



## Impact of COVID-19 on Environment During Lock-Down Period: A Case Study

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**ABSTRACT:** The coronavirus pandemic has caused a global reduction in economic activity and although this is a major cause for concern, the slowing down of human activity during lockdown period appears to have had a positive impact on the environment. Due to less human activities, manmade pollution has gone to almost zero level in this period in many parts of the world. In India, many attempts have been made for making Ganga river clean during the last many years. That Ganga river has become clean in a three week lock-down. In the month of April, residents of Jalandhar city in Punjab, got a surprise when they witnessed Dhauladhar Mountain range situated at a distance of about 200 Km in Himachal Pradesh (H.P.) for the first time in a decade. Similarly the Pir Panjal range which extends from H.P. to Jammu and Kashmir was a blur to the locals, recently the view is completely clear.

**Keywords:** Pandemic; pollution; lock-down and environment.

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**INTRODUCTION:** What we have done to our environment in the blind race of the development is a matter of concern to all of us. This is the result of a process called pollution. In this process contaminants are introduced into the environment that causes adverse change.<sup>1</sup> A pollutant is a waste substance that pollutes everything i.e. air, water and soil etc. Pollution has endangered the stability of the Earth's support systems and threatened the continuing existence of human societies.<sup>2</sup>

Study made by the Lancet Commission in Oct., 2017 on Pollution and Health found that global pollution, specifically contaminated air, water, soil kills about nine million people annually, which is three times the number of deaths caused due to combined effects of malaria, tuberculosis and AIDS, and about 15 times more than deaths caused due to wars and other forms of human violence.<sup>3</sup> We have been living in this polluted environment for a longer period. Each natural resource in the environment is contaminated to lesser or more extent. We all are paying directly or indirectly due to this pollution. Recently in 2019, we came across a deadly corona virus which may have become very dangerous in this polluted environment.

Corona viruses are a group of related RNA viruses that cause diseases in mammals and birds. In human beings, these viruses cause respiratory tract infections that can range from mild to fatal. Mild symptoms include some cases of the common cold (which is also caused by other viruses predominant-

ly rhinoviruses), while other fatal varieties can cause SARS, MERS AND COVID-19. The virus (officially named SARS-CoV-2) has been responsible for millions of infections globally, causing hundreds of thousands of deaths. The disease caused by an infection with SARS-CoV-2 is called COVID-19, which stands for corona virus disease 2019.

This virus has been originated from a food market in Wuhan, China, in December 2019. From there, it spread into many countries of the world. As a result, in the world horrified by corona pandemic, lock-down was imposed and human activities were very much restricted. During this period of lockdown environment got the chance of recovery. In the present study effects of chemical pollutants (particularly particulate matter) on the health of human beings have been discussed and corona virus can be more fatal in the polluted environment.

**Sources of Chemical Pollution:** Human activities have caused the degradation of the environment. Our technological advances have made us a species largely dependent on chemicals and these chemicals are toxic to life and our environment. Pollution results when chemicals are released into environment and disturb the balance of our ecosystems, threaten our health, pollute the air we breathe and contaminate our food. Three factors determine the severity of a pollutant: its chemical nature, concentration, area affected and the persistence. Following factors are the main sources of chemical pollution.

**1. Transportation** – Emissions from the vehicles are one of the biggest causes of air pollution.<sup>4, 5 & 6</sup> China, Russia, India and USA<sup>7</sup> etc. are leading countries in the world in air pollution emissions. Cars, planes and other conveyances after burning fossil fuel in the form of petroleum release CO<sub>2</sub> and other greenhouse gases which contribute to global warming and climate change.

**2. Factories and Industries** – The sources of pollution vary from small unit of cigarettes to large volume of emission from industrial activities<sup>8 & 9</sup>. Major stationary pollution sources include chemical factories, coal-fired power plants<sup>10</sup>, petrochemical plants, large live-stock farms (dairy cows, poultry etc.), metals production factories and plastics factories etc.

### Effects of Chemical Pollutants:

1. The pollutant that affects mostly the people is **particulate matter (PM)** and is used as a measure for air pollution. The term PM is used for a mixture of solid particles and liquid droplets suspended in air<sup>11</sup>. These particles are formed from several sources such as combustion processes in road traffic and factories, tire wear, forest fires, chemical or photochemical reactions in the atmosphere, particles from the soil surface and volcanic eruptions<sup>12</sup> etc.

