

# **A review on : a study of air pollution on most controversial incident COVID 19**

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## **Abstract:**

Millions of people have been affected by the arrival of COVID-19. Due to the lockdown restrictions across India, there has been a major improvement in air pollution levels, India has been under complete lockdown to prevent the spread of COVID-19, which has a significant impact on the environment, human health, social and economic factors. To study baseline emissions when anthropogenic sources were drastically reduced during the lockdown and unlock phases in India. In most places, the lockdown results in a reduction of up to 15% in air pollution. Air quality improved greatly during the total lockdown period, giving city governments important information to develop laws and regulations on how to improve air quality.

## **Introduction:**

Air pollution is the cause of the disease. Corona virus disease has become a global epidemic affecting many countries including India. Air pollution refers to any chemical, physical or biological change that causes excessive disease. The first reported case of COVID 19 in India occurred in January 2020. Air pollution and global One of the main causes of overall death at the level is one of the main causes of death of more than three million people annually. After the lockdown in India, a lot of reduction in air pollution was seen before Corona. Currently in India, air pollution is found in major cities such as Delhi, Ahmedabad, Surat, Kolkata, Bangalore and Mumbai.



Figure:1

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### *As per COVID 19 air pollution*

India, which has the second-largest population in the world, Has a COVID-19 illness issue. On May 18, India started investigating 1 lakh (0.1 million) COVID-19 infection cases; by July 11<sup>th</sup>, there were a total of 8 lakh cases. In India, social Exclusion and lockdown regulations were used, but they also had an effect on the economy, Standard of living, and ecology. Where there was a negative effect on the economy and human Life, there was a good effect on the environment. reviewed that Ghosh et al.,( 2020)

Delhi, a megacity of 19 million people, is notorious for having poor Air quality, which is mostly caused by manmade pollutants. Even though the COVID-19 Pandemic represents a health emergency, Delhi's lockdown caused an unparalleled drop in Pollution emission sources of between 85% and 90%, which led to a dramatic decline in the Concentration of the majority of pollutants. Here, we present an experimental estimate of the Baseline level, which is the minimal amount of key criterion pollutants attained after lockdown In consistently fair weather. Epidemiologists claim that the effects of such chronic air pollution Exposure are excess respiratory and cardiovascular morbidity and death, which are more severe Than bouts of acute pollution. As the lockdown which was imposed on 24 March 2020, was Extended during April and May. Beig et al., (2020) stated.

Human are always stride toward the protection of the Environment and global climate change at various levels. Due to diverse reasons our efforts Were not enough It is clearly established that ever growing industrialization for the last two Decades is immensely polluted the hydrosphere, biosphere and atmosphere also other Overlooked concerns like air pollution, noise pollution, soil pollution. Air pollution it was found That

there has been a sharp drop in the major air pollutants like PM<sub>2.5</sub>, PM<sub>10</sub>, O<sub>3</sub>, SO<sub>2</sub>, CO, Hydrocarbons, and NO<sub>2</sub> as compared to the pre-lockdown phase. RS Sharma et al.(2021) studied.

The primary cause of worry for the entire world is the spread of COVID-19 or the coronavirus in recent months. Beginning on March 24, the Indian government has imposed a total shutdown. Third step lockdown was now proclaimed following the second step lockdown. India is currently in Lockdown 3.0. Although the effects of the lockdown have had a significant negative impact on our nation's economy, this circumstance. N. Das et al.,(2021) studied.

### *Air pollution after covid 19*

India started the lockdown on 24 March 2020. We analysed the air quality of three megacities of India, namely Mumbai, Delhi, and Kolkata, during the lockdown phase and compared it with the pre-lockdown and post-lockdown scenarios. We considered seven major air pollutants: PM<sub>2.5</sub>, PM<sub>10</sub>, NO<sub>2</sub>, NH<sub>3</sub>, SO<sub>2</sub>, CO, and O<sub>3</sub>. The air pollution level in the eastern part of Mumbai and the western part of Delhi and Kolkata usually remains high. Delhi was the worst polluted megacity, followed by Kolkata and Mumbai. Mahato et al.(2020) conducted a research.

The examine the changes in air quality during Different phases of the COVID-19 pandemic, including the lockdown and unlock period (post-Lockdown) as compared to pre-lockdown and to establish the relationships of the Environmental and demographic variables with COVID-19 cases in the state of Maharashtra, The worst-hit state in India. Sahoo, Mangla, et al.(2021)researched that.

