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Impact of Coronavirus (COVID-19) Outbreak on Society, Air Quality, and Economy in India: A Study of Three “P”s of Sustainability in India

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Abstract: The outbreak of novel coronavirus (COVID-19) pandemic forced affected countries to implement strict lockdown to contain the spread of this disease before the advent of the vaccine. This containment resulted in social and economic crisis globally. This study evaluated the impact of COVID-19 on three “P”s of sustainability (Planet, People, and Profit) in India. A comparative analysis was conducted by evaluating the available secondary data in different sectors during the pre-lockdown and lockdown period. Seven major air quality parameters: particulate matter (PM_{2.5} and PM₁₀), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), ammonia (NH₃), carbon monoxide (CO), and ozone (O₃) were studied in six states of India to review the ambient air quality status. Stratified random sampling technique was used in this study for collective portrayal of the country’s air quality. A drastic cutback of the level of PM_{2.5} and PM₁₀ with significant increase of O₃ was observed in the lockdown phase for most of the selected monitoring stations. A significant change in level of PM_{2.5} and PM₁₀ was observed when *t*-test was performed in between the pre-lockdown and lockdown period. Improvement of ambient air quality was also observed considering the air quality index (AQI) during lockdown. The trend and volatility of two broad Indian stock market indices, SENSEX and NIFTY-50, were analyzed, and results showed that both the indices have recovered during the forty-day lockdown phase. The potential effects of the crisis on various sectors of Indian economy were assessed in this study, and a set of policy recommendations for these sectors were suggested.

Keywords: air quality index (AQI), COVID-19; lockdown; psychological crisis; stock market; sustainability

1. Introduction

A sudden occurrence of pneumonia with an unrevealed etiology in Wuhan, Hubei province, China in December 2019 created a global health concern. The severity of this disease unfolded as large number of similar fatal cases erupted in China and it became ubiquitous very rapidly. The Chinese authorities surprised the world with the identification of a new type of coronavirus on 7 January 2020. The outbreak of this highly dynamic novel coronavirus resulted in worldwide chaos [1]. The World Health Organization (WHO) named the newly discovered disease COVID-19 on 11 February 2020 [2].

Coronavirus (CoVs) belonging to the family Coronaviridae contains single stranded RNA with an animal host and helical nucleocapsid with around 27–31 kb genomic size. This is considered as one of the largest RNA genomes in the entire viral world. The diameters of helical capsid and enveloped virion are 14–16 and 80–160 nm, respectively. Very common and well-known genera of this family include avian infectious bronchitis virus, and human coronavirus (HCoV) OC43, among others. The virus is very infectious and mainly causes upper respiratory tract infection (URTI) in humans. It leads to cytoplasmic replication and uses Golgi apparatus and endoplasmic reticulum in budding [3].

Although the novel coronavirus (SARS-CoV-2) detected in Wuhan, China, is a novel strain, it has its own history. In the year 1960, HCoV that could infect upper respiratory tract in children was characterized for the first time in the laboratory. It was detected and identified for the first time in 1965 from the upper respiratory tract in an adult who was suffering from common cold [4]. Having coronavirus infection is very common in both adults and children [5,6]. A study showed that children under six years old, suffering from acute respiratory tract infection, are very prone to coronavirus infection [7]. Asthmatic children may have wheezing during this viral infection [8]. In the 21st century, the first pandemic that caused “a worldwide health threat” was due to the outbreak of one type of animal coronavirus, namely SARS (severe acute respiratory syndrome), that displayed mild respiratory symptoms and fever in southern China in 2002. The occurrence was also reported in Europe, North America, and South-East Asia with 813 reported deaths by July 2003 [9,10]. Another major outbreak of Middle East Respiratory Syndrome Coronavirus (MERS-CoV) took place in the Kingdom of Saudi Arabia in 2012, which caused severe respiratory illness and renal failure [11]. The MERS-CoV was spread in 27 countries with 2494 positive cases and 858 reported deaths [2]. The seven most common HCoV are 229E (alpha coronavirus), NL63 (alpha coronavirus), OC43 (beta coronavirus), HKU1 (beta coronavirus), MERS-CoV (the beta coronavirus that causes MERS), SARS-CoV (the beta coronavirus that causes SARS), and SARS-CoV-2 (the novel coronavirus that causes coronavirus disease 2019, or COVID-19) (Table 1).

Table 1. Five major human coronavirus (HCoV) reported worldwide.

Virus	First Infection Reported in Human		Reference
	Place	Year	
SARS	Guangdong province of southern China	2002	[9]
HCoV-NL63	Netherlands/Holland	2004	[12]
HCoV-HKU1	Hong Kong	2005	[13]
MERS-CoV	Jeddah, Saudi Arabia	2012	[14]
COVID 19/SARS-CoV-2	Wuhan, Hubei Province of China	2019	[15,16]

Surprisingly, as of 20 January 2020, with 278 confirmed cases in China, the positive cases of coronavirus infection were also reported in Thailand, Japan, and the Republic of Korea. The neighboring country India registered its first coronavirus positive case on 30 January 2020, in Kerala (a state of India), but no significant widespread occurrence was observed during the entire month of February. As of 5 March 2020, the total confirmed new cases reached double digits (23 cases) in India, making the situation alarming. On 11 March WHO declared COVID-19 as a pandemic, and by understanding the critical situation, on the same day India also announced COVID-19 as a “notified disaster” under the Disaster Management Act, 2005. The need for the power of the Epidemic Diseases Act, 1897 was felt to combat the situation and to increase the suppression of virus spread in India. First COVID-19 related death was reported in India on 13 March 2020. After a total of 88 reported deaths on 21 March 2020, Prime Minister of India, Mr. Narendra Modi, declared “Janta Curfew” (that translates to “public lockdown” in English) from 7:00 a.m.–9:00 p.m. (Indian Standard Time or IST) on 22 March to restrict the widespread

appearance of SARS-CoV-2 in India. However, with the aim of having absolutely zero COVID-19 cases, the Government of India declared a series of lockdown throughout the nation [2,17,18] (Figure 1).

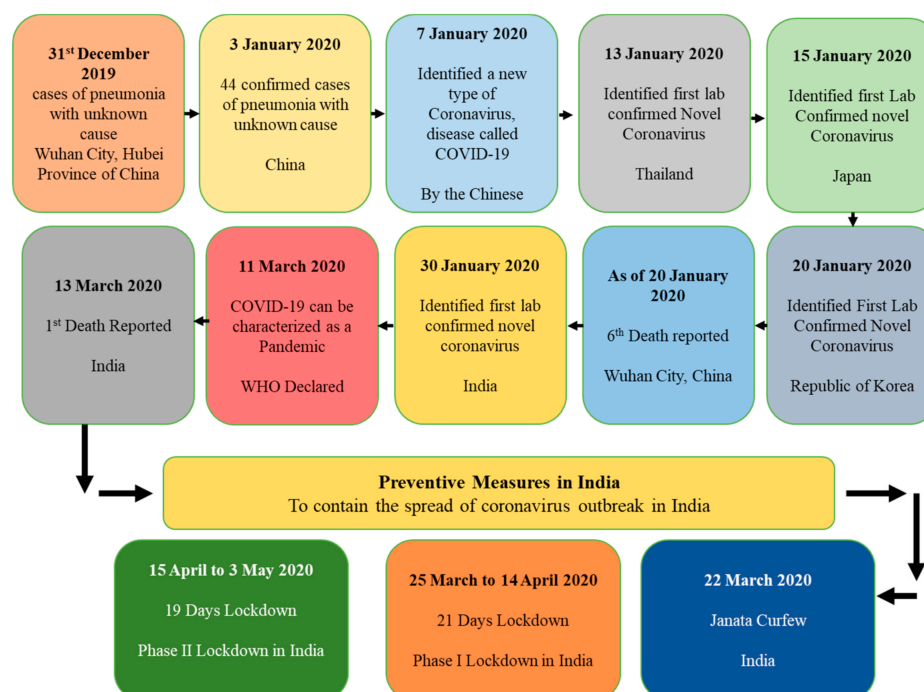


Figure 1. Time scale analysis of COVID-19 outbreak [2].

Lockdown is considered as the primary strategy to be adopted to manage the disease outbreak worldwide in absence of a vaccine [19]. A defined planning of public health care is highly required for the reduction of death rate, high incidence rate, or occurrence of morbidity. Although the chance of re-establishment of the disease after three weeks of lockdown is a possibility, the need for a prolonged lockdown with desired relaxation was also mentioned in a model-based forecast of the COVID-19 [20].

The world has faced 691,013 mortality cases with 38,938 in India until 4 August 2020. The impact of the outbreak of COVID-19 is immense on the health of the society. The lockdown disturbed the lifestyle of Indian citizens with their physical, mental, and social wellbeing. It also affected the education sectors worldwide. The world has also witnessed the fear of economic slowdown with more than 120 countries registering the spread of COVID-19. India has been suffering from long term negative impact of air pollution due to the heavy traffic and transport in the working time (rush hours) throughout the year. The lockdown period restricts heavy traffic, movement of public vehicles, production from industrial sectors, and unwanted driving to regulate the releases of air pollutants in urban areas [21–25]. The probability of transmission has always been reduced with the presence of low level of pollutants in the air. Studies reported that the viability of SARS-CoV-2 in aerosol is for at least 3 h [26]. Recent investigation showed that SARS-CoV-2 is transmitted through respiratory droplets from coughing, sneezing, talking, shouting of infected persons of close contact, direct touch, or contact with the inanimate materials, which have been touched by infected individuals. Studies also reported the long-term survival of COVID-19 outside the body of infected persons [26,27]. Controlling the emission of air pollutants may be an effective policy to reduce the worldwide COVID-19 related fatalities. India is the largest democracy in the world with a population of over 1.36 billion people [28]. In India, the COVID-19 crisis came at a time when the economy was still managing the tremors of demonetization and Goods and Services Tax (GST). As per the Economic Survey 2019–2020, India's gross domestic product (GDP) growth rate was expected to be in between 6% and

6.5%. Experts on GDP numbers predicted lower GDP rate for India amid the COVID-19 crisis. The World Bank has lowered India's growth for fiscal year 2021 to 2.8%, which will be observed as the lowest growth rate since the economic reforms of 1991. Asian Development Bank forecasted the rate to be 4%, while Fitch rating estimated a 2% growth rate. Some global rating agencies like Moody's Investors Services downgraded it from a previous estimation of 5.3% to 2.5%. Acuite Rating and Research Ltd. estimated a GDP loss of equivalent to around USD 98 billion (About Indian Rupees or Rs.7.5 lakh crore) during this lockdown period [29]. S&P Global Rating has changed its predictions from 5.5% to 3.6% [30].