World Health Organization (WHO) estimates that PM<sub>2.5</sub> concentration contributes to approximately eight lakh premature deaths per year, ranking it the 13th leading cause of mortality worldwide<sup>13</sup>. The size of particles is directly linked to its potential for causing health problems. Small Particles i.e. PM<sub>2.5</sub> or fine particulate matter which are 2.5 micrometers in diameter or less can pose serious health problems because they can penetrate deep into your lungs and potentially your bloodstream.

People suffering from heart or lung diseases, children and older adults are most likely to be affected by particle pollution exposure. Long-term exposure to high levels of PM causes adverse health effects for those who live close to air pollution sources.<sup>14 & 15</sup>

Children are not small adults<sup>16</sup> and their excess exposure to PM affects their lung development.<sup>17, 18</sup>

Dry mouth, cough, wheezing, and limited activities caused due to breathing problems are the most common symptoms of respiratory diseases resulted from air pollution.<sup>20, 21 & 22</sup>

Not only this, pollutants also damage environment. PM particles can be carried over long distances by wind where they settle on ground or water. Depending on their chemical composition they make lakes and streams acidic and change the nutrient balance in coastal waters and large river basins.

2. The main effect of breathing in raised levels of NO<sub>2</sub> (nitrogen dioxide) is the increased likelihood of respiratory problems. NO<sub>2</sub> inflames the lining of the lungs, and it can reduce immunity to lung infections.
3. SO<sub>2</sub> (Sulfur dioxide) is formed from burning fossil fuels. O<sub>3</sub> (ozone) at ground level is formed by the reaction of sunlight with pollutants from vehicle emissions. O<sub>3</sub> is a major factor in causing asthma and NO<sub>2</sub> and SO<sub>2</sub> can also cause asthma, bronchial symptoms, lung inflammation and reduced lung function.

## RESULTS AND DISCUSSION:

### Effects of lock-down:

**1.** Due to reduction in industrial and transport activities in the world all natural resources i.e. air, water and soil have become clear. There have been many visible effects of this lock-down period. Water bodies have cleared up. In India, many attempts had been made for making Ganga river clean during the last many years and a little success has been seen so far even after spending about 20,000 crore rupees in the last five years. That Ganga river has become clean in a three week lock-down. The water of Rewalsar lake in Distt. Mandi in H.P. has become crystal clear.

In the month of April this year, residents of Jalandhar city in Punjab, got a surprise when they witnessed Dhauladhar Mountain range situated at a distance of about 200 Km in H.P. for the first time in a decade. Similarly the Pir Panjal range (Pir Ki Gali) which extends from H.P. to Jammu and Kashmir was a blur to the locals, recently the view is completely clear.

**2.** Due to less movement of vehicles, closure of factories and construction work pollution has gone to almost zero level in this period in many parts of the world. May month in India, which usually records peak carbon emissions due to the decomposition of leaves, has recorded what might be the lowest levels of pollutants in the air since the 2008 financial crisis. March 22 was the 'Janata Curfew', following which; a significant dip in air pollution levels was measured across the country. Cities like Delhi, Kolkata and Bengaluru, saw their average Air Quality Index (AQI) staying within two digits.

**3.** Data Source: The analysis carried out by the Centre for Science and Environment, New Delhi has been used in the paper.

During lockdown daily average levels of PM<sub>2.5</sub> have reduced sharply from the pre-lockdown days in India's big cities like Delhi, Mumbai, Kolkata, Bengaluru. But the impact of this overall declining trend is dra-

matic on daily peak-hour pollution. The analysis has assessed hourly trends in PM<sub>2.5</sub> levels during the day before and after the lockdown and also on the day of the Janata curfew.

With traffic minimized, hourly trends have plummeted, reducing daily exposures to toxic vehicular pollution. Overall daily levels and hourly PM<sub>2.5</sub> concentration that are also affected by other pollution sources have reduced considerably. For comparison, the average of March 18-19, 2020 has been taken as regular days and the average of March 25-26 as lockdown days. Janata curfew was on 22 March. On regular days, peak hour pollution during morning and evening traffic hours normally inflates like a balloon. But after the lockdown and imposition of curfew, the peak hour PM<sub>2.5</sub> conc. has dropped by 57 % in Delhi (Figure 1).