## Current covid scenario of air pollution

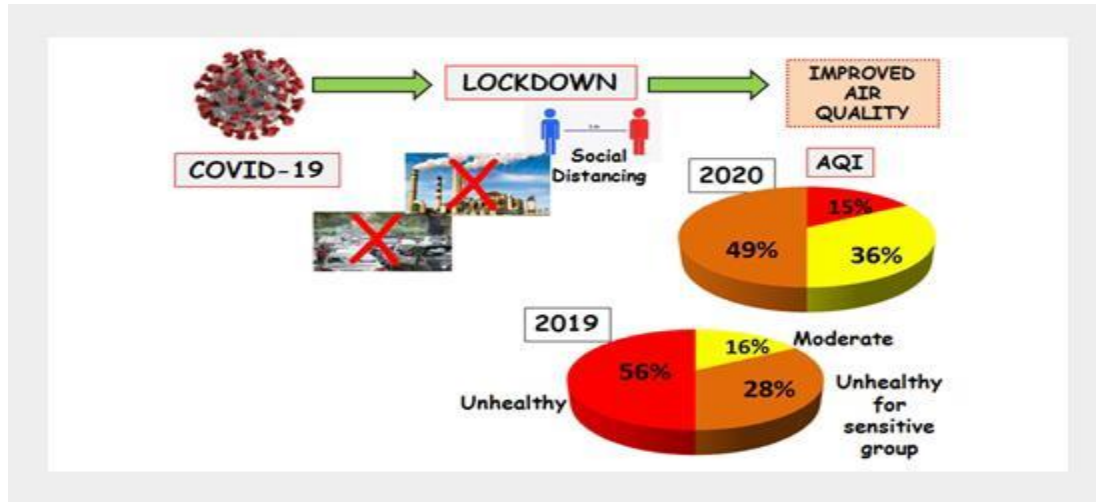


Figure:2

Source:[https://aaqr.org/images/article\\_images/2020/feature/20-05-0262.png](https://aaqr.org/images/article_images/2020/feature/20-05-0262.png)

The COVID-19 pandemic enforced nationwide Lockdown, which has restricted human activities from March 24 to May 3, 2020, resulted in an Improved air quality across India. The present research investigates the connection between COVID-19 pandemic-imposed lockdown and its relation to the present air quality in India; Besides, relationship between climate variables and daily new affected cases of Coronavirus And mortality in India during this period has also been examined. Chakraborty et al., (2021) conducted a survey.

Air quality data from the India of Delhi at Various COVID-19-related times, such as pre-lockdown, lockdown, and unlocked (post-Lockdown), in order to determine baseline air pollution levels and effects of the COVID-19 Lockdown emission scenario (2018–2020). The air quality improved throughout the lockdown Phases, with the areas affected by industry and transportation experiencing the biggest gains. The terrible exponential increase in the disease's death and transmission rates has caused the. Sahoo, Salomao, et al.,( 2021, p. 19)studied.

Lockdown has been Imposed everywhere to stop the sickness from spreading further. The effects of this lockdown Were profound on both the social and economic levels. It also had some beneficial effects on The environment in terms of air quality.