The widely accepted definition of sustainable development, "that meets the needs of the present without compromising the ability of future generations to meet their own needs", comes from the "Report of the World Commission on Environment and Development: Our Common Future" in 1987. The concept of needs and idea of limitation on sustainability has been illustrated and well explained in this report [31].

In the mid-1990s, John Elkington introduced the ways to measure sustainability, which are almost universally agreed upon. This framework says that the role of sustainability is to maximize benefit to People, Planet, and Profit, which is widely known as the "3Ps" of sustainability [32]. The objective of this study was to analyze the effect of recent COVID-19 outbreak on three major domains (social, environment, and economic) of sustainable development or the "3Ps" of sustainability from the perspective of the Indian scenario. A comparative analysis was conducted by evaluating the available secondary data in different sectors during the pre-lockdown and lockdown period. The severity of disease outbreak was evaluated by analyzing the number of confirmed cases and mortality cases in the Indian scenario and globally on a daily basis. In this abrupt changing scenario, the study also aimed to capture the concern on the status of wellbeing of the Indian society. The changes in ambient air quality during the pre-lockdown and lockdown period were observed along with the estimation of the effect of COVID-19 outbreak on the Indian economy with special reference to the Indian Stock Market. An effective future planning to combat the COVID-19 pandemic was developed by generating new ideas and analyzing present status in Indian scenario and global aspects.

2. Methods

A comprehensive survey of recently published literature to generate a brief idea on virology, etiology, and epidemiology of novel coronavirus (SARS-CoV-2) was performed. The literature survey elaborated the effect of COVID-19 outbreak on three broad areas, i.e., society, environment, and economy, in two major phases (pre-lockdown, PLD; and lockdown, LD). The time frame of the study is presented in Figure 2. PLD and LD phases consisted of forty days and were further divided into four phases, PLD 1, PLD 2, PLD 3, PLD 4, LD 1, LD 2, LD 3, and LD 4, and each of them consisted of ten days.

Social impact (the first "P" of sustainability, people) was studied globally and from the Indian aspect by reviewing recently published literature and analyzing available epidemiological data from 1 February 2020 (the date of availability of complete set of data), to 3 May 2020 (the last day of second lockdown phase in India), on COVID-19 from Situation Report 12–104 [2]. (Table 2). Comparison was made between the status of mortality and morbidity, newly confirmed cases, and death cases in the last 24 h both in the Indian and global context [33]. Crude case fatality ratio was calculated day wise by using Equation (1) [34].

$$\text{Crude case fatality ratio} = \left(\frac{\text{the number of deaths}}{\text{the number of laboratory confirmed cases}} \right) \times 100. \quad (1)$$



Figure 2. Time period breakup of pre-lockdown (PLD) and lockdown (LD) phase used in this study.

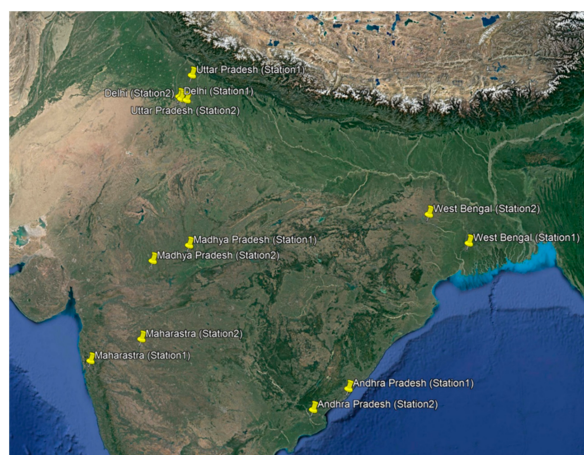
Table 2. Time frame of the study that consists of 40 days of pre-lockdown (PLD) and 40 days of lockdown (LD) phases.

Areas to Be Analyzed	Pre-Lockdown (PLD) Phase	Lockdown (LD) Phase	
		Phase-I	Phase-II
Social	1 February 2020–24 March 2020	25 March 2020–14 April 2020	15 April 2020–3 May 2020
Environmental	14 February 2020–24 March 2020	25 March 2020–3 May 2020	
Economic	14 February 2020–24 March 2020 (26 trading days in the Indian Stock Market)	25 March 2020–3 May 2020 (23 trading days in the Indian Stock Market)	

To analyze the impact of COVID-19 on the environment (second “P” of sustainability, planet), spatial changes of seven major air quality parameters, particulate matter 2.5 (PM_{2.5}), particulate matter 10 (PM₁₀), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), ammonia (NH₃), carbon monoxide (CO), and ozone (O₃), were taken into consideration for the pre-lockdown and lockdown ambient air quality analysis. Stratified random sampling technique was applied for this study. Six geographically scattered Indian states (West Bengal, Delhi, Maharashtra, Uttar Pradesh, Madhya Pradesh, and Andhra Pradesh) were selected for this study. The sites were selected in such a way so that they can collectively portray the air quality status of the entire country. Two sites from each of these six states were selected at random, and the data were collected from the official website of Central Pollution Control Board (CPCB) and Ministry of Environment, Forest, and Climate Change (MoEF) [35] (Table 3; Figure 3). Forty days prior to the starting date of lockdown was considered for the pre-lockdown (PLD) study, followed by another forty days during two consecutive lockdown (LD) phases, including Phase-I and Phase-II for this analysis (Table 2). The 24-h average data of each parameter was collected for each monitoring site on a regular basis. For further evaluation, at ten days interval, the mean value of each parameter was considered. The value of air quality index (AQI) was also recorded by following the same pattern from the published site. The graphs were prepared by using Origin Pro 8: a GUI software Version-64 bit. Location map for selected air quality monitoring sites was prepared by using ArcGIS Pro with an imagery resolution 4800 × 2718 and 100% scaling (Figure 3). The aim of this study was to discuss the comparison of means between all the above-mentioned stations based on the availability of data. The Student’s *t* test was used in this study to compare the means indicating a significant *p* value (<0.05).

Table 3. Details of selected air quality monitoring stations in India [35].

State	Station No.	Latitude and Longitude	Elevation	Type	Name of the Monitoring Sites
West Bengal	Station 1	22.4955° N, 88.3709° E	11 m	Suburban	Jadavpur, Kolkata
	Station 2	23.6872° N, 86.9461° E	111 m	Industrial	Asansol Court Area, Asansol
Delhi	Station 1	28.6975° N, 77.1604° E	214 m	Industrial	Wazirpur, Delhi
	Station 2	28.6125° N, 77.2373° E	216 m	Urban	Major Dhyan Chand National Stadium, Delhi
Maharashtra	Station 1	19.0195° N, 73.0433° E	14 m	Urban	Mahape, Navi Mumbai
	Station 2	19.8406° N, 75.2466° E	568 m	Urban	More Chowk Waluj, Aurangabad
Madhya Pradesh	Station 1	23.2358° N, 77.3986° E	527 m	Urban	T T Nagar, Bhopal
	Station 2	22.7152° N, 75.8700° E	550 m	Urban	Chhoti Gwaltoli, Indore
Uttar Pradesh	Station 1	29.4677° N, 77.7116° E	267 m	Urban	New Mandi, Muzaffarnagar
	Station 2	28.5509° N, 77.4709° E	200 m	Urban	Knowledge Park—V, Greater Noida
Andhra Pradesh	Station 1	17.8148° N, 81.9700° E	14 m	Urban	Anand Kala Kshetram, Rajamahendravaram
	Station 2	17.6868° N, 83.2185° E	45 m	Urban	GVM Corporation, Visakhapatnam

**Figure 3.** Location map of twelve selected air quality monitoring stations in India. The map is prepared by ArcGIS Pro.

The effect of COVID-19 on Indian economy (third “P” of sustainability, Profit) was also studied based on the secondary data available in the official websites of Reserve Bank of India (RBI), Center for Monitoring Indian Economy Pvt. Ltd., Bombay Stock Exchange, and National Stock Exchange. The study was both explorative and empirical in nature. The explorative part was based on the various articles published in electronic media, newspapers like The Economic Times, and Business Standard. The empirical part mainly dealt with the effect of COVID-19 on the Indian Stock Market with special reference to Bombay Stock Exchange and National Stock Exchange during the first and second lockdown phase (Table 2). A period of eighty days ranging from 14 February 2020, to 3 May 2020, was considered to examine this effect. A trend of unemployment rate of India was also analyzed during this same study period (14 February 2020, to 3 May 2020). The analysis and interpretation of market data was done both graphically and statistically. In statistical analysis, the change in index value was calculated by subtracting closing index value at time “t + 1” from closing index value at time “t”. The change in index value was divided by closing index value at time “t” to determine daily market return.

The standard deviation of daily market returns was determined to measure the market volatility. In graphical analysis, the charts were drawn to explain the trend of two major stock indices in India, i.e., SENSEX (on Bombay Stock Exchange) and NIFTY 50 (on National Stock Exchange). Average of daily returns was also calculated during the pre-lockdown and the lockdown phase. On the other hand, the increase in confirmed cases of COVID-19 was measured as the change in the confirmed cases of COVID-19. The degree of association, i.e., Pearson correlation coefficient between the stock market return (SENSEX return and NIFTY 50 return) and the increase in confirmed cases of COVID-19 were determined to catch the stock market's reaction to the COVID-19 during the pre-lockdown and the lockdown phase.

