stalling of urban activity due to the lockdown. On the other hand, in rural India, the labor sector under the Mahatma Gandhi Rural Employment Guarantee Act (MGNREGA), 2005, is probably the worst impacted group as they are not provided jobs due to lockdown. As most of the labor sectors are associated with the construction works and daily wage earners, they are to face hardship.

1.3.3 The Issues Concerning the ‘Social Stigma’

Besides the economic challenges, the issues associated with provoking stigmatization to COVID-19 infected or patients having similar symptoms (e.g., fever, cough, or breathing trouble which is caused by other diseases) looms large, which unfortunately the Indian citizens are experiencing. Social stigma is ‘the negative association between a person or group of people who share certain characteristics and a specific disease. In an epidemic, this may mean people are labeled, stereotyped, discriminated against, treated separately, and experience loss of status because of a perceived link with a disease’ (WHO 2020). It is ironical that stigma and fear are commonly reported around communicable diseases and epidemic outbreaks anywhere and anytime globally; however, the magnitude depends on the mass awareness, level of literacy, and the social structure of the area where a disease cluster is located. The consequence is that it hampers the response significantly by driving people to hide the illness to avoid discrimination, preventing them from seeking health care immediately, and discouraging them from adopting healthy behaviors.

The presence of social stigma around the COVID-19 outbreak in India is clear from the statement from the end of the Union Ministry of India.

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37 The wage/salaried workers who are not eligible for paid leave and do not have written job contract and enjoy social security benefits are considered as informal workers in this report.

38 MGNREGA is an Indian labor law and social security measure that aims to enhance livelihood security in rural areas by providing at least 100 days of wage employment in a financial year to every household whose adult members volunteer to do unskilled manual work.

39 See Zee Media Bureau news coverage on 9 April 2020, available under the URL: https://zeenews.india.com/india/centre-issues-advisory-to-address-social-stigma-associated-with-corona-virus-covid-19-2274974.html.
Cases have been reported of people affected with COVID-19 as well as healthcare workers, sanitary workers, and police, who are in the frontline for management of the outbreak, facing discrimination on account of heightened fear and misinformation about infection. Even those who have recovered from COVID-19 face such discrimination.

The rising incidents of prejudices and social stigma against some communities and areas caused the Union Ministry of Health and Family Welfare (MoHFW), Government of India to seriously intervene, and issue an advisory on 9 April 2020. The advisory says that ‘such prejudices and social stigma during the outbreak of communicable diseases may cause fear and anxiety, which could culminate in increased hostility, chaos, and unnecessary social disruptions’. 40

1.4 The COVID-19 Crisis as the Catalyst for Change

Fighting against a pandemic like the COVID-19 is a war-like situation. It is a symmetric shock with asymmetric impacts that require thoughtful responses and exploring the opportunities arising out of the crisis. The outbreak of war is a cathartic moment that causes suffering, plight, and devastation. However, the historical semantic records confirm that war brings forth societal transformation. Scholarly works confirm World War I as the positive catalyst for progressing women’s rights, whereas World War II as the dawn for decolonization. Similarly, the ‘fight against COVID-19’ has been emerging as the catalyst, particularly for the developing world, toward a positive societal and economic transformation that carries the long-term benefits. In this section, we will discuss all these things concerning India.

1.4.1 An ‘Opportunity’ to Uplift Health Financing

The public expenditure on health is a vital metric regarding the public health scenario of a nation. WHO’s global health dataset on health financing reveals that if the domestic general government health expenditure is concerned, India ranks far lower, even behind some countries, which are classified as the ‘poorest’ in the world (Fig. 1.10). The Report entitled ‘National Health Profile 2019’, published by the Ministry of Health and Family Welfare, Government of India,41 takes a detailed account of socioeconomic status, disease burden, health finance, health infrastructure, and human resources in the sector. It mentions that, in 2016, the public spending on health was just 1.17% of the GDP. In comparison, nations classified as Lower-Income Countries by the World Bank spent 1.57% of their GDP on health that year.