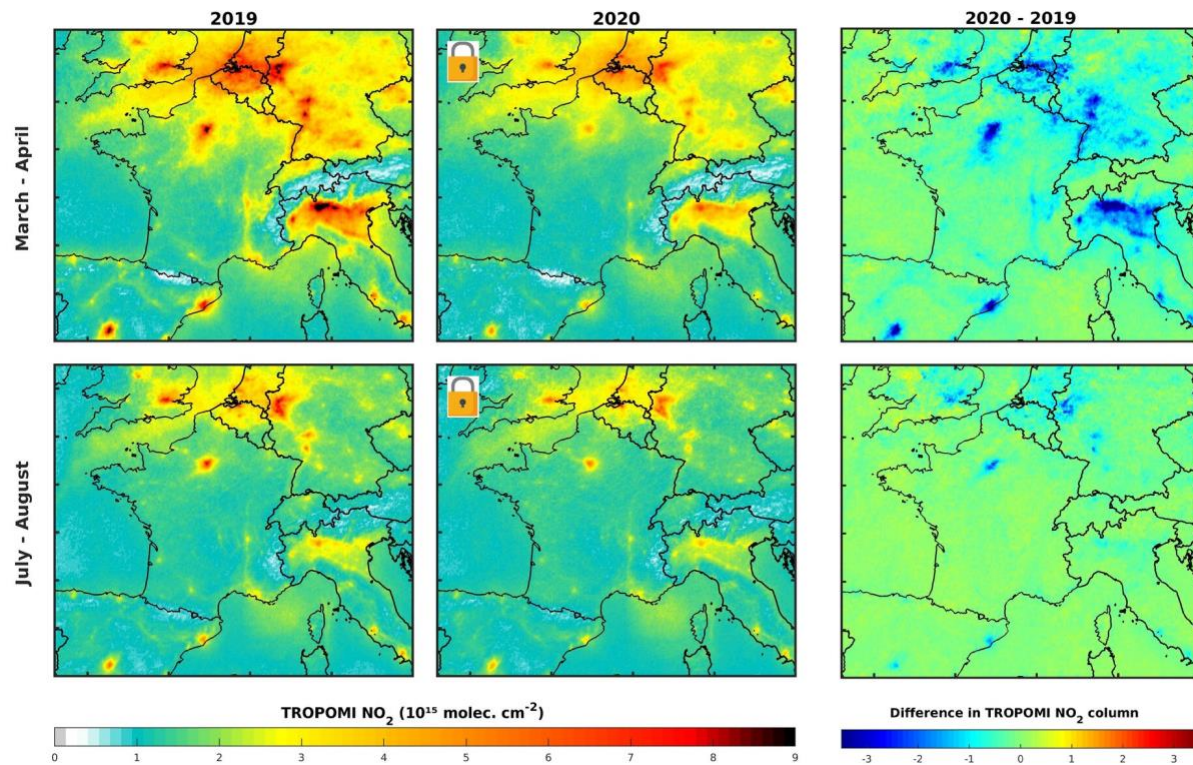


Figure:3

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The strict nationwide lockdown imposed in India beginning From 25<sup>th</sup> March 2020 to prevent the spread of COVID-19 disease reduced the mobility and Interrupted several important anthropogenic emission sources thereby creating a temporary air Quality improvement. This study conducts a multi-scale (national-regional-city), multi-species, And multi-platform analysis of air pollutants and meteorological data by synergizing surface And satellite observations. In contrast, sulphur dioxide (SO<sub>2</sub>) levels did not show any defined Reduction trend but rather increased in Mumbai, Bengaluru, and Kolkata. (Sathe et al., 2021) studied.