3. Results and Discussions

3.1. Analysis of Impact of COVID-19 on Society (First “P” of Sustainability, People)

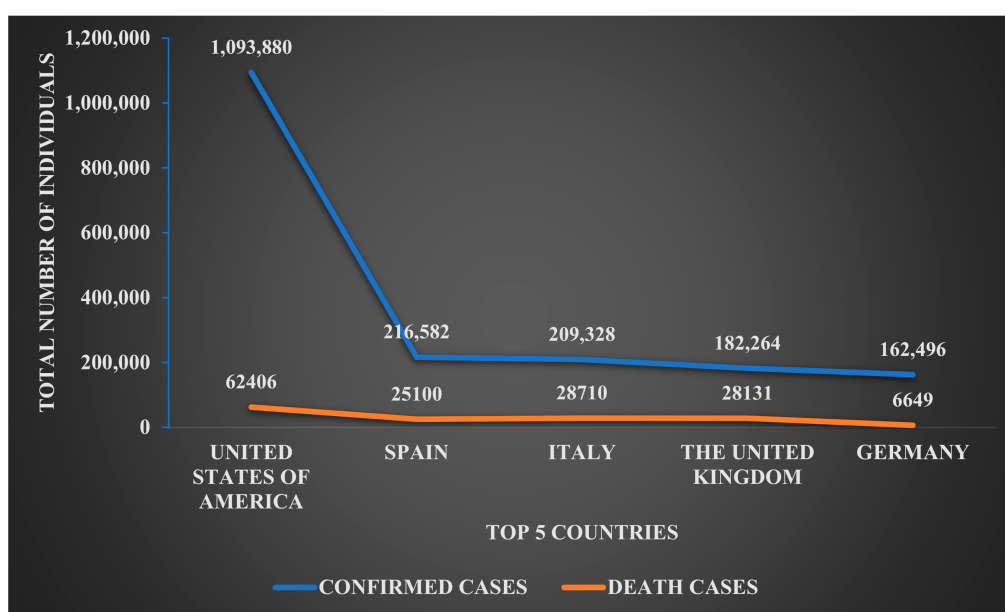
A study based on Wuhan, China, the epicenter of the novel coronavirus, showed that the restricted movement and social distancing can curtail the rampant spread of the virus [36]. Around 60% reduction of new coronavirus cases was mentioned in a study on Hubei province, China, during lockdown and even after its withdrawal [37].

The advent of the COVID-19 globally has led to the enforcement of complete as well as partial lockdown worldwide. The countries with high mortality rates (China, United States, Italy, Spain, Iran, France, United Kingdom, and Germany) [38] have intensified their efforts to manage the pandemic throughout their country using collective public health intervention measures and rigorous social distancing. Mental health risks go hand in hand with physical health risks; hence, immaculate attention must be given to both. Along with timely assessment and management of prevention and control of the disease, the situation also demands psychological crisis analysis to minimize cognitive influence of infected person with the side-effects as well as the after-effects [39]. As for non-infected persons, often, lack of knowledge of the nature of the virus, varied incubation period in different individuals, asymptomatic carriers, limitation of movement, less interaction with people, and no discovery of vaccine along with extended home stay enhances anxiety, stress, and depression [40]. Lockdown demands the formation of psychological intervention teams to confront psychological crises [41]. The lack of regular public interaction makes people prone to detrimental behaviors like prolonged watching of television, lack of physical activities, dependence on electronic gadgets, and severely increased health risks [42]. An interesting study on the active social media users in China reported the negative impact of lockdown on linguistic expressions. The expression of pessimistic emotions like distress, anger, anxiety, and depression, among others, was increased enormously, while a sharp decline of tendency of positive expression use was also observed [43]. Indulging in physical activities on a regular basis during home stay is highly recommended [40]. Studies also showed that there are chances of physical inactivity, tendency of weight gain, along with psychological, neurological, and musculoskeletal disturbance during this prolonged lockdown period [44].

An extended lockdown majorly affects the economic strength of the common man, which leads to joblessness, homelessness, and extreme food crisis. The COVID-19 crisis and the ongoing lockdown has pushed off employees of various organizations feeling apprehensive for their future. Retail and wholesale, manufacturing, business services, and administration are the most affected sectors [45]. Inadequate food leads to undernutrition, especially in children and plunged already poor people deeper into the poverty.

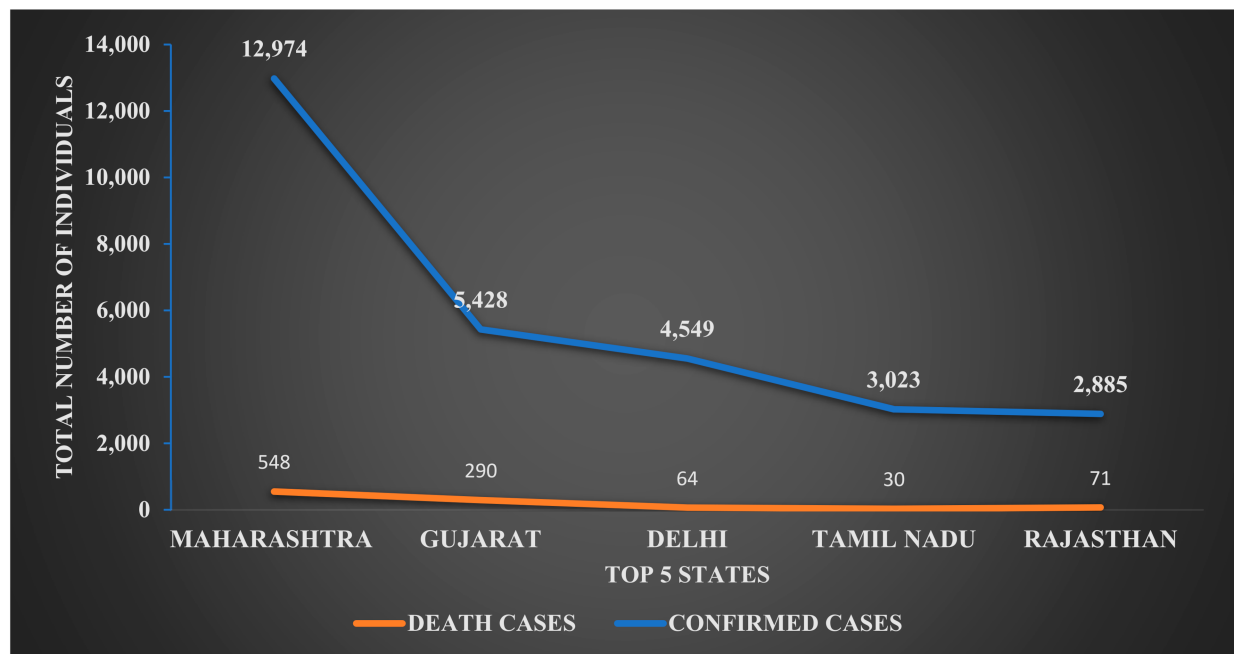
Being the foremost health crisis, COVID-19 has created a paradigm shift in the education system worldwide. The lockdown of education institutes has caused major obstruction in students' learning system. Though the policymakers are in perplexity, with the target of reducing viral contamination, it is rightly justified to close schools, colleges, universities, and all such educational institutions. The necessity of online teaching has been felt on a global scale [46,47]. This situation has brought up sweeping changes in the conventional education system.

The severity of coronavirus can be assessed by its widespread entry in different countries along with India (Figure 4A,B). Globally, there are 62,363,527 total confirmed cases, out of which 1,456,687 people have died up until November 2020. India alone has 9,431,691 total confirmed cases, which accounts for 15.12% of global total confirmed cases, and 137,139 death cases, which accounts for 9.41% global death cases. A comparative analysis of epidemiological data collected from the WHO website reflects the actual scenario of COVID-19 pandemic worldwide. According to the WHO's first published situation report on January 21, 2020, there were 282 confirmed cases with only six reported deaths. There is a 229,566-fold increase of total number of deaths due to the coronavirus pandemic globally since the first report was published. Considering the huge loss, the Government of India declared a series of lockdowns to be followed by the nation. This study observed an effective decrease of mortality rate during the lockdown period in India. The maximum crude case fatality ratio was reported on April 13, 2020 (3.37%), and the value reached up to 3.25% on the last day of the Phase-II of lockdown in India (Figure 5A). During the Phase-I of lockdown of 21 days, 37.67 times increment in the death cases was observed, which resulted in the declaration of a continuous Phase-II of lockdown. In this period of 19 days, the frequency of death cases was reduced by 3.45 times, more than 90% reduction than the Phase-I period. A sharp reduction in the total confirmed cases from 18.44 times to 3.50 times was also reported during the Phase-I to Phase-II of lockdown. A comparative analysis with global aspect highlights a substantive difference of occurrences of daily confirmed cases and number of deaths in India (Figure 5B–D).



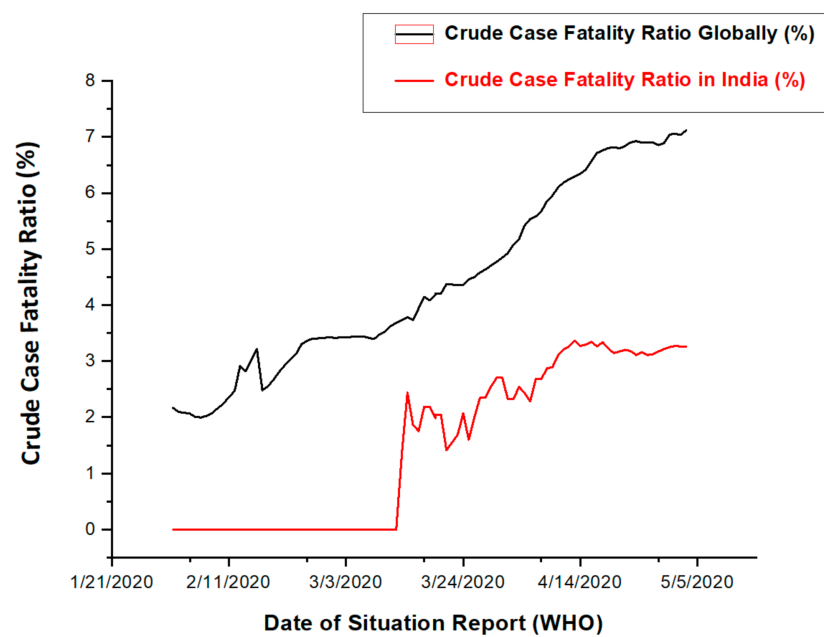
(A)

Figure 4. Cont.