From studies done by System of Air Quality and Weather Forecasting and Research (SAFAR) and Automotive Research Association of India (ARAI) and The Energy and Resources Institute (TERI) in 2018, it is found that vehicles contribute about 40 % of the total particulate load in Delhi. Comparatively, the load is somewhat lesser on Janata curfew day in Delhi. This could be due to the shorter duration of Janata curfew (14 hours) that had also shifted the peak hours beyond the curfew hours. It is also found that public had rushed out for panic buying on that day. Other cities like Mumbai, Kolkata, Bengaluru also witnessed a severe drop in peak hour pollution and also daily average levels with some variation.

As India locked down, air pollution falls sharply in mega cities. The Centre for Science and Environment's analysis of daily pollution data before and during the lockdown in Delhi, Mumbai, Kolkata and Bengaluru showed striking improvement.

**City-wise trends in hourly pollution and peak hour pollution at a glance:** Hourly trends in PM<sub>2.5</sub> levels on a regular day, after lockdown and on Janata curfew day in Delhi, Mumbai, Kolkata & Bengaluru have been shown in Figures 1,2,3 & 4 respectively.

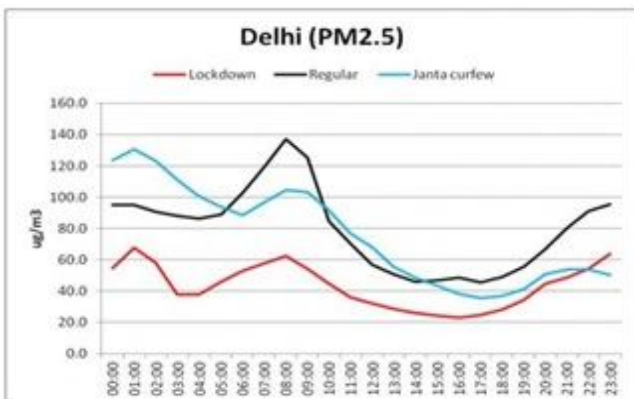


Figure 1: Hourly variation in PM<sub>2.5</sub> levels in Delhi.

**Delhi:** Daily peak declined on a lockdown day by about 57 % and by about 24 % on a Janata curfew day as compared to a regular day (Note: Average of 37 stations).

**Mumbai:** Daily peak declined on a lockdown day by about 52 % and by about 65 % on a Janata curfew day as compared to a regular day.

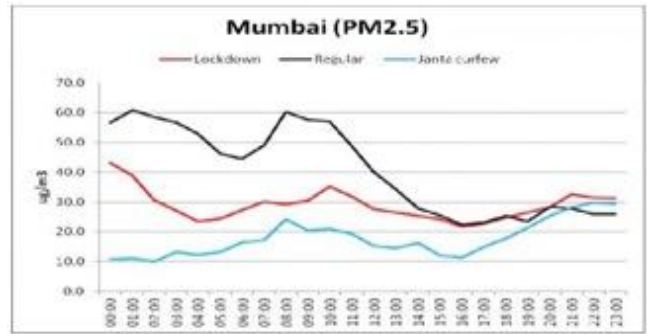


Figure 2: Hourly variation in PM<sub>2.5</sub> levels in Mumbai.

**Kolkata:** Daily peak declined on a lockdown day by about 46% and by about 82 % on a Janata curfew day as compared to a regular day (Note: Average of 7 stations).

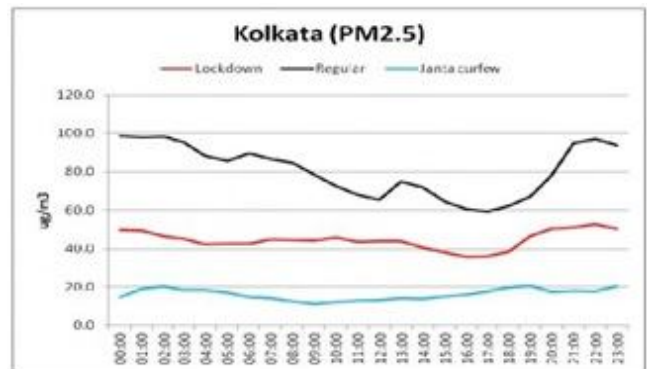


Figure 3: Hourly variation in PM<sub>2.5</sub> levels in Kolkata.