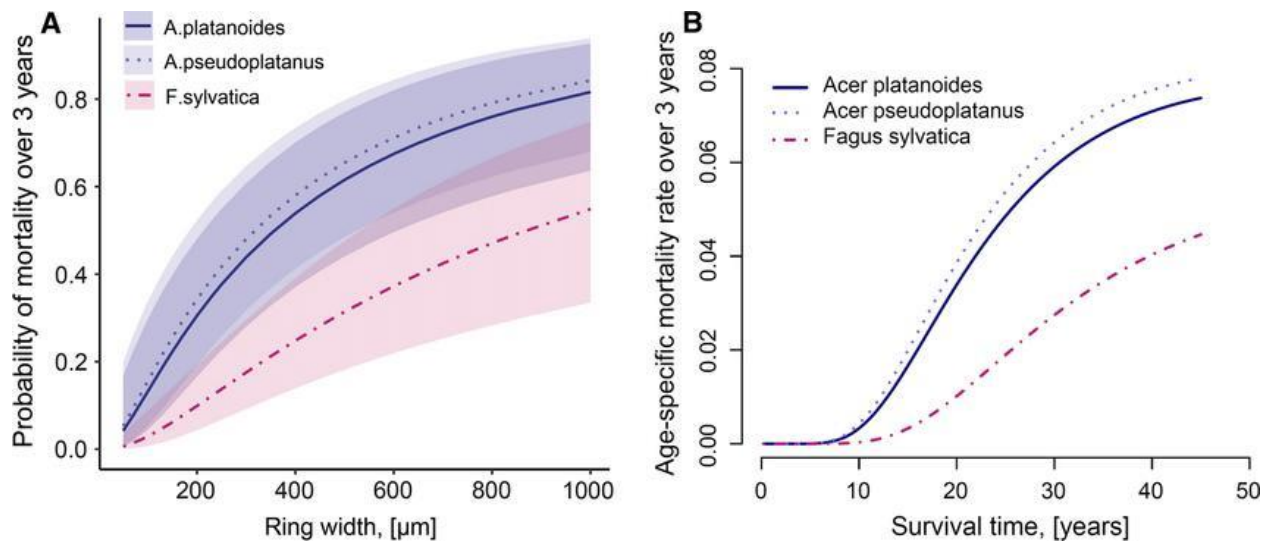


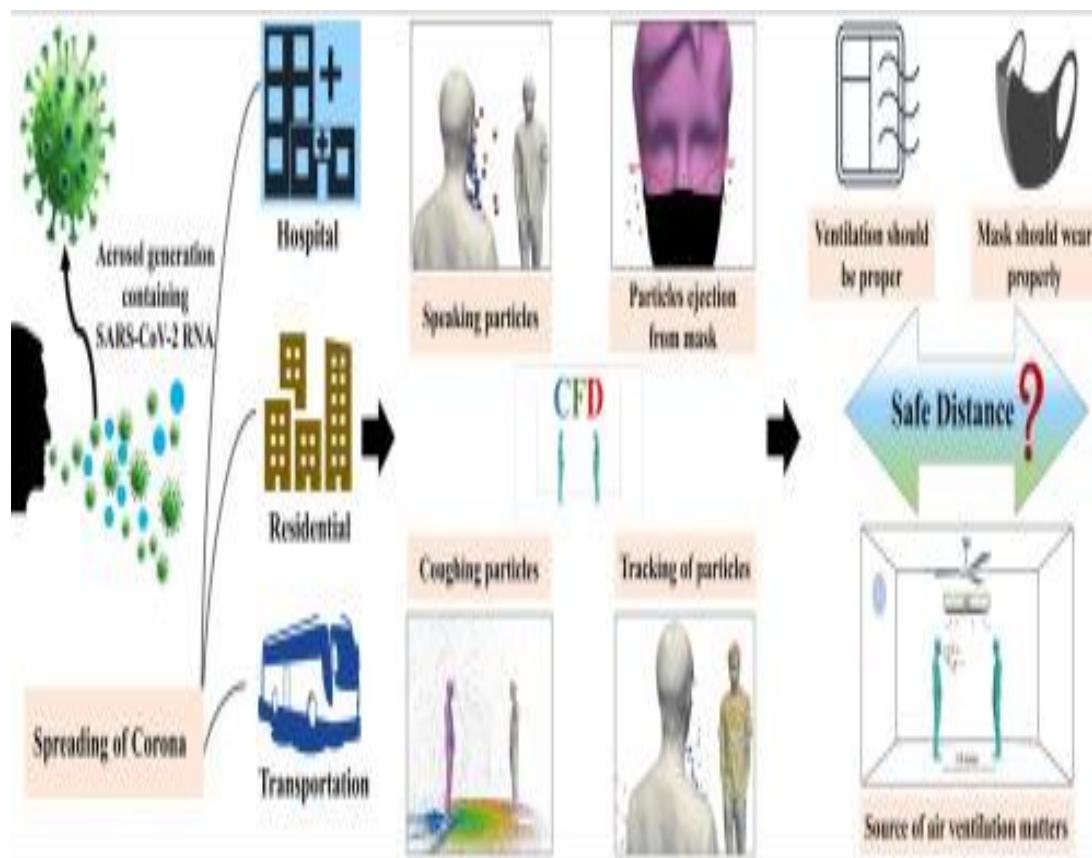
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The airborne nature of viral particles, adequate Ventilation has been identified as one suitable mitigation strategy for reducing their Transmission. While 'dilution of air by opening the window' has been prescribed by national And international health agencies, unintended detrimental consequences might result in many Developing countries with high ambient air pollution. A COVID airborne infection risk Estimator was used to estimate the probability of infection by aerosol transmission in various Commuter micro-environments: (a) air conditioned (AC) taxi (b) non-AC taxi (c) bus and (d) Autorickshaw. D. Das & Ramachandran,(2021)researched.

An extreme event the COVID-19 pandemic. Lockdown in India, in a bid to slow down the pandemic, helped in reducing air pollution levels of major Industrial cities, due to significant improvement in the air quality index. That have also Contributed in reducing global carbon emissions and greenhouse gas emissions. There have Been a 40–50% improvement in the riverine water quality in terms of dissolved oxygen, Biological oxygen demand, coliform bacteria levels and suspended particulate matter. Those Short-term environmental benefits may even pose larger threat to the environment during the Post-lockdown 'as usual scenario'. Mohanty et al.,(2020) surveyed .

Figure:5



Source: <https://ars.els-cdn.com/content/image/1-s2.0-S1342937X22001010-ga1.jpg>

January 30, 2020, India recorded its first COVID-19 Positive case in Kerala, which was followed by a nationwide lockdown extended in four Different phases from 25<sup>th</sup> March to 31<sup>st</sup> May, 2020, and an unlock period thereafter. It has come as a respite to the environment. Utilizing the air quality index data recorded during this Adverse time, the present study is undertaken to assess the impact of lockdown on the air quality of Ankleshwar and Vapi, Gujarat, India. The AQI data obtained from the Central Pollution Control Board was assessed for four lockdown phases. We compared air quality data for the Unlock phase with a coinciding period in 2019 to determine the changes in pollutant concentrations during the lockdown, analyzing daily AQI data for six pollutants (PM<sub>10</sub>, PM<sub>2.5</sub>, CO, NO<sub>2</sub>, O<sub>3</sub>, and SO<sub>2</sub>). Nigam et al., (2021) studied.