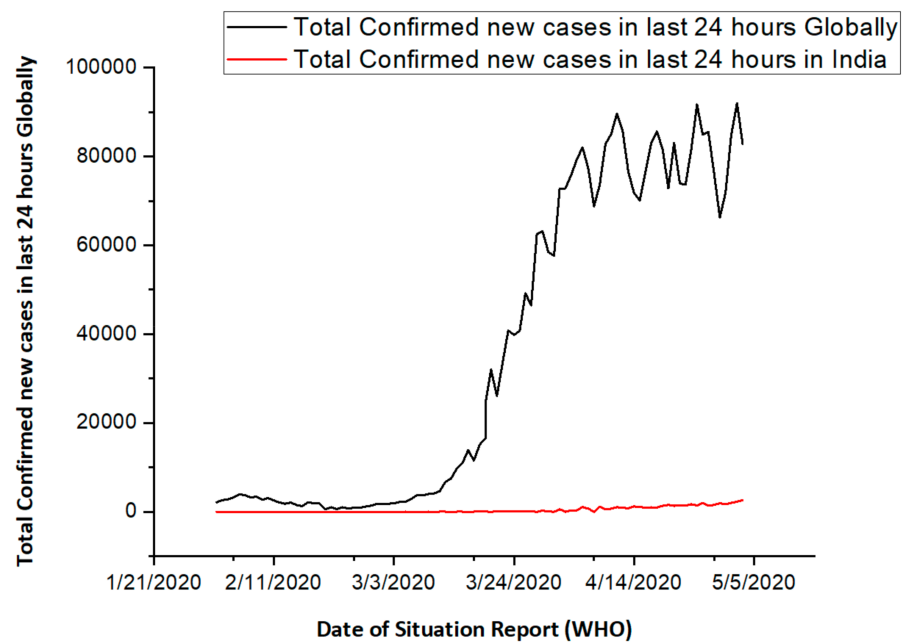
(B)

Figure 4. (A) Top five COVID-19 affected countries as of 3 May 2020 [2]. (B) Top five COVID-19 affected states in India as of 3 May 2020 [2].

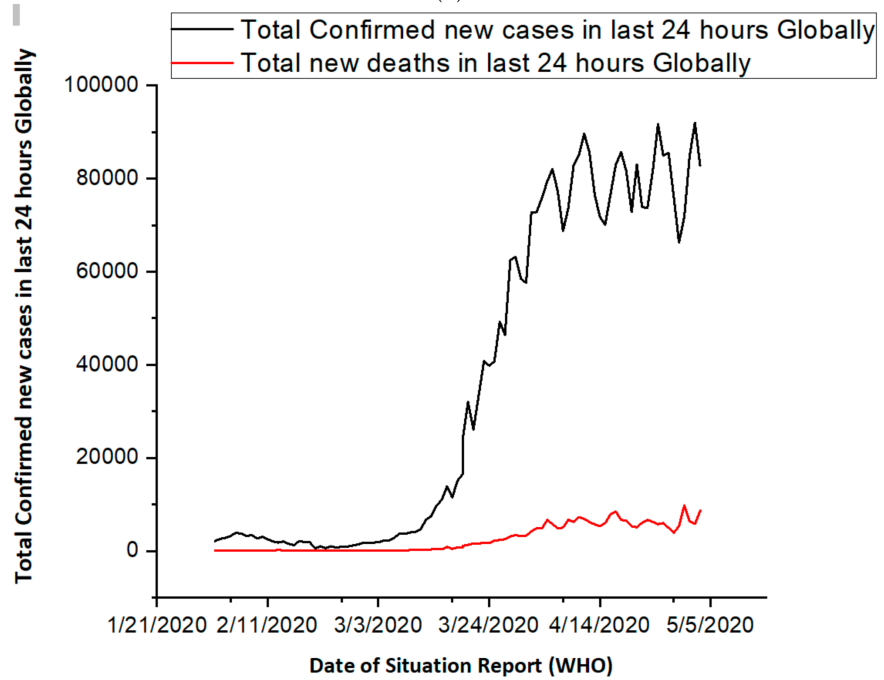


(A)

Figure 5. Cont.



(B)



(C)

Figure 5. Cont.

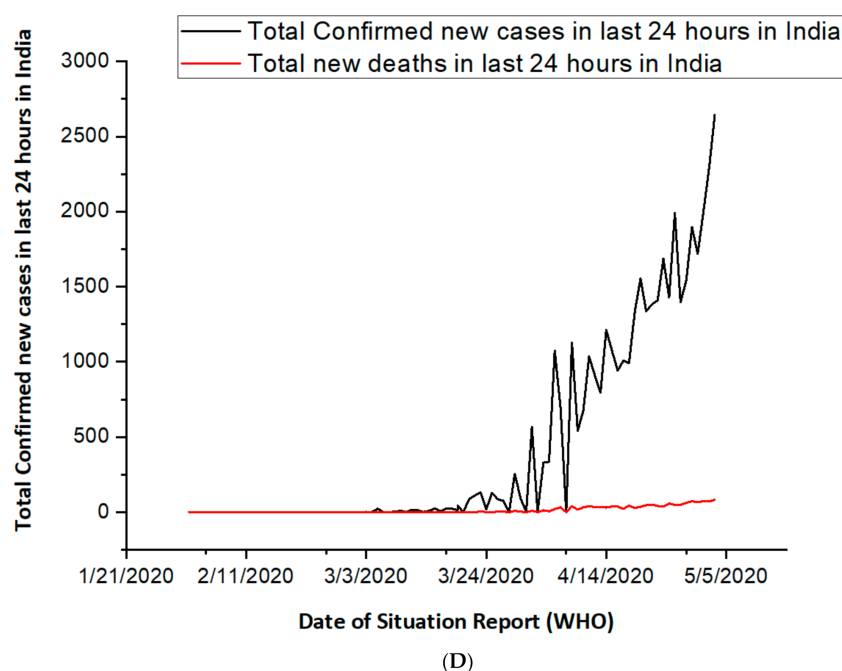


Figure 5. (A) Global and Indian crude case fatality ratio due to COVID-19 [2]. (B) Total confirmed new cases of COVID-19 in last 24 h globally and in India [2]. (C) Total confirmed new cases vs. total new deaths in last 24 h for COVID-19 globally [2]. (D) Total new confirmed cases vs. total new deaths in last 24 h for COVID-19 in India [2].

Depending on the incubation period of the coronavirus, the development of symptoms may appear after 14 days of complete isolation [48]; thus, the occurrence of new cases can be reduced by maintaining social distancing, restricted movement, and other health and safety guidelines. People with symptoms of COVID-19 should be under proper isolation and medication as per Government norms. The situation is critical and challenging for the asymptomatic patients. Therefore, full lockdown is the ultimate way for its control. However, since the absolute zero case was not achieved, a third lockdown phase was readily declared in India from 4 May 2020, to 17 May 2020.

3.2. Analysis of Impact of COVID-19 on Environment (Second “P” of Sustainability, Planet)

The probability of viral outbreak can be controlled by reducing the pollutants in the air. Severity of high level of $PM_{2.5}$ and PM_{10} may enhance the chances of entry of the COVID-19 virus in human body due to the intake of these particulate matters easily via respiration process. Recent study showed that the COVID-19 virus stays for a longer period in air by surface attachment with aerosol particles [26]. This study based on twelve stations across the six states in India (Table 3; Figure 3) showed that the concentration of $PM_{2.5}$ and PM_{10} in the ambient air during pre-lockdown (PLD) phase was observed to be very high, well above their permissible limits of 60 and 100 $\mu g/m^3$ (24-h average), respectively, indicating the presence of bad air quality [48]. The concentration of $PM_{2.5}$ and PM_{10} in air for the PLD1 and PLD2 phases was nearly two to 2.5 times greater than the standard value, respectively, while for the PLD3 and PLD4 phases, the concentration was nearly 1.5 times greater than the standard value for nearly all the stations. A sharp fall in the concentration was observed in the first two lockdown (LD) phases, improving the quality of the ambient air, followed by the LD3 and LD4 phases that varied in accordance with the LD1 and LD2 phases, the fall gradually progressing from the LD1 to LD4; the concentration of $PM_{2.5}$ and PM_{10} in air was found to be 1.5 to 2.5 times lesser than the standard values (Table S2; Figure 6A,B). Lockdown phase restricts movement of vehicles and production from industries, among others. Road dust, construction materials, incomplete combustion of carbon particles, solid waste dumping, industrial activities, fine particulate matter from household activities like

cooking, water heating, and kerosene usage may have contributed to the high-level of particulate matters in the ambient air and indoor environment (Table S1). These particulate matters are the major determining factor of air quality index (AQI) in India during the pre-lockdown phase. Drastic changes of level of air quality parameters may have occurred due to the restriction of heavy traffic loads, unwanted movement, minimum road dust, less solid waste dumping, and construction materials, among others.