**Bengaluru:** Daily peak declined on lockdown day by about 42% and by about 13 % on a Janata curfew day as compared to a regular day.

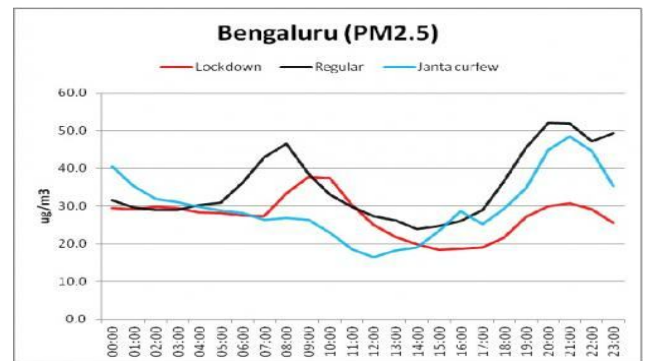


Figure 4: Hourly variation in PM<sub>2.5</sub> levels in Bengaluru.

In Mumbai, the lockdown started earlier and showed a sharper drop. So comparison has been done accordingly (March 17-19, 2020 Vs March 20-23, 2020). Indicatively, average daily PM<sub>2.5</sub> levels of couple of days preceding the 'Janata Curfew' show a drop of 26 %, 61 %, 60 % and 12 % in Delhi, Mumbai, Kolkata and Bengaluru respectively. This change is inevitable as human activities have reduced.

Daily PM<sub>2.5</sub> levels in Delhi, Mumbai, Kolkata and Bengaluru between March 9-23, 2020.

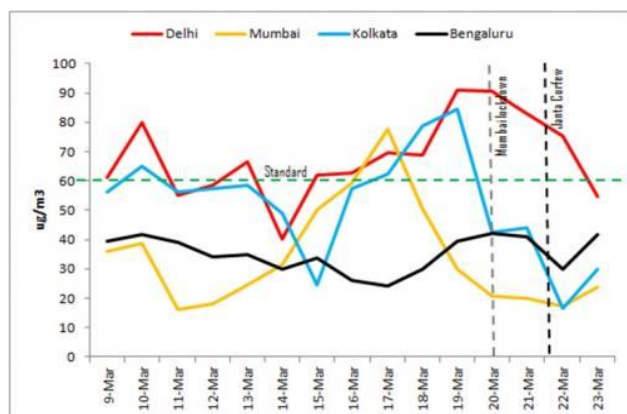


Figure 5: Daily variation in PM<sub>2.5</sub> levels.

Swift response to the pandemic has induced this change in air quality. Scientists have warned that this pandemic can get worse in areas with high level of pollution. European Public Health Alliance warned that patients suffering from chronic lung and heart diseases worsened by long-term exposure to air pollution are less able to fight lung infections. In India, the Collective of Doctors for Clean Air has warned that people suffering from chronic lung diseases living in highly polluted areas can be more vulnerable to corona virus disease.

This risk factor could have been reduced if overall air pollution had improved. Now, the search is on to understand the role of particulate pollution in spread of this virus. It is hoped that greater awareness about the role of air pollution in enhancing vulnerability of populations to such pandemics and the overall disease burden will strengthen collective and political action in the future.

**CONCLUSION:** Air pollutions mainly due to particulate matter have terrible effects on human health. So their control is vital and should be on the top of priority list of the governments. This public health emergency due to the COVID -19 pandemic and its unpredictability has given us a new prism to view the air pollution crisis. This pandemic has forced us to face the reality that long-term and sustained action to reduce air pollution and health risk is non-negotiable.

An effective and powerful environmental protection agency should have enough budgets for administration, research, development, monitoring, and full control of the environment including air pollution. All are asking how will this transitory change play out in the long run? As we all know that better air quality will benefit all of us, everywhere.

**CONFLICT OF INTEREST:** The author declares that I have no affiliation with or involvement in any organization or entity with any financial or nonfinancial interest in the subject matter or materials discussed in this manuscript.

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