A nationwide lockdown was imposed in India from 24 March 2020 to 31 May 2020 to contain the spread of COVID-19. The lockdown has changed the atmospheric pollution across the continents. Here, we analysed the changes in two most important air quality related trace gases, nitrogen dioxide (NO<sub>2</sub>) and tropospheric ozone (O<sub>3</sub>) from satellite and surface observations, during the lockdown (April–May 2020) and unlock periods (June–September 2020) in India, to examine the baseline emissions when anthropogenic sources were significantly reduced. Gopikrishnan et al., (2022) reviewed.

The effect of global pandemic condition due To Covid-19 lockdown has an impact on the socioenvironmental scenario of Indian Sundarban Region. The objectives of the current chapter are to discuss the positive as well as the negative Impact of Covid-19 lockdown on the socioenvironmental scenario of Indian Sundarban. As the Tourism activity of Indian Sundarban area has been closed due to the lockdown situation, Pollution from mechanized boats and launches has been reduced. It is having a great impact on The mangrove faunal biodiversity. Restriction in the anthropogenic activities in the upper Estuarine region is also responsible for the betterment of environmental quality of the Indian Sundarbans region. Chaudhuri & Bhattacharyya,( 2021)reviewed.

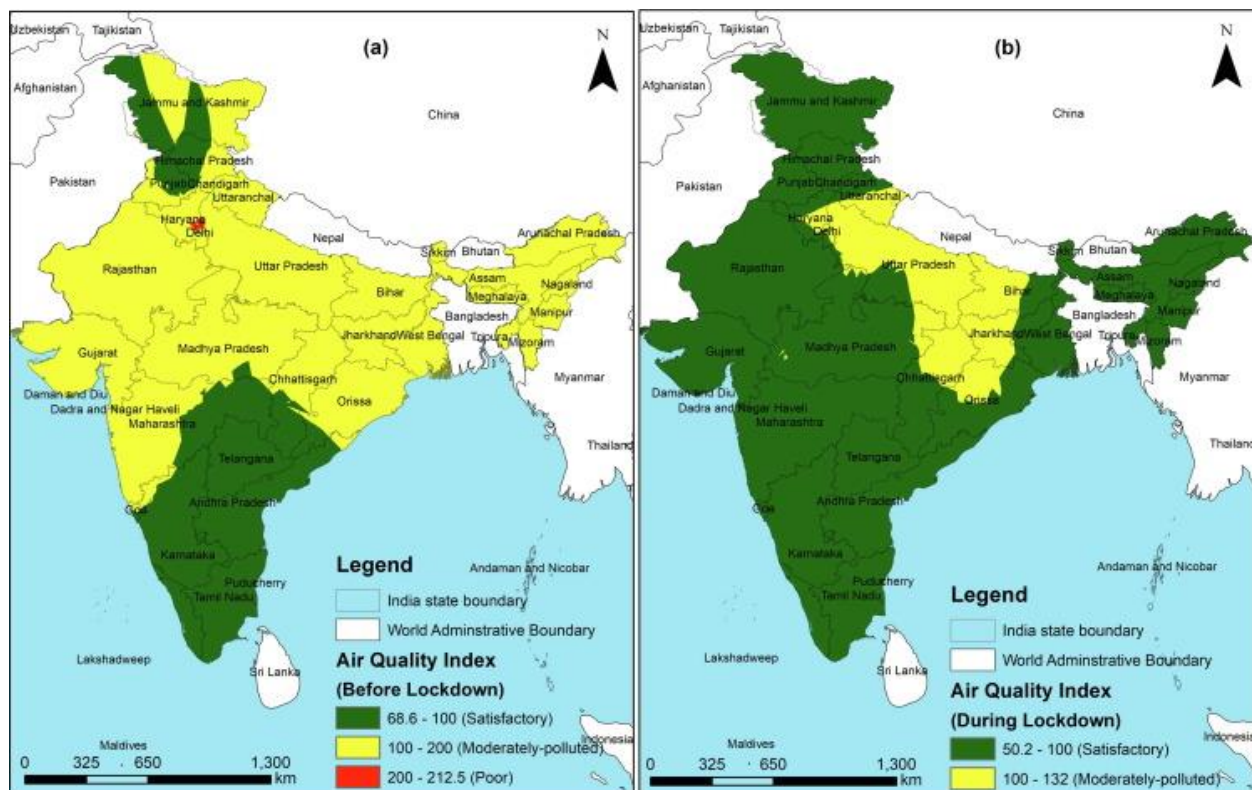


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The quarantine due to the ongoing novel coronavirus have an Immense impact on human mobility and economic activities as well as on air quality. The Drastic reduction in pollution levels in cities across the world, a large discussion has magnetized Regarding if the lockdown has an adequate alternative counter-measure for enhancing air Quality Simple before/after comparison approach were carried out to capture the declining trend In air pollution levels caused by the lockdown restrictions. The results showed that the Frequency distribution for NO<sub>2</sub> has more variable than that for PM<sub>2.5</sub>, and the distribution has Flatter from 2020 to the baseline 2018-2019 period. Benchrif et al,( 2021)studied.