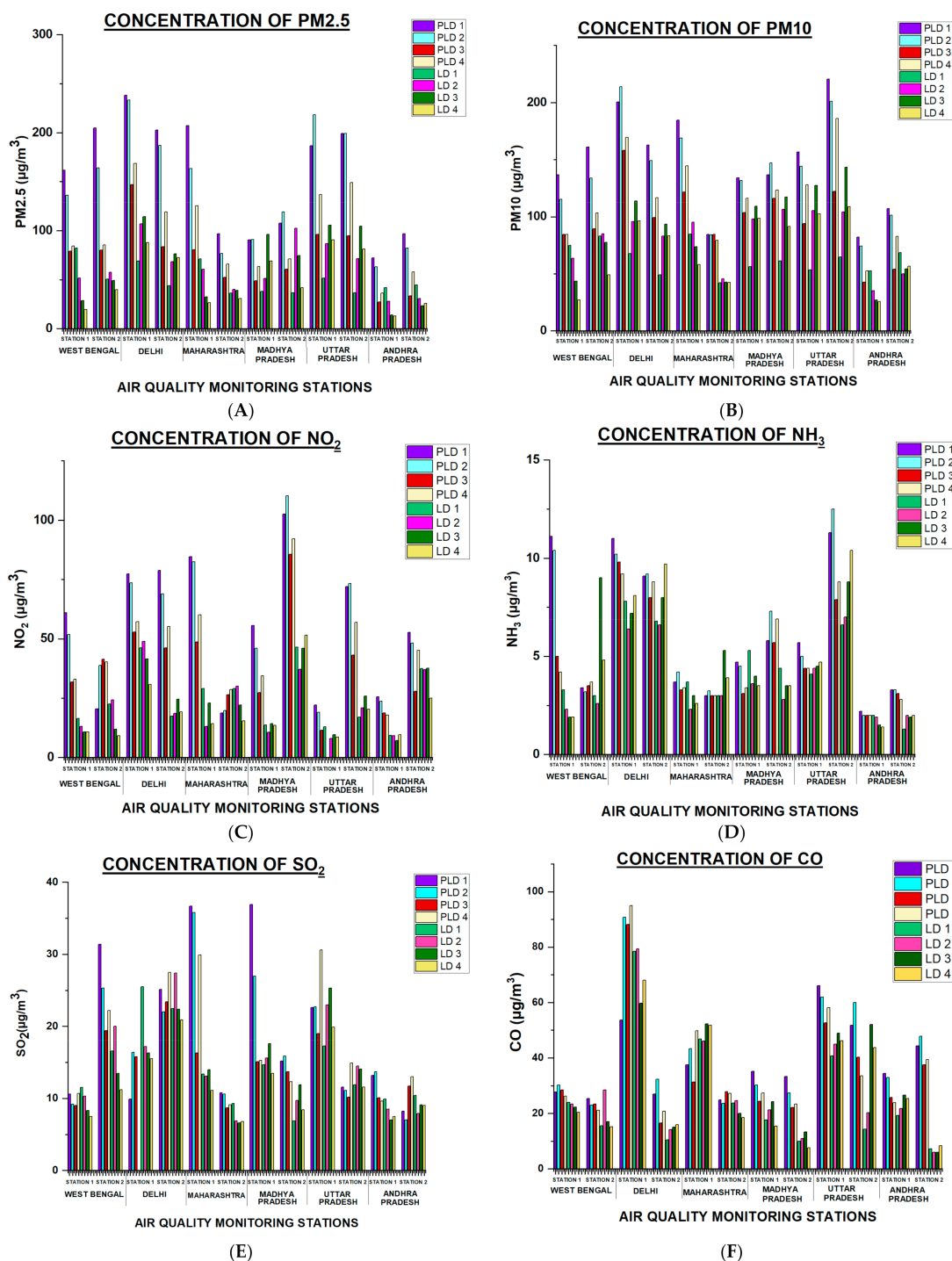


Figure 6. Cont.

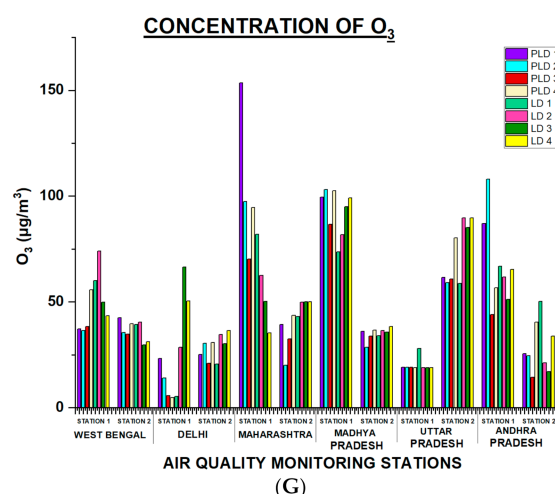


Figure 6. The changes of concentration of (A) PM_{2.5}; (B) PM₁₀; (C) NO₂; (D) NH₃; (E) SO₂; (F) CO; and (G) O₃ at selected sites in pre-lockdown and lockdown phase.

The levels of NO₂ and O₃ in India were several times higher than the standard values of 80 and 60 µg/m³ (24 h average), respectively, for few monitoring sites [49]. These levels were within the standard limits before lockdown period, but few sites were exceptionally vulnerable due to its concentration (Table S2; Figure 6C,G). The lockdown minimized the contribution of NO₂ and O₃ in the atmosphere from vehicles, industry, and power generation stations (Table S1). A sharp decrease was found over time for the level of NO₂, while the changes of trend of O₃ were quite different than other parameters. In some monitoring stations, the level of O₃ was increased significantly during the lockdown phase, whereas only few results showed a decreasing trend during the lockdown period. O₃ became a prominent pollutant instead of particulate matters during the lockdown phase in most of the places (Figure 6G). A clampdown of atmospheric NO₂, which has become a major factor for the COVID-19 mortality in north Italy and central Spain, reduces the probability of fatality in India during the lockdown phase [50].

The concentration of NH₃, SO₂, and CO in the air in the pre-lockdown phase was observed to be very near and lesser than their standard value of 400, 80 (24-h average) and 2000 µg/m³ (8-h average), respectively (Table S2) [49]. Atmospheric NH₃ comes mainly from the agricultural sectors (Table S1). As the areas selected in this study for the air quality monitoring were situated mostly in the urban neighborhoods, no significant level of NH₃ was observed in the pre-lockdown and lockdown phase in any of the monitoring sites (Figure 6D). In case of SO₂, the level was within the limit for each selected monitoring site (Figure 6E). A study showed that fatality cases developed by the COVID-19 incidence in China is positively associated with the SO₂ level and negatively associated with the PM_{2.5} and PM₁₀ concentrations [51]. Again, atmospheric NH₃ and SO₂ are the major contributors for the formation of secondary aerosols that can be generated by oxidation to form water droplet in dry air or clouds [52]. Low levels of NH₃ and SO₂ in the atmosphere reduce the chances of generation of the secondary aerosols, which may be a factor for the COVID-19 outbreak. CO was not considered as a major air pollutant at any site during the pre-lockdown and lockdown period due to its lower values (Figure 6F). A study in Barcelona (Spain) also showed that air pollutants such as PM₁₀ and NO₂ were reduced significantly after two weeks of lockdown phase, while a slight change in SO₂ concentration as well as increasing trend of O₃ concentration was found in this phase [25]. In China, PM_{2.5} decreased significantly due to the reduction of anthropogenic activities during lockdown phase [14]. Mortality drastically decreased in quarantine period because of the huge reduction in the levels of air pollutants in China [53]. High level of air pollutants acts as a significant co-factor to induce the lethality of the COVID-19 in north Italy [54].

The overall status of air quality in India was determined by analyzing the AQI value that was estimated using the concentrations of prominent pollutants. Additionally, the stations at certain time intervals could not provide sufficient data that mainly resulted in near zero values. The rest of the values showed the trend of air quality at monitoring sites. The values gradually decreased over time, which indicated the better quality of air during the lockdown phase (Figure 7).

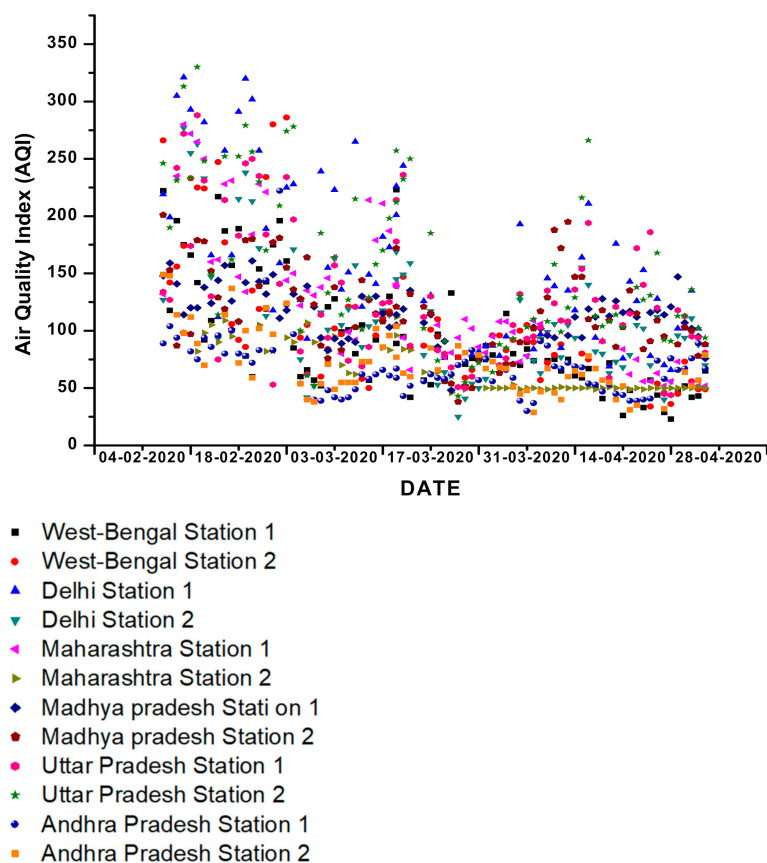


Figure 7. The changes of air quality index (AQI) in pre-lockdown and lockdown phase. In India, standards of AQI 0–50: Good; 51–100: Satisfactory; 101–200: Moderate; 201–300: Poor; 301–400: Very Poor; 401–500: Severe [35].

