

COVID-19 pandemic highlights the urgent global need to control air pollution

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COVID-19 health effects are a wake-up call to control air pollution. Credit: ATS

A new commentary published online in the *Annals of the American Thoracic Society* provides an exhaustive examination of published research that discusses whether air pollution may be linked to worse

COVID-19 outcomes. The studies that the authors examined look at several potential disease mechanisms, and also at the relationship between pollution, respiratory viruses and health disparities.

In "COVID-19 Pandemic: A Wake-Up Call for Clean Air," Stephen Andrew Mein, MD, Department of Medicine, Beth Israel Deaconess Medical Center, Boston, and colleagues discuss several ways that the COVID-19 pandemic highlights the urgent need to address the global problem of [air pollution](#) through sustainable local and national policies to improve respiratory [health](#) and equity worldwide. More than 91 percent of the world's population lives in areas that exceed the World Health Organization's air quality guidelines and more people are impacted by worsening air quality each year.

The commentary focuses on the health effects of ambient air [pollution](#). Ambient air pollution consists of potentially harmful pollutants, such as small particles and toxic gases, emitted by industries, households, cars and trucks. International studies have shown that exposure to these pollutants worsens viral respiratory infections and new studies are showing a similar association with ambient pollution and COVID-19 outcomes.

"There are a multitude of studies showing that exposure to higher long-term ambient air pollution is associated with both increased risk of infection and death from COVID-19," Dr. Mein said. "Historically, air pollution has been linked with worse outcomes, including higher mortality, due to other [respiratory viruses](#) like influenza."

He added, "Research that we examined on pollution during the COVID-19 pandemic has found similar detrimental effects. New research on COVID-19 adds further evidence of the adverse effects of ambient air pollution and the urgent need to address the public health crisis of pollution."

One of the most prominent studies that the authors examined, in which COVID-19 mortality was modeled, found that each small ($1 \mu\text{g}/\text{m}^3$) increase in long-term fine inhalable particle (PM_{2.5}) exposure was associated with an 8 percent increase in mortality during the pandemic. Another study concluded that air pollution has contributed 15 percent to COVID-19 mortality worldwide.

"The studies we reviewed evaluated whether long-term, ambient air pollution exposure that occurred years prior to the pandemic was associated with worse COVID-19 outcomes," Dr. Mein stated.

The exact mechanisms for the association between long-term pollution and poor COVID-19 outcomes are not fully known. However, scientists have suggested several theories. Long-term exposure to air pollution may impair the immune system, leading to both increased susceptibility to viruses and more severe viral infections.

Higher air pollution exposure is associated with higher rates of heart disease and metabolic disorders such as diabetes, which are known to be risk factors for severe disease and death from COVID-19. These chronic effects would have occurred prior to the reported reductions in air pollution since the start of the COVID-19 pandemic.

A major point of the authors' commentary is that improved air quality (due to less travel and industrial activity) during the pandemic may have reduced morbidity and mortality from non-communicable diseases.

"Research evaluating associations between the dramatic reduction in ambient air pollution during the global lockdowns and health care utilization for respiratory conditions would further confirm the impact of ambient air pollution on non-communicable diseases and the need to reduce air pollution to improve overall health."

The authors also noted that much of the research about ambient air

pollution and the COVID-19 pandemic is just emerging. "While the primary association between air pollution and COVID-19 outcomes has been generally consistent, there is still much research to be done. In particular, there is a need for studies that adjust for individual-level risk factors, since current studies have been restricted to county or municipal-level exposure and outcome data. Research also needs to be conducted to evaluate whether air pollution is contributing to the stark differences in COVID-19 outcomes among minority groups."

Racially and ethnically [diverse communities](#) are more likely to be located in areas closer to industrial pollution such as PM2.5 and nitrogen dioxide, and to work in types of businesses that expose them to more air pollution. These inequalities in residential and occupational air pollution exposure may be one of the causes of the stark disparities of the COVID-19 pandemic along racial and ethnic lines.

In conclusion, the authors state, "The COVID-19 pandemic has highlighted the widespread health consequences of [ambient air pollution](#), including acute effects on respiratory immune defenses and chronic effects that lead to higher risk of chronic cardiopulmonary disease and acute respiratory distress syndrome (ARDS). These chronic health effects likely explain the higher COVID-19 mortality among those exposed to more air pollution. The [pandemic](#) has also provided a glimpse into the health benefits of cleaner air. As we emerge from this devastating public health crisis, COVID-19 is a wakeup call for the need to adopt stricter air quality standards and end our tolerance for pollution in disadvantaged neighborhoods. As part of our post-COVID-19 recovery, we must clean up the air to improve respiratory health and equality worldwide."

More information: Stephen A. Mein et al. COVID-19 Pandemic: A Wake-Up Call for Clean Air, *Annals of the American Thoracic Society* (2021). [DOI: 10.1513/AnnalsATS.202012-1542VP](https://doi.org/10.1513/AnnalsATS.202012-1542VP)

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