The levels of PM<sub>2.5</sub> showed a significant increase of 525.2%, 281.2%, and 185.0% at sites S1, S2 and S3, respectively in the unlock 8 (January 2021), in comparison to its concentration in the lockdown phase. The COVID-19 pandemic Lockdown was provided a 'window' of reinstatement to natural resources including the air Quality, but the scenario after the phased unlocking was explored. They evaluated the status of Air quality during the 8<sup>th</sup> phase of unlocking of COVID-19 lockdown (January 2021) at three Locations of North India. Shukla et al., (2022) researched.

Lockdown was imposed by the Indian government in the Month of March 2020 as an early precaution to the COVID-19 pandemic which obstructed the Socio-economic growth globally. The main aim of this study was to analyse the impact of Lockdown on the existing air quality in three megacities of India by assessing the trends of PM<sub>10</sub> and NO<sub>2</sub> concentrations. A comparison of the percentage reduction in concentrations of Lockdown period with respect to same period in year 2019 and pre-lockdown period was made. It was observed from the study that an overall decrease of pollutant concentrations was in the Ranges of 30–60% and 52–80% of PM<sub>10</sub> and NO<sub>2</sub>, respectively, in the three cities during Lockdown in comparison with previous year and pre-lockdown period. Ganguly et al., (2021) researched.

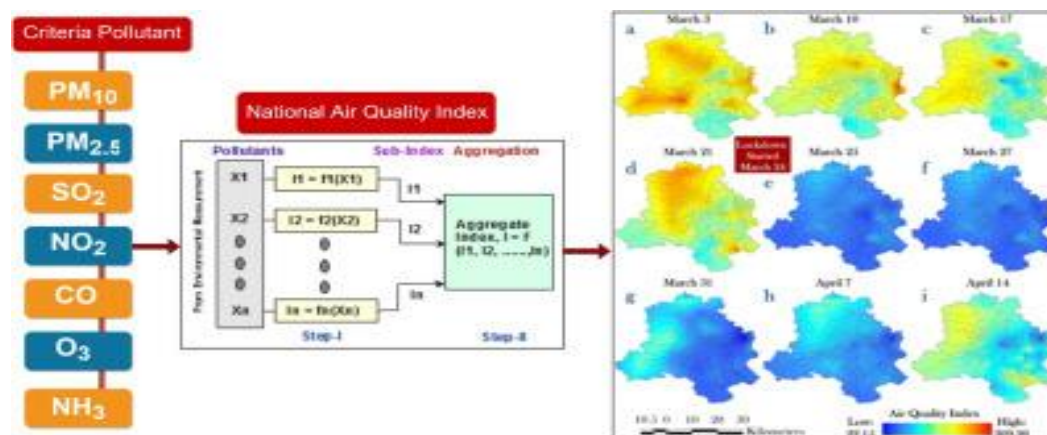


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The primary cause of worry for the entire world is the spread Of COVID-19 or the coronavirus in recent months. Beginning on March 24, the Indian Government has imposed a total shutdown. Third step lockdown was now proclaimed following The second step lockdown. India is currently in Lockdown 3.0. Although the effects of the Lockdown have had a significant negative impact on our nation's economy, this circumstance Is beneficial for natural healing. India's major cities are working to recover from various forms Of pollution. Therefore, the purpose of this study is to examine the pattern of air pollution in The Kolkata metropolitan region and its environs before

and after a lockdown. The air quality Index data from the observatory stations in the Kolkata metropolitan region served as the basis For this study. N. Das et al., (2021)studied.

Covid-19 pandemic has adversely affected all the Aspects of life in adverse manner; however, a significant improvement has been observed in The air quality, due to restricted human activities amidst lockdown. Present reports a Comparison of air quality between the lockdown duration and before the lockdown duration in Seven selected cities (Ajmer, Alwar, Bhiwadi, Jaipur, Jodhpur, Kota, and Udaipur) of Rajasthan (India). The period of analysis is 10 March 2020 to 20 March 2020 (before lockdown period) Versus 25 March to 17 May 2020 (during lockdown period divided into three phases). In order To understand the variations in the level of pollutant accumulation amid the lockdown period, A trend analysis is performed for 24 h daily average data for five pollutants (PM<sub>2.5</sub>, PM<sub>10</sub>, NO<sub>2</sub>, SO<sub>2</sub>, and ozone). M. Sharma et al., (2020)researched.