Inhalable particles are small enough to penetrate the thoracic region and cause lung or heart diseases, making elderly people and children particularly vulnerable. Thereby, approximately 3% of cardiopulmonary and 5% of lung cancer deaths are attributed to the particulate matters globally [55]. A *t*-distribution test was performed based on the sampling distribution to locate specific pollutants against the distributed data. Student's *t*-test considering the lockdown and pre-lockdown phase showed a significant change of PM_{2.5} at all sampling states except Madhya Pradesh. The changes of PM₁₀ concentrations were found significant for all sampling states after comparing the lockdown and pre-lockdown data (Table 4).

Table 4. Result of *t*-test of PM_{2.5} and PM₁₀ during the pre-lockdown and lockdown phases.

	West Bengal	Delhi	Maharashtra	Madhya Pradesh	Uttar Pradesh	Andhra Pradesh
PM _{2.5}	0.002368	0.001332	0.008773	0.178311	0.00149	0.009776
PM ₁₀	0.001358	0.000626	0.005647	0.003419	0.010935	0.013942

$p < 0.05$.

The correlation of AQI with PM₁₀ (Table 5) during the lockdown period was much more significant and consistent than PM_{2.5} (Table 5). Uttar Pradesh showed the peak ($R^2 = 0.98$) followed by Delhi and Maharashtra ($R^2 = 0.89$ and 0.87 , respectively), whereas PM_{2.5} had shown gradual decrease among the states except for Delhi, showing primary peak ($R^2 = 0.94$) followed by Uttar Pradesh ($R^2 = 0.84$). The phase of lockdown had continuously favored the lower emittance of both the particulate matters ranging ($R^2 = 0.8$ – 0.99). The detailed study was done by means of all possible data that could be drawn from the available and reliable resources.

Table 5. Regression analysis of PM_{2.5} and PM₁₀ with air quality index (AQI) at different sampling states.

Location	Parameters	PM _{2.5} (Independent Variable)		PM ₁₀ (Independent Variable)	
		Pre Lockdown	Lockdown	Pre Lockdown	Lockdown
West Bengal	AQI (Dependent Variable)	$y = 1.1105x - 21.341$ $R^2 = 0.9936$	$y = 0.9025x - 15.367$ $R^2 = 0.693$	$y = 0.6365x + 30.037$ $R^2 = 0.9774$	$y = 1.1121x - 14.039$ $R^2 = 0.886$
Delhi		$y = 1.1466x - 32.068$ $R^2 = 0.9851$	$y = 0.9214x - 7.1844$ $R^2 = 0.9497$	$y = 0.7739x + 20.696$ $R^2 = 0.8931$	$y = 0.7864x + 11.809$ $R^2 = 0.8982$
Maharashtra		$y = 1.0575x - 26.837$ $R^2 = 0.9357$	$y = 0.6695x - 2.449$ $R^2 = 0.6609$	$y = 0.8608x + 8.8484$ $R^2 = 0.9785$	$y = 1.047x - 7.8886$ $R^2 = 0.9679$
Madhya Pradesh		$y = 1.7121x - 136.24$ $R^2 = 0.9698$	$y = 1.1079x - 46.362$ $R^2 = 0.8047$	$y = 0.9873x + 0.5474$ $R^2 = 0.9929$	$y = 0.9862x - 5.6189$ $R^2 = 0.8761$
Uttar Pradesh		$y = 0.9385x - 2.6224$ $R^2 = 0.7994$	$y = 0.8428x - 10.335$ $R^2 = 0.8416$	$y = 0.8878x + 2.7001$ $R^2 = 0.8877$	$y = 1.113x - 16.145$ $R^2 = 0.9874$
Andhra Pradesh		$y = 0.9046x - 15.074$ $R^2 = 0.8665$	$y = 0.7621x - 17.939$ $R^2 = 0.307$	$y = 0.8209x + 7.7514$ $R^2 = 0.8083$	$y = 0.5826x + 11.367$ $R^2 = 0.1004$

3.3. Analysis of Impact of COVID-19 on Economy (Third “P” of Sustainability, Profit)

The total of forty days lockdown in India from 25 March 2020, to 3 May 2020, is considered as one of the largest lockdowns in the world, affecting 1.33 billion populations in the country. During this lockdown period, the Indian economy was expected to observe a severe downfall with a loss of USD 4.64 billion (over Indian Rs. 35,000 crore) per day [29]. Effect on the economy can be understood by analyzing the Central Government’s and the Reserve Bank of India’s policy measures, by analyzing sectoral impact and losses. Figure 8 shows how the unemployment rate had changed over time during the pre-lockdown and lockdown phase. The average unemployment rate of India during the pre-lockdown phase (from 14 February to 24 March 2020) was $7.6 \pm 0.26\%$ (SD). The average unemployment rate of India during the lockdown phase (from 25 March to 3 May 2020) was $16.09 \pm 6.56\%$ (SD). An upward trend in the unemployment rate was observed during the lockdown phase and the highest 24.12% unemployment rate was recorded on May 2, 2020 [56]. Results from this analysis clearly showed that the COVID-19 caused a significant impact on the Indian economy.

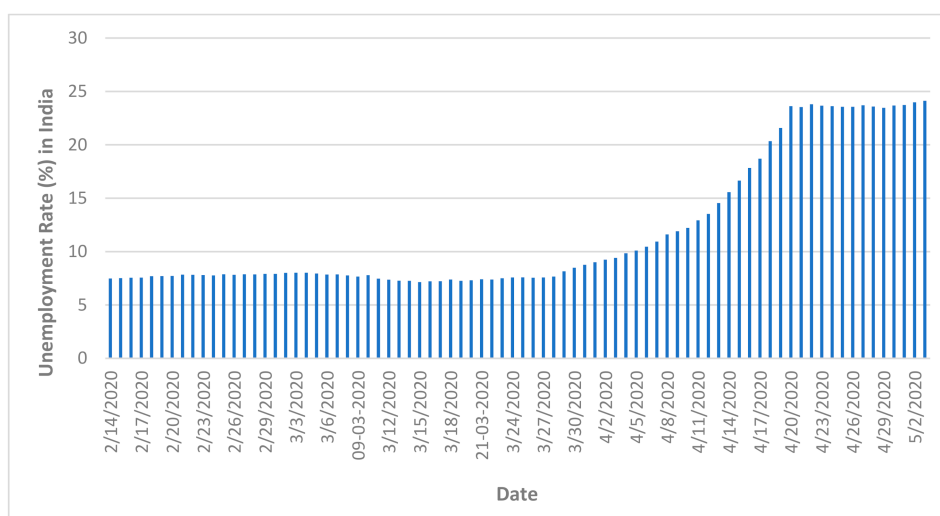


Figure 8. The change of unemployment rate in India during the study time (pre-lockdown and lockdown phase) [56].

3.3.1. Analysis of Policy Measures

In order to cope up with this pandemic, the Finance Minister of India announced a relief package worth USD 22.5 billion (Indian Rs.1.7 lakh crore) under the “Pradhan Mantri Garib Kalyan Yojana” (Prime Minister’s Poor welfare scheme) for the low-income population [57] (Figure S1). The measures, if implemented properly, are intended to give some sort of relief to the informal workers and other poor people. However, the government should rethink to reduce the agony of these people in long-run. As per the Economic Survey of 2018–19, almost 93% of India’s total workforce is informal, which includes daily wage earners such as construction workers, brick field workers, petty traders, rickshaw and e-rickshaw drivers, barbers, vegetable sellers, landless labors, and many others. The Government should come up with complete set of relief package to help them out in this crisis period. The proposed package accounts for only 0.8% of estimated GDP [58]. The other COVID-19 affected G20 countries have announced a satisfying relief package for battling against this contagion.

Japan has topped the list among G20 countries. India’s COVID-19 stimulus commitment size is not at all satisfactory as compared to others (Figure 9).

To fight against this emergency, the Reserve Bank of India has also undertaken several policy measures on 27 March 2020 [59] (Figure S2). On 20 April 2020, RBI announced, in consultation with the Government of India, that the limit for Ways and Means Advances (WMA) for the period of six months from April 2020 to September 2020 will be revised to USD 26.112 billion (Indian Rs. 200,000 crore) [60]. In addition to the above, the Reserve Bank of India announced a special liquidity fund of USD 6.565 billion (Indian Rs. 50,000 crore) on 27 April 2020 [61]. Sharp volatility in the Indian Stock market due to the COVID-19 has imposed liquidity stress on the high-risk debt mutual fund segment. The industries will be able to maintain their liquidity with this special liquidity fund and will ensure financial stability.

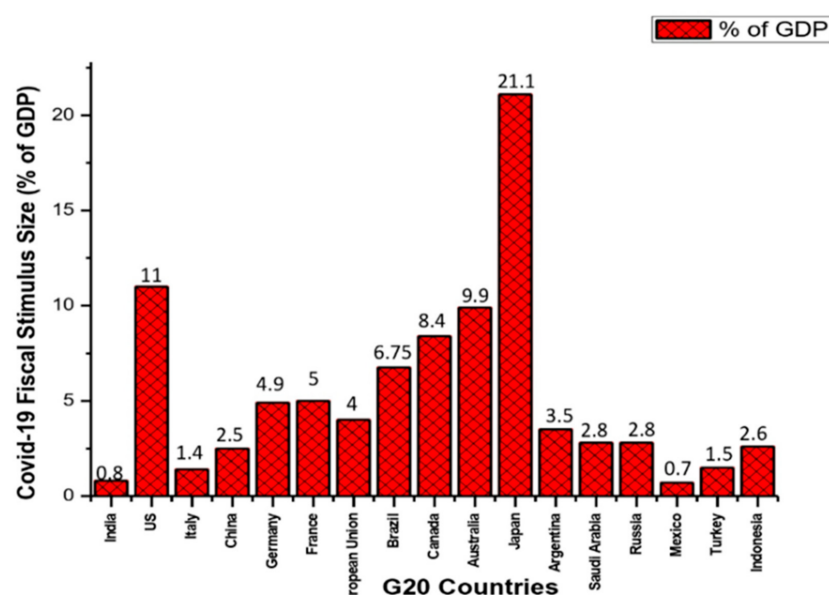


Figure 9. Covid-19 stimulus commitment size (as % of GDP) [57].