40 See the MoHFW, Govt. of India advisory dated 09 April 2020 under the URL: https://www.mohfw.gov.in/pdf/AddressingSocialStigmaAssociatedwithCOVID19.pdf.
41 See: http://www.cbhidghs.nic.in/showfile.php?lid=1147.
The health shock of the COVID-19 in the country has shaken the health system of the country. The 1.28% of GDP on public health in 2019 is found insufficient for the preparedness against a pandemic outbreak. Even the targeted value of ‘2.5 percent by 2025’ may run short for the country with such a large volume of the population depending on the public health and emergency medical system.

The Government of India outlay (2019) for health as INR 623.9 billion (of which INR 317.5 billion for National Health Mission (2019–20) and INR 64 billion for Ayushman Bharat) and the allocation of INR150 billion for healthcare to control COVID-19 outbreak are significant steps toward enhancing the government health financing.42

The country boasts of more than two million health workers43 and a total of 1,159,309 allopathic doctors registered with the state medical councils and the Medical Council of India (MCI) as on 31 March 2019. Assuming an 80% availability, around 9.27 lakh doctors are available for active service. However, it needs serious government initiative regarding the patient to doctor ratio, which is present, 1445:1 (modern medicine) and does not reach the WHO’s recommendation (i.e., 1000:1). Parallelly, there are 7.88 lakh ayurveda, unani, and homeopathy (AUH) doctors in the country, practicing traditional systems of medicine. Adding 80% of them (i.e., around 6.30 lakh) as available for the service, together with allopathic doctors, the doctor–patient ratio becomes 1:860.44

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42See the press release note at Press Information Bureau dated 9 April 2020, available under the URL: https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1612534.
43WHO’s report on ‘Healthcare Workforce in India’, available under the URL: https://www.who.int/hrh/resources/16058health_workforce_India.pdf.
44See Business Standard news coverage on 29 November 2019. Available under the URL: https://www.business-standard.com/article/pti-stories/doctor-patient-ratio-in-india-less-than-who-prescribed-norm-of-1-1000-govt-119111901421_1.html.
The present public health infrastructure, consisting of 529 Medical colleges (MBBS), 702 Ayush, 313 Dental (BDS), 253 PG Dental, ~158 thousand sub-centers, more than 25,000 Primary Health Centres (PHC), and ~5,624 Community Health Centres (CHC), needs to be equipped with the modern medical facilities and ample human resources to cope up with the national health emergency, not only for the present crisis but for the future as well. COVID-19 outbreak has expedited the process of up-gradation. Presently, the public health facilities dedicated to COVID-19 management are categorized into three categories.

- **Dedicated COVID Hospital (DCH):** Hospitals that offer comprehensive care, primarily for those who have been clinically assigned as severe. These hospitals are accommodated with the fully equipped ICUs, ventilators, and beds with assured oxygen support. All DCHs have separate areas for suspected and confirmed cases. DCHs are designed to serve as referral centers for the Dedicated COVID Health Centres and the COVID Care Centres.

- **Dedicated COVID Health Centre (DCHC):** These are hospitals that serve to offer care for all cases that have been clinically assigned as moderate. The DCHCs have separate areas for the suspected and confirmed cases. There are beds with assured oxygen support, and every DCHC is mapped to one or more Dedicated COVID Hospitals.

- **Dedicated COVID Care Centre (DCCC):** They are designed to offer care only for cases that have been clinically assigned as mild or very mild cases or COVID suspect cases. These are the makeshift facilities that may be set up by the States/UTs in hostels, hotels, schools, stadiums, and lodges, both public and private.