The e COVID-19 pandemic shutdown of the transportation And industrial sectors as well as stay-at-home recommendations have demonstrated that the air Quality has improved throughout this time, little is known about the function of ambient air Pollution and weather in its transmission. The purpose of this study was to determine whether The COVID-19 transmission in five Indian megacities had been aided by the air quality index (AQI), three primary pollutants (PM<sub>2.5</sub>, PM<sub>10</sub>, and CO), ground level ozone (O<sub>3</sub>), and three Meteorological variables (temperature, relative humidity, and wind speed. Kolluru et al.,( 2021) reviewed.

The disease has spread in almost every part of the world and Has been declared a global pandemic in March 2020 by World Health Organization (WHO). The corona virus outbreak has emerged as one of the deadliest pandemics of all time in human History. The ongoing pandemic of COVID-19 has forced several countries of the world to Observe complete lockdown forcing people to live in their homes. This lockdown impacted the Pollution levels of environment and improved air and water quality in the short span owing to Very fewer human activities. The present work scientifically analysed the available data for Primary air pollutants (PM<sub>2.5</sub>, NO<sub>2</sub>, SO<sub>2</sub> and CO) from two major Indian cities, Lucknow and New Delhi. Srivastava et al., (2020) stated.

## **Conclusion:**

Air pollution is sometimes referred to as the disease of civil society. Most outdoor human activities are restricted in India as a result of the COVID-19 pandemic. As a result, there was a significant reduction in anthropogenic air pollution during the lockdown. Air pollution again reached comparable levels during the previous year's lockdown period or the period before the lockdown. People can easily understand the fact that any general lockdown can prevent air pollution

## **Reference**

1. Benchrif, A., Wheida, A., Tahri, M., Shubbar, R. M., & Biswas, B. (2021). Air quality During three covid-19 lockdown phases: AQI, PM2.5 and NO2 assessment in cities with More than 1 million inhabitants. *Sustainable Cities and Society*, 74, 103170. <https://doi.org/10.1016/j.scs.2021.103170>
2. Ghosh, A., Nundy, S., & Mallick, T. K. (2020). How India is dealing with COVID-19 pandemic. *Sensors International*, 1, 100021. <https://doi.org/10.1016/j.sintl.2020.100021>
3. Bhat, S. A., Bashir, O., Bilal, M., Ishaq, A., Din Dar, M. U., Kumar, R., Bhat, R. A., & Sher, F. (2021). Impact of COVID-related lockdowns on environmental and climate change scenarios. *Environmental Research*, 195, 110839. <https://doi.org/10.1016/j.envres.2021.110839>
4. Chakraborty, R., Pal, S. C., Ghosh, M., Arabameri, A., Saha, A., Roy, P., Pradhan, B., Mondal, A., Ngo, P. T. T., Chowdhuri, I., Yunus, A. P., Sahana, M., Malik, S., & Das, B. (2021). Weather indicators and improving air quality in association with COVID-19 Pandemic in India. *Soft Computing*. <https://doi.org/10.1007/s00500-021-06012-9>
5. Chaudhuri, P., & Bhattacharyya, S. (2021). Chapter3—Impact of Covid-19 lockdown On the socioenvironmental scenario of Indian Sundarban. In A. L. Ramanathan, C. Sabarathinam, F. Arriola, M. V. Prasanna, P. Kumar, & M. P. Jonathan (Eds.), *Environmental Resilience and Transformation in Times of COVID-19* (pp. 25–36). Elsevier. <https://doi.org/10.1016/B978-0-323-85512-9.00032-2>
6. Agarwal, N., Meena, C. S., Raj, B. P., Saini, L., Kumar, A., Gopalakrishnan, N., Kumar, A., Balam, N. B., Alam, T., Kapoor, N. R., & Aggarwal, V. (2021). Indoor air Quality improvement in COVID-19 pandemic: Review. *Sustainable Cities and Society*, 70, 102942. <https://doi.org/10.1016/j.scs.2021.102942>
7. Das, D., & Ramachandran, G. (2021). Risk analysis of different transport vehicles in India during COVID-19 pandemic. *Environmental Research*, 199, 111268. <https://doi.org/10.1016/j.envres.2021.111268>
8. Das, N., Sutradhar, S., Ghosh, R., & Mondal, P. (2021). Asymmetric nexus between air Quality index and nationwide lockdown for COVID-19 pandemic in a part of Kolkata Metropolitan, India. *Urban Climate*, 36, 100789. <https://doi.org/10.1016/j.uclim.2021.100789>