3.3.2. Analysis of Sectoral Impact

Tourism, hospitality, and aviation are among the worst affected sectors that are facing the maximum losses. Consumption has also been affected due to the decline in income levels. Lockdown has made the financial market tremendously unstable, leading to wealth erosion of investors. Supply side has also been disturbed due to the shutdown of factories and unavailability of the raw materials. Some sectors like chemical products, automobiles, pharmaceuticals, and electronics, among others, have been overwhelmed by the raw material and component shortages. The outbreak of coronavirus has also impacted the international trade adversely. Daily wage earners and migrant workers are the worst sufferers with zero level income in India. Millions of workers are trapped far away from their hometown with no work, money, and safety. Some migrant workers walked more than thousand kilometers to return to their hometowns and villages. However, the government has announced some monetary benefits for them and gave permission to run some special trains between selected cities to move them on May 1, 2020 [62]. Agriculture, domestic and international travel [63], sports and entertainment, and tourism [64] have majorly been affected due to this lockdown. The effect has also been seen on other sectors such as e-commerce, education and skill, financial services and fintech, retail, automobiles, medical services, real estate and construction, consumer durables, micro, small and medium enterprises (MSME), power generation, renewable energy, and textiles, among others (Figure S3).

3.3.3. Analysis of Indian Stock Market

Financial markets in India are observing sharp volatility in sync with the fall in global indices in the US, Europe, Asia, and other developing economies. Performance of the Indian Stock Market has always been linked with the global market. In the US, the Dow Jones Industrial Average (DJIA) fell to 23,533.22 points on 11 March 2020, which was 25,018.16 points on March 10, 2020 [65]. This was due to the WHO's declaration of the COVID-19 as a pandemic. NASDAQ Composite was also crashed by 4.79% on that day. However, since the announcement of \$2 trillion relief package on 25 March 2020, the DJIA gained 3271.78 points or by 15.43% on 30 April 2020. Other global indices also witnessed the similar trends. The Indian Stock Market has also witnessed volatility given the present global slowdown and domestic lockdown. All broad market index and sectoral indices ended with declines. A comparative study was generated by analyzing two stock market indices, namely, SENSEX [66] and NIFTY 50 [67], to understand the trend and volatility between pre-lockdown and lockdown phases.

SENSEX was showing a declining trend during the pre-lockdown phases due to the decline in the global market, as the pandemic has raised the fear of worldwide recession. India observed “Janta Curfew” (public lockdown) on 22 March 2020, to fight against COVID-19 and on the very next day, The BSE SENSEX fell 3934.72 points or by 13.15%, which was recorded as the biggest single day fall after three years (Figure 10A). The index witnessed an increasing trend during the lockdown phase as compared to the pre-lockdown phase. It gained 5184.84 points during this phase. After announcement of the relief package on 26 March 2020, the index was lifted by 1410.99 points or by 4.94%. However, the crash was unexpected after the Reserve Bank India’s policy announcement on 27 March 2020 (Figure 10B). The National Stock Exchange, NIFTY 50, also recorded a declining trend like SENSEX. It was closed at 7610.25 points and lost 1135.20 points or 12.98% on 23 March 2020, after observing “Janta Curfew” (public lockdown) (Figure 10C). It also witnessed an increasing trend during the lockdown phase like BSE SENSEX. The index gained 1542.05 points during this phase. The Government of India’s relief package announcement effect was seen on 26 March 2020, which lifted the index by 323.6 points or by 3.89% (Figure 10D). It can be inferred from the trend that the returns were highly deviated and volatile in nature. SENSEX was more volatile (4.02%) than NIFTY 50 (3.97%) during this phase. Returns of Sensex and NIFTY 50 were declined sharply from 5.75% to −13.15% and from 5.83% to −12.98%, respectively, on 23 March 2020. This was due to the negative perception of stock market investors (Figure 10E). The COVID-19, global economic condition, and “Janta Curfew” (public lockdown) on 22 March 2020, have raised the fear of wealth loss among those investors. It can be observed that the market remained volatile during this phase also. However, volatility of SENSEX came down to 3.22%, as compared to 4.02% in pre-lockdown phase. Investors managed to get an average return of 0.81% during this phase. NIFTY 50 was also reflecting the same picture with a lower volatility of 3.06%. Therefore, the market crawled back slowly with high volatility and is expected to recover fast (Figure 10F).

From the above analysis, it can be inferred that both the indices have rebounded during the forty days lockdown phase. Calculated average daily market return during pre-lockdown study period was −1.65% on SENSEX and −1.67% on NIFTY 50. During the lockdown phase, it went up to 0.81% on SENSEX and 0.82% on NIFTY 50. The results suggest that the market is moving in a positive direction. Once this pandemic is over with strong recovery of global market, the Indian Stock Market will also rebound fast. Although the Government of India declared a relief package to fight against this pandemic, proper implementation of this package is paramount at the ground level. Food, safety, and shelter are the needs of this hour for migrant workers who were trapped all over the country. The Government of India should take prompt action for their settlement. There are policy measures in different sectors that may restore the growth and performance of the Indian economy (Figure S4). On the other hand, Central and State governments should work jointly to minimize the effects of this pandemic.

Descriptive statistics are summarized in this section to describe the basic features of the economic data set. Table 6 shows the descriptive statistics of the variables employed in the study. During 26 trading days of the pre-lockdown phase both SENSEX and NIFTY 50 recorded a higher mean value as compare to the lockdown phase of 23 days. Mean returns of both SENSEX and NIFTY 50 during pre-lockdown phase were negative. However, the standard deviations of return for both the indices have decreased in the lockdown phase with a positive mean return.

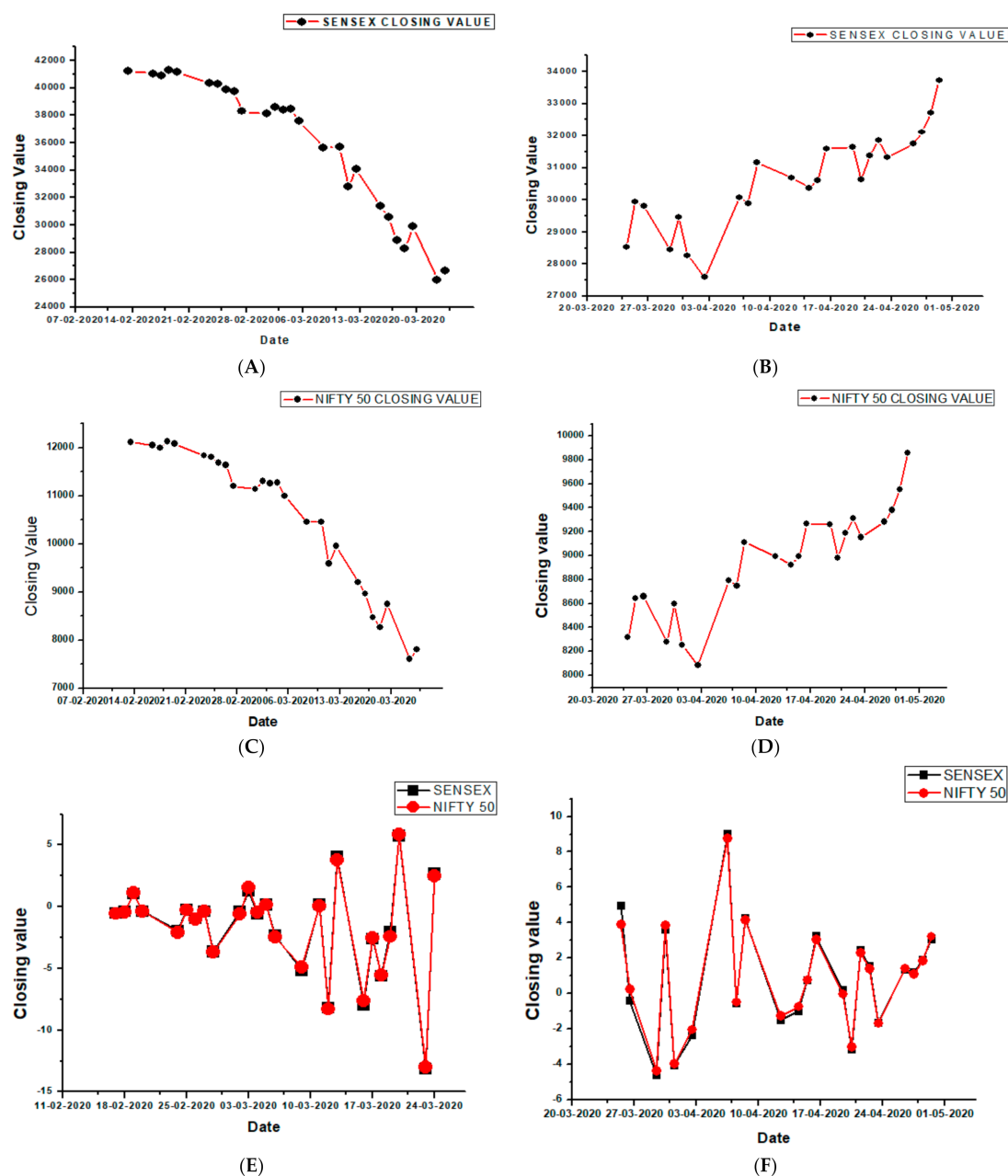


Figure 10. Trend of (A) BSE SENSEX in pre-lockdown phase, (B) BSE SENSEX in lockdown phase [65]; (C) NIFTY 50 in pre-lockdown phase, (D) NIFTY 50 in lockdown phase [66]; and Daily Return (%) of SENSEX and NIFTY 50 in (E) pre-lockdown phase and (F) in lockdown phase.