Within the first week of May, 7,740 facilities have been serving in 483 districts in all States/Union Territories that include hospitals and facilities of the State/UT governments as well as the central government. It includes 6,56,769 isolation beds, 3,05,567 beds for confirmed cases, 3,51,204 for suspected cases, 99,492 oxygen-supported beds, 1,696 facilities with oxygen manifold, and 34,076 ICU beds.45 The country is well focused on the testing of COVID-19 infection and the detection of the cases from the very beginning. Indian Council of Medical Research (ICMR)46 data shows that a total of 43,324,834 samples have been tested in the laboratories throughout the country up to 31 August 2020. The total number of samples tested on 31 August 2020 only was 1,016,920, which was well above the government’s targeted milestone of one million tests daily (attained on 22 August 202047).48

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45See One India news coverage, available under the URL: https://www.oneindia.com/india/7-740-dedicated-covid-19-health-facilities-in-483-districts-identified-health-ministry-3086182.html.
46See the ICMR website (accessed on 1 September 2020): https://www.icmr.gov.in/.
47See The Print dated 22 August, 2020: https://theprint.in/health/india-crosses-10-lakh-daily-covid-tests-milestone-within-month-of-boosting-screening-process/487265/.
48See the Ministry statement: https://zeenews.india.com/india/government-is-planning-to-increase-covid-19-testing-capacity-to-one-lakh-per-day-health-minister-harsh-vardhan-2280035.html.
At the end of August, India’s COVID-19 recoveries have crossed 26 lakh which has made the recovery rate to reach 76.47% (Fig. 1.11). It has been made possible due to the strategic health policy that includes the ‘aggressive’ testing, comprehensive tracking, and efficient treating in supervised home-isolation, facility-isolation, and hospitals. The case fatality rate (CFR) is found lower when compared to the global average. The CFR shows a continuous declining trend and reaches 1.81% at the end of August. Despite other parameters, the growing rate of recovered patients is also contributed by the dedicated service of the health workers at the forefront and effective management from the part of the government.

### 1.4.2 Becoming Self-Reliant in PPE Production

The first item under this heading must be the production of the Personal Protection Equipment (PPEs). PPEs are kinds of protective gear designed to safeguard the health of workers by minimizing the exposure to a biological agent. It includes goggles, face-shield, masks (Surgical/N-95), gloves (surgical/examination), coverall/gowns (with or without aprons), headcover, and shoe cover. The quest for boosting the fight against the novel coronavirus has made the country ramp up the production of COVID-19 protective gear and medical equipment. This effort has made India transform into an ‘exporter’ of the PPEs where there was not a single domestic manufacturing unit of PPEs before the COVID-19 outbreak in the country.
Fig. 1.12  Remarkable growth in PPE production: From 0 on 1st March, India produces nearly 4.5 lakh PPE kits every single day as on 18 May 2020, and in 60 days, the PPE industry in India has witnessed 56 times growth (Data Source Ministry of Health & Family Welfare, Govt. of India 2020)

During May, when the infected count has started rising throughout the country by leaps and bound, the Government of India placed a bulk order for PPE. Out of a total of 22 million PPE, 14.2 million were decided to be bought from the domestic manufacturers.49 Government strategy worked as inertia. A statement from the Union Ministry confirmed that on 18th May 2020, India produced over 4.5 lakh PPE suits by more than 600 companies in the country, certified MSME to manufacture PPEs (Fig 1.12).

The exports of the PPEs started in the month of July. The notification issued on 29 June 2020 by the Director General of Foreign Trade (DGFT) permitted the export of the PPE after satisfying the internal demands. A statement from the government confirmed on 14th August that India had exported 23 lac of PPEs to the USA, UK, UAE, Senegal, and Slovenia to help those countries in their fight against novel coronavirus disease.50 An economic assessment by the Strategic Investment Research Unit (SIRU) has described the Indian domestic PPE manufacturing as the INR 7000 Crore industry making process, which has more potential ahead than that is exposed so far (Lakshmanan and Nayyar 2020).

