

## COVID-19, Air Pollution and Climate Change: The Interaction between the Existential Threats

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Two years since the COVID-19 pandemic began to sweep the earth, life remains upended, classrooms have sat empty, and families have struggled through health and financial crisis. The pandemic has envisioned the need for a strong foundation of emergency health preparedness to overcome such urgent health impacts of anthropogenic influences on our ecosystem, which emerges in the form of such deadly pandemics. COVID-19, a respiratory infectious disease, originated in China, then spread rapidly to other places of the world to take the shape of a pandemic. Early studies had shown that being in close proximity to anyone who has the disease, increases the risk of infection. The transmission occurs via direct and indirect modes. Direct transmission occurs through SARS-CoV-2 bioaerosol in the form of droplet infection and the indirect mode; it is transferred by surface contact in the immediate environment of an infected patient.

According to preliminary studies, it was revealed that there is a correlation between climate change, air pollution, and risk for various respiratory diseases including the COVID-19. Air pollution can make people vulnerable to various diseases and climate change can add as a damaging factor to increase the fatality of the disease through various associated climatic factors such as sunshine hours, daily rainfall, humidity, average temperature, and wind speed.

### *Covid-19 and Air Pollution*

A series of studies have shown a direct relation between air pollution and vulnerability to COVID-19. A stack of studies conducted on these links has exposed the fact that air pollutants behave as risk factors for the respiratory system facilitating pathogens to invade and infect [1-7]. Air pollution affects our lungs and results in weakening and making them more vulnerable to these respiratory viruses [8-9]. Air pollution also elicits the risk of various cardiovascular diseases; lung infections and other respiratory diseases. It was reported that chronic exposure to particulate matter can result in cardiovascular diseases. Increased risk of COVID-19 infection is found to be associated with exposure to air pollutant levels such as particulate matter (PM 2.5, PM10), carbon monoxide (CO), NO<sub>x</sub>, SO<sub>x</sub>, and ozone (O<sub>3</sub>) [10]. A study further revealed that chronic exposure to particulate matter is linked with 15% of global COVID-19 deaths [11-13].

### *Covid-19 and Climate Change*

The COVID-19 pandemic and climate change do not appear directly correlated, however, upon a closer look, a series of significant relationships are revealed. A preliminary study on COVID-19 cases and climatic conditions found a correlation between COVID-19 cases; temperature, evaporation, wind speed, and humidity in Delhi [14]. Another study revealed that climate change has affected the local bat biodiversity, which directly fostered the emergence of the SARS-CoV-2 strain [15].

As an effect of climate change the carbon dioxide concentration, greenhouse gases, and cloud coverage are increasing. Some factors are causing greenhouse effect and others are creating an umbrella effect by increasing cloud condensation nuclei (CCN) and cloud coverage (CC). These factors, in turn, play a crucial role in the green coverage, heat balance and species diversity of the planet, which has direct effects on the natural habitat and ecosystem. The World Health Organization (WHO) has established the relationship between epidemics and changing environmental patterns which emerged in the last few decades.

Human health and the environment are closely interwoven, for example, the health effects of air pollution can lead to asthma and also increased risk for other infectious diseases. Curbing the drivers of climate change will help to reduce the emergence and re-emergence of zoonosis that are made more likely by intensive farming, deforestation, illegal trade, and increased human encroachment into wild habitats. Climate change has created conditions favorable for the survival and spread of many pathogens and the associated habitat destruction and defragmentation forces wilds to migrate and contact other animals or humans and helps in the easy maneuver of infected pests and pathogens. Future risks are difficult to predict, however it can be said that climate change accelerates various favorable factors which thrive the pathogens and their transmission.

### *Some final thoughts*

The emergence of various infectious pandemic diseases has risen in recent decades. Most of these diseases are of zoonotic origin *i.e.* they have entered humans from the animals or mostly wild animals. With the huge habitat destruction and defragmentation, the wild is coming closer to humans and increasing the chances of getting infected from the wild spillover of pathogens. Rethinking our practices and behavior can prevent transmissions and spillover of such deadly diseases from entering into the human population. Management and mitigation of air pollution will not only help to restore our biosphere, but it also will keep our lungs healthy; which in turn can fight such respiratory infections. To combat the future risk of such pandemics, we need to drastically reduce our carbon footprint and discover ways to minimize anthropogenic invasions in our ecosystem, so as to enjoy ecosystem services more prudently. To conclude, pollution, climate change and infectious diseases cause preventable loss of human life. Strategic adjustments and an improved understanding of the harmful impacts of climate change and air pollution are needed to prevent the further spread of such deadly infectious diseases.

### References

1. Becker S and Soukup JM. "Exposure to urban air particulates alters the macrophage mediated inflammatory response to respiratory viral infection". *J. Toxicol. Environ. Health Part A* 57.7 (1999): 445-457.
2. Cai Q-C., et al. "Influence of meteorological factors and air pollution on the outbreak of severe acute respiratory syndrome". *Public Health* 121.4 (2007): 258-265.
3. Horne BD., et al. "Short-term elevation of fine particulate matter air pollution and acute lower respiratory infection". *Am J Respir Crit Care Med* 198.6 (2018): 759-66.
4. Xie J and Zhu Y. "Association between ambient temperature and COVID19 infection in 122 cities from China". *Sci Total Environ* 724 (2020): 138201.
5. Xie J., et al. "The short-term effects of air pollutants on hospitalizations for respiratory disease in Hefei, China". *Int. J. Biometeorol* 63.3 (2019): 315-326.
6. Xie J and Zhu Y. "Association between ambient temperature and COVID-19 infection in 122 cities from China". *Sci. Total Environ* (2020): 138201.
7. Zhu Y., et al. "Association between short-term exposure to air pollution and COVID-19 infection: evidence from China". *Sci Total Environ* 727 (2020): 138704.
8. Travaglio M., et al. "Links between air pollution and COVID-19 in England". *MedRxiv* (2020).
9. Wu X., et al. "Evaluating the impact of long-term exposure to fine particulate matter on mortality among the elderly". *Sci Adv* 6.29 (2020): eaba5692.
10. Sangkham S., et al. "Influence of air pollution and meteorological factors on the spread of COVID-19 in the Bangkok metropolitan region and air quality during the outbreak". *Environ Res* 197 (2021): 111104.
11. Cole MA., et al. "Air pollution exposure and Covid19 in dutch municipalities". *Environ Resource Econ* 76 (2020): 581-610.
12. Zoran MA., et al. "Assessing the relationship between surface levels of PM2.5 and PM10 particulate matter impact on COVID-19 in Milan, Italy". *Sci Total Environ* 738 (2020): 139825.

13. Lolli S and Vivone G. "The role of tropospheric ozone in flagging COVID-19 pandemic transmission". Bull AtmosSci Technol 1 (2020): 551-5.
14. Singh O., et al. "Association between climatic variables and COVID-19 pandemic in National Capital Territory of Delhi, India". Environ Dev Sustain (2020): 1-15.
15. Beyer RM., et al. "Shifts in global bat diversity suggest a possible role of climate change in the emergence of SARS-CoV-1 and SARS-CoV-2". Sci Total Environ 767 (2021): 145413.

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