The results of the Karl Pearson's correlation coefficient test were analyzed in this section. Pair wise correlations are reported in Table 7. The correlation matrix showed significant and moderate negative correlation between SENSEX return and increase in confirmed cases of the COVID-19 in the pre-lockdown phase. Significant and moderate negative correlation between NIFTY 50 return and increase in confirmed cases of the COVID-19 was also observed during the same period. Both were significant at 1% level ($p = 0.05$) of significance. Therefore, the market reacted negatively to the increase in confirmed cases of COVID-19. Both SENSEX and NIFTY 50 returns dropped as the number of confirmed cases increased. The correlation of SENSEX return with the increase in confirmed cases of COVID-19 and NIFTY 50 return with the increase in confirmed cases of COVID-19 was found to be insignificant during the lockdown phase.

Table 6. Descriptive statistics.

Variables	N	Maximum	Minimum	Mean	Std. Dev.	Skewness	Kurtosis
SENSEX Index Value Pre-lockdown	26	25,981.24	41,323.00	35,977.45	5017.58	−0.717	−0.894
NIFTY 50 Index Value Pre-lockdown	26	7610.25	12,125.90	10,536.67	1475.16	−0.706	−0.899
SENSEX Index Value in Lockdown phase	23	27,590.95	33,717.62	30,591.09	1500.41	−0.151	−0.147
NIFTY 50 Index Value in Lockdown phase	23	8083.80	9859.90	8940.99	447.03	−0.169	−0.337
SENSEX Return Pre-lockdown (%)	25	−13.15	5.75	−1.64	4.02	−0.993	1.891
NIFTY 50 Return Pre-lockdown (%)	25	−12.98	5.83	−1.67	3.97	−0.954	1.868
SENSEX Return in Lockdown phase (%)	22	−4.61	8.97	0.81	3.22	0.466	0.599
NIFTY 50 Return in Lockdown phase (%)	22	−4.38	8.76	0.82	3.06	0.470	0.826

Table 7. Pair wise correlation matrix.

Variables	SENSEX Return in Pre-Lockdown	Growth in Confirmed Cases of COVID-19 in Pre-Lockdown	NIFTY 50 Return in Pre-Lockdown	SENSEX Return in Lockdown Phase	Growth in Confirmed Cases of COVID-19 in Lockdown Phase	NIFTY 50 Return in Lockdown Phase
SENSEX Return in Pre-lockdown	1					
Growth in confirmed cases of COVID-19 in pre-lockdown	−0.647 *	1				
NIFTY 50 Return in Pre-lockdown		−0.647 *	1			
SENSEX Return in Lockdown phase				1		
Growth in confirmed cases of COVID-19 in Lockdown phase				0.03	1	
NIFTY 50 Return in Lockdown phase					0.029	1

* Correlation is significant at the 0.01 level (2-tailed).

4. Future Perspective

While the world is busy with the Mars Civilization project, establishing a footprint at outer space, undertaking research about black hole, building nuclear weapons, and building the fifth generation (5G) of wireless technology, among others, all the developments have come to a halt with the advent of a virus. The world leaders prepare themselves for wars by developing different types of arms and ammunition, but this time a nanometer-sized enemy arrests the whole world and becomes a potential global threat.

Restricting or quarantine can only be one of the means to defeat the COVID-19 pandemic. Quarantine is the ultimate option for public health concern that can only be achieved by individual consciousness. This study was performed during a time when no COVID-19 vaccines were available. The findings of this study showed that the increasing rate of the COVID-19 can be controlled by extending lockdown. Again, impact of this lockdown on atmospheric pollution is already established by many researchers [68–70]. Steps like airport screening, proper treatment of suspected individuals, and their isolation should be strictly maintained. The situation could remain up until 2022 [71]. In this perspective, various future measures may curtail the risk of this pandemic, including lockdown on holidays, allowing VR (virtual reality) shopping for malls and other commercial stores, and allowing the least human interaction at malls by using entry pass with timer. The districts should be made self-sufficient for overcoming this crisis. Providing good medical facilities, hospitals with advanced technology, and highly skilled doctors for each individual district of the country are the basic requirements. Opening of commercialized grocery store or supermarkets for each individual district, where the farmers could sell their crops, vegetables, and handmade products, among others, to the local people can be the other way to make it more self-sufficient. The education sector could enhance its focus on virtual classroom facilities and online classes. This will not only be a solution for a pandemic like the COVID-19, but can also be a smart move towards giving quality education across the nation. In the era of social networking platforms such as Facebook and WhatsApp, pushing the country towards cashless transaction could be another smart and futuristic move to combat such a pandemic. As the virus can survive for about 24 h on paper [26] and about 72 h on metal [72], online transaction must be well practiced, ensuring zero contact. Use of robotics at various cash counters of bank, shops, hospitals, and restaurants, among others, could be a boon to cope with this situation. Many sectors and organizations are indifferent towards work from home culture; the same needs to be encouraged at different sectors with proper planning. The assessment of home schooling by “predicted grades” can be a suitable alternative [46]. The unorganized workers could be engaged to produce sanitizer, hand liquid soap, masks, and other personal protective equipment (PPE) at different community or district levels.

The global awareness to fight against this pandemic should be generated. Governments of each nation need to utilize funds for large scale research based on their climatic conditions. A continuous generation of disaster funds, developing vaccine with minimum cost, and sufficient supply of PPE for the health care system and individuals are also required. To curb such a crisis, a COVID-19 Detection Kit should be made available at online sites. The kit should detect the virus in person instantly; moreover, a part of district private or government hospitals should be engaged to make COVID-19 detection kits as per issued standard. This will increase the availability of testing kits and will ultimately lead to more testing.

5. Conclusions

The world has witnessed several severe epidemics, such as the plague during 1812–1819, first cholera pandemic during 1816–1826, second cholera pandemic during 1829–1851, third plague pandemic 1855–1860, and smallpox during 1877–1977, among others, and global recessions, such as The Great Depression of 1929–1939, The OPEC Oil Price Shock of 1973, The Asian Crisis of 1997, and the US Subprime crisis of 2008, and has also managed to recover. The incidence of coronavirus outbreak makes the world rethink its unlimited resource utilization and overexploitation. The need for sustainability comes from the high demand for food. The disparity between need and greed forces the entire world to face this hardship. A sustainable future plan by developing environmentally friendly townships and changing lifestyle of individuals can head us towards a safe contaminant free environment.

Our society needs to be prepared to cope with such types of pandemic like the way we prepare ourselves for war and other emergencies. Other than the extended lockdown, different moves have already been made by the Government of India at the state and district

levels. To strengthen the fight, the right information has been circulated by the Ministry of Health and Family Welfare along with the creation of the PM (Prime Minister)-Care Fund. Other important measures have also been adopted, like digital collaboration, advancement of new technology, and increasing the capacity of quarantine centers [73]. The lockdown has affected different sectors of the Indian economy like industry, agriculture, education, transportation, and tourism, among others. All these sectors have been witnessing a tremendous downfall since the outbreak of COVID-19, imposing an adverse effect on the third “P” of sustainability, i.e., Profit. Generation of energy, production of food, and materials, among others, have also been impacted by the crisis. The descriptive statistics performed in this study show the higher mean values of both stock market indices (SENSEX and NIFTY 50) during the pre-lockdown period in comparison to the lockdown period. Mean returns of both indices are negative in the pre-lockdown period, which implies the impact of lockdown on both of these indices. On the other hand, a positive impact is observed on the environment with minimum anthropogenic activities. This study showed that the concentration of PM_{2.5}, PM₁₀, NO₂, and O₃ have come down to their respective standard limit as set by the Central Pollution Control Board and the Ministry of Environment and Forest at 12 select sampling stations in India during the lockdown period. Other air quality parameters such as NH₃, SO₂, and CO are already within the standard limit during the pre-lockdown and the lockdown periods at all sampling stations. AQI values establish the improvement of air quality during the lockdown period. This impact is likely to be extended over coming years. It would be foolish to expect a fast economic rebound from the present situation. In this crisis period, more fiscal stimulus is desired. It will have an impact on fiscal deficit, but it is expected to recover after economic rebound. Policy makers should make policies to attract foreign direct investments. They will bring in capital inflow, new technology, and employment opportunities. They will also ensure increase in exports, exchange rate stability, development of backward areas, and overall economic development. Being an importer of oil, India can take the advantage of the falling oil price by importing oil cheaply and keeping it in the reserve for future. Given the sharp volatility in the stock market, investors are more inclined to risk free investment. Domestic and institutional investments can be attracted towards risk free instruments like bank fixed deposit, T-Bills, commercial papers, and other money market instruments. It will be an effective policy that will increase capital inflow in the money market. With these policies, the cost of COVID-19 on the economy can be minimized to some extent. Application of preventive vaccine against the COVID-19 pandemic will ensure the sustainability of people, planet, and profit, and the intensity of COVID-19 will certainly be reduced after successful introduction of different effective vaccines.

Supplementary Materials: The following are available online at <https://www.mdpi.com/2071-1050/13/5/2873/s1>: Figure S1: Highlights of Announcement by Indian Government to fight against COVID-19 pandemic [55], Figure S2: Policy Actions by RBI to fight against COVID-19 pandemic [57], Figure S3: An analysis of Sectoral Impact for COVID-19 pandemic [60–62], Figure S4: Policy Recommendation for COVID-19 pandemic, Table S1: Possible sources and consequences of major air quality parameters in India [21–24], Table S2: National ambient air quality standards in India [49].

Author Contributions: S.K. and I.G. designed the study and T.G., P.C. and T.C. collected the data and performed the environmental analysis. S.S. and A.S. performed the economic analysis. S.K. and I.G. performed the social analysis. S.K., I.G. and A.R. interpreted the data. S.K. and I.G. wrote the paper with contributions from A.R., S.S., A.S. and T.G., A.R. proofread the manuscript. All authors have read and agreed to the published version of the manuscript.

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