49See the Times of India news coverage on 2 May 2020: https://timesofindia.indiatimes.com/india/india-ramps-up-production-of-covid-19-protective-gears-medical-equipment/articleshow/75507915.cms.
50See Times Now News on 14 August 2020: https://www.timesnownews.com/mirror-now/in-focus/article/self-reliant-for-ppes-india-s-effort-to-fight-covid-19-globally/637055.
1.4.3 Rediscovering the Agricultural Economy

While the Indian economy has taken a massive hit from the coronavirus pandemic and resultant lockdowns, the agricultural sector remains the silver lining for the Financial Year 2020–2021. The estimates of Gross Value Added (GVA) by various sectors in the First Quarter in the FY 2020–2021 show that only Agriculture, Forestry, and Fishing witnessed an increase in income with GVA at 3.4% and rest of the sectors saw a fall in income (Table 1.2). Three factors significantly envisage the positive growth in this primary sector amidst the lockdown—the normal monsoon and the exemption of the agricultural activity from the nationwide lockdown and the added human resources in the rural agricultural fields due to the reverse migration.

The Indian Meteorological Department (IMD) forecasted the monsoon to be 102% of the long-period average. A normal monsoon is always reported well for India, reaching its benefit to a considerable part of the rural workforce who are employed in the agricultural sector. While most economic activities came to a standstill since April due to the lockdown, the farming activities were exempted, which facilitated the uninterrupted harvesting of Rabi crops (i.e., winter crops) and the sowing of Kharif crops (i.e., monsoon crops). The smooth flow of agricultural commodities throughout the lockdown period and across both rural and urban areas ushered the economic benefit for the country.

| Industry                                | April–June (Q1) | Percentage change over the previous year |
|-----------------------------------------|-----------------|----------------------------------------|
|                                         | 2018–2019       | 2019–2020 | 2020–2021 | 2019–2020 | 2020–2021 |
| Agriculture, forestry, and fishing      | 427,177         | 439,843 | 454,658 | +3.0 | +3.4 |
| Mining and quarrying                   | 88,634          | 92,807 | 71,209 | +4.7 | −23.3 |
| Manufacturing                          | 561,875         | 578,936 | 351,396 | +3.0 | −39.3 |
| Electricity, gas, water supply, and other utility services | 74,998          | 81,628 | 75,877 | +8.8 | −7.0 |
| Construction                           | 249,913         | 262,828 | 130,750 | +5.2 | −50.3 |
| Trade, hotels, transport, communication, and services related to broadcasting | 609,330         | 630,860 | 334,284 | +3.5 | −47.0 |
| Financial, real estates, and professional services | 757,850         | 803,322 | 760,491 | +6.0 | −5.3 |
| Public administration, defence, and other services | 387,589         | 417,483 | 374,659 | +7.7 | −10.3 |

Data Source: MSPI, Government of India
Hundreds of thousands of migrant workers returned to their native villages across India after the pandemic-induced lockdown left them unemployed in the cities. Reverse migration is seen as a massive threat to the economy, and there are possibilities of raising informality in the economy. However, these human resources, added to the rural agricultural economy, contributed well to the growth of the agricultural economy more than the expectation. Kharif crop, sowing across India in 2020, is about 21% more than last year (2019). The country is witnessing a growth in acreage compared to the last year for some of the crop varieties. Black gram sowing acreage has witnessed a growth of 43.11% this year over last year; pigeon pea (arhar) shot up by 37.74%; finger millet (ragi) by 45%; and groundnut by 56.57%. Official data shows that the acreage of rice cultivation has gone up by almost 19%, oilseed crops by 44.75%, pulses by 32.35%, cotton by 17.28%, and coarse cereals by 12.23%.\(^51\)

The Government of India shows strict supervision on the flow and trade of agricultural commodities and the interests of the farmers that led to the promulgation of three ordinances on 5 June 2020.