9. Ganguly, R., Sharma, D., & Kumar, P. (2021). Short-term impacts of air pollutants in three megacities of India during COVID-19 lockdown. *Environment, Development and Sustainability*, 23(12), 18204–18231. <https://doi.org/10.1007/s10668-021-01434-9>
10. Gopikrishnan, G. S., Kuttippurath, J., Raj, S., Singh, A., & Abhishek, K. (2022). Air Quality during the COVID-19 Lockdown and Unlock Periods in India Analyzed Using Satellite and Ground-based Measurements. *Environmental Processes*, 9(2), 28. <https://doi.org/10.1007/s40710-022-00585-9>
11. Kolluru, S. S. R., Patra, A. K., Nazneen, & Shiva Nagendra, S. M. (2021). Association Of air pollution and meteorological variables with COVID-19 incidence: Evidence from Five megacities in India. *Environmental Research*, 195, 110854. <https://doi.org/10.1016/j.envres.2021.110854>
12. Mahato, S., Pal, S., & Ghosh, K. G. (2020). Effect of lockdown amid COVID-19 Pandemic on air quality of the megacity Delhi, India. *Science of The Total Environment*, 730, 139086. <https://doi.org/10.1016/j.scitotenv.2020.139086>
13. Mohanty, R. K., Mandal, K. G., & Thakur, A. K. (2020). COVID-19 Pandemic: Lockdown Impacts on the Indian Environment, Agriculture and Aquaculture. *Current Science*, 119(8), 1260. <https://doi.org/10.18520/cs/v119/i8/1260-1266>
14. Nigam, R., Pandya, K., Luis, A. J., Sengupta, R., & Kotha, M. (2021). Positive effects Of COVID-19 lockdown on air quality of industrial cities (Ankleshwar and Vapi) of Western India. *Scientific Reports*, 11(1), 4285. <https://doi.org/10.1038/s41598-021-83393-9>
15. Sahoo, P. K., Mangla, S., Pathak, A. K., Salãmao, G. N., & Sarkar, D. (2021). Pre-to-Post lockdown impact on air quality and the role of environmental factors in spreading The COVID-19 cases—A study from a worst-hit state of India. *International Journal of Biometeorology*, 65(2), 205–222. <https://doi.org/10.1007/s00484-020-02019-3>
16. Sahoo, P. K., Salomão, G. N., da Silva Ferreira Júnior, J., de Lima Farias, D., Powell, M. A., Mittal, S., & Garg, V. K. (2021). COVID-19 lockdown: A rare opportunity to Establish baseline pollution level of air pollutants in a megacity, India. *International Journal of Environmental Science and Technology*, 18(5), 1269–1286. <https://doi.org/10.1007/s13762-021-03142-3>

17. Sathe, Y., Gupta, P., Bawase, M., Lamsal, L., Patadia, F., & Thipse, S. (2021). Surface And satellite observations of air pollution in India during COVID-19 lockdown: Implication to air quality. *Sustainable Cities and Society*, 66, 102688.  
<https://doi.org/10.1016/j.scs.2020.102688>
18. Sharma, M., Jain, S., & Lamba, B. Y. (2020). Epigrammatic study on the effect of Lockdown amid Covid-19 pandemic on air quality of most polluted cities of Rajasthan (India). *Air Quality, Atmosphere & Health*, 13(10), 1157–1165.  
<https://doi.org/10.1007/s11869-020-00879-7>
19. Sharma, R. S., Panthari, D., Semwal, S., & Uniyal, T. (2021). Aftermath of Industrial Pollution, Post COVID-19 Quarantine on Environment. In C. Chakraborty, S. Roy, S. Sharma, & T. A. Tran (Eds.), *The Impact of the COVID-19 Pandemic on Green Societies: Environmental Sustainability* (pp. 141–167). Springer International Publishing. [https://doi.org/10.1007/978-3-030-66490-9\\_6](https://doi.org/10.1007/978-3-030-66490-9_6)
20. Srivastava, S., Kumar, A., Baudh, K., Gautam, A. S., & Kumar, S. (2020). 21-Day Lockdown in India Dramatically Reduced Air Pollution Indices in Lucknow and New Delhi, India. *Bulletin of Environmental Contamination and Toxicology*, 105(1), 9–17.  
<https://doi.org/10.1007/s00128-020-02895-w>