**The Farmers’ Produce Trade and Commerce (Promotion and Facilitation) Ordinance 2020** seeks to provide for barrier-free trade of farmers’ produce outside the markets notified under the various state agricultural produce market laws (state APMC Acts). The Ordinance allows intrastate and interstate trade of farmers’ produce outside: (i) the physical premises of market yards run by market committees formed under the state APMC Acts and (ii) other markets notified under the state APMC Acts. Such trade can be conducted in any place of production, collection, and aggregation of farmers’ produce, including (i) farm gates, (ii) factory premises, (iii) warehouses, (iv) silos, and (v) cold storages.\(^52\)

**The Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Services Ordinance 2020** provides a framework for the protection and empowerment of farmers concerning the sale and purchase of farm products. The provisions of the Ordinance will override all state APMC laws. The Ordinance provides for a farming agreement before the production or rearing of any farm produce aimed at facilitating farmers in selling farm products to sponsors.\(^53\)

**The Essential Commodities (Amendment) Ordinance 2020** amends the Essential Commodities Act 1955, allowing the Government of India to delist certain commodities as essential. The Act empowers the government to control the production, supply, distribution, trade, and commerce in certain commodities. The Ordinance seeks to increase competition in the agriculture sector and enhance

\(^{51}\)See the report posted in the website of the Ministry of Agriculture and Farmers Welfare, GOI: https://pib.gov.in/PressReleasePage.aspx?PRID=1639340.

\(^{52}\)See the Ordinance in the official website of the Department of Agriculture, Cooperation and Farmers Welfare, GOI: http://agricoop.nic.in/recentinitiatives/farmers-produce-trade-and-commerce-promotion-and-facilitation-ordinance-2020.

\(^{53}\)See the details in the official website of the Ministry of Agriculture and Farmers Welfare: https://pib.gov.in/PressReleasePage.aspx?PRID=1629750.
farmers’ income. It aims to liberalize the regulatory system while protecting the interests of consumers.\textsuperscript{54}

Agriculture has been the cornerstone of the Indian economy till date. The growth in the agricultural sector amidst the COVID-19 trapped India provides the ‘oxygen’ to the ‘gasping’ national economy. The pandemic brings to fore the practical experiences that give the government and policymakers to nourish the human resources associate with the sector, safeguarding their interests, values, economic, and social security based on which the urban-industrial economy could flourish, carrying with it the long-term benefit for the national economy.

\subsection*{1.4.4 A Shift Toward ‘Localization’}

The immediate and tangible impact of ‘black swan events’ is carried out by the disruption in the supply chain. The geopolitical environment and a globally recessionary climate are likely to lead to greater protectionism and risk aversion. The practical lessons learned from the pandemic outbreak of COVID-19 are expected to lead to direct the policies toward greater localization of supply chains, especially of essential commodities, labor force as well as for sectors that are perceived to be strategically important. The pandemic has pointed out that the transformation in the economy through policymaking is becoming essential. The encouragement in local resource-based enterprises, agro-industrial initiatives, food-processing with local production can be sustainable management for the stream of migrant labor forces. Technology diffusion has a vital role to play for the optimum utilization and processing of agricultural products to a variety of usable goods.

Millet (which is locally named as Ragi)-based technology development by the Central Food Technological Research Institute (CFTRI), Mysuru may be taken as an instance. The Millet-based projects undertaken by this institution aims to enhance the visibility and total acceptance of Millet based products in the rural and urban populations. This compilation is brought in order to help in creating a sustainable ecosystem for the growers and processors. The CSIR-CFTRI has developed innovative technologies based on millets, and a large number of these have been successfully transferred to the Small and Medium Enterprises. The utilization of those innovative technologies has been successfully used in producing Ragi Rusk, Ragi Noodles, Ragi Papad, Convenience Flour for Mudde, Instant Beverage From Ragi, Ragi Roti, Ragi Snack, Ragi Flakes, Ragi Murukku Mix, Malted Ragi Flour-Enzyme Rich, Extruded Ragi, Germinated Ragi Drink Mix, Puttu Mix, and many more products.

\textsuperscript{54}See the Gazette of India dated 5 June 2020: \url{http://egazette.nic.in/WriteReadData/2020/219748.pdf}. 
### 1.4.5 A Real Push for Being ‘Digital’

Digital India is a flagship program of the Government of India with a vision to transform India into a digitally empowered society and knowledge economy (Fig. 1.13). The core objectives of this project include the broadband internet service for rural areas, integration of all core ICT infrastructure built under the National e-Governance Plan (NeGP), universal access to mobile connectivity, Public Internet Access Programme (PIAP) under the National Rural Internet Mission (NRIM), cradle-to-grave digital identity, digital financing, and many other things to ensure the digital infrastructure as a utility to every citizen.

This pandemic has set the ‘being digital’ as a compulsion to cope up with the changing sociocultural environment during the post-pandemic world. Institutions, organizations, and public and private offices have been shifted to work remotely, and the employees are now ‘online’ and working from home. While these trends were already ‘in-motion’, the entire process will be expedited in the near future. Interestingly, in India, even the most traditional brick and mortar businesses have been forced to experiment with digital channels. This presents a real and immediate opportunity to drive efficiencies through digital media. The crisis has pointed out the importance of government initiative and investment in enabling technologies like cloud, data, and cybersecurity. This will change the way we work with far-reaching implications on online commercial real estate, e-commerce, e-governance, cybersecurity, process automation, data analytics, and self-service capabilities.

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### Digital Infrastructure as a Core Utility to Every Citizen
- Availability of high speed internet as a core utility for delivery of services to citizens
- Cradle to grave digital identity that is unique, lifelong, online and authenticable to every citizen
- Mobile phone & bank account enabling citizen participation in digital & financial space
- Easy access to a Common Service Centre
- Shareable private space on a public cloud
- Safe and secure cyber-space

### Governance & Services on Demand
- Seamlessly integrated services across departments or jurisdictions
- Availability of services in real time from online & mobile platforms
- All citizen entitlements to be portable and available on the cloud
- Digitally transformed services for improving ease of doing business
- Making financial transactions electronic & cashless
- Leveraging Geospatial Information Systems (GIS) for decision support systems & development

### Digital Empowerment of Citizens
- Universal digital literacy
- Universally accessible digital resources
- Availability of digital resources/services in Indian languages
- Collaborative digital platforms for participative governance
- Citizens not required to physically submit Govt. documents/certificates

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*Fig. 1.13* The key vision areas, centered by the Digital India Programme (Source Ministry of Electronics & Information Technology, Government of India)
1.5 Conclusion

The COVID-19 outbreak manifests its uniqueness in many senses. The global reach of the virus, the ability of human-to-human transmission, the fatality rate in the population in the age group of $\geq 60$ years, the geopolitical reordering, and the economic recession—all these are unprecedented in the recorded history of mankind. More interestingly, the same disease is exposing its malicious effect differently across the individuals, geographical locations, age groups, and working classes. The vaccine is hitherto (i.e., when we are writing) unknown. Humankind is fighting against the pestering virus with the immune system, which exists to protect the host from noxious environmental agents, especially pathogenic organisms. The spillover of the virus, causing the initial consequence as an urban health hazard, has transformed into a global pandemic that is now manifesting the societal and economic transformation throughout the globe. This phase is crucial as the effect is hostile and the impact is diverse. A conventional local grocery shop to a multinational corporate house—all are affected, though the channels of infestation are different.

The practitioners of Medical Science are working at the frontline of the fight against this pandemic. However, beyond this scenario of an acute health hazard, the pandemic has carried with it the other threats for mankind associated with the economy, society, culture, psychology, and politics. The long period of lockdown all over the globe has resulted in environmental reinvigoration and diminishing of the pollution level. On the other hand, the lockdown has affected the world economy to initiate another global economic recession. The fallout of the latter is of grim significance to the entire population of the world. Amidst these multifaceted dimensions of the pandemic, this is high time for global solidarity to save humankind on this only planet in the universe where life exists.

Human society, its ambient environment, the process of socioeconomic development, and politics and power—all drive to set the world order. All these parameters are intimately and integrally related. The interconnections of these three driving forces have a significant bearing on life, space, and time. In parallel, the interrelationship between all these drivers is dynamic, and they are changed drastically with time and space. The social-scientists serve to align the thought, based on which the policymakers need to understand the prevailing equation to project the unforeseen future. The trajectory of the future world helps in planning and policymaking with a scientific direction.

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