What if clean air benefits during COVID-19 shutdown continued post-pandemic?

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A new study by Columbia University Mailman School of Public Health researchers poses a hypothetical question: What if air quality improvements in New York City during the spring 2020 COVID-19 shutdown were sustained for five years without the economic and health costs of the pandemic? They estimate cumulative benefits of clean air

during this period would amount to thousands of avoided cases of illness and death in children and adults, as well as associated economic benefits between $32 to $77 billion. The study's findings are published in the journal *Environmental Research*.

The researchers leveraged the unintended "natural experiment" of cleaner air in New York City during the COVID-19 shutdown to simulate the potential future health and economic benefits from sustained air quality improvements of a similar magnitude. They do not frame this study as an estimate of the benefits of the pandemic. Rather they offer this hypothetical clean air scenario as an aspirational goal for policies to reduce emissions, largely from fossil fuel combustion.

Exploratory analyses found that neighborhoods with higher percentages of low-income residents or higher percentages of Black or Latinx residents tended to have proportionally higher benefits from reduced $PM_{2.5}$ concentrations when compared to neighborhoods with lower levels of poverty or Black or Latinx populations. However, this does not mean that the disparity in health outcomes across neighborhoods would be eliminated under this scenario because underlying risk factors would still remain. The researchers also caution that limited air quality monitors and available data during the shutdown period constrained their ability to assess the impact of improved air quality on health disparities across neighborhoods.

Air quality improvements during the New York City spring shutdown were the result of an estimated 60-percent decline in automobile traffic, as well as declines in air traffic, construction, restaurant operation, and electricity generation.

"Air quality improvements from the shutdown happened as the result of a tragic situation. However, our hypothetical clean air scenario could be achieved through air pollution and climate mitigation policies, including

those that support low carbon modes of transportation and reduce emissions in other sectors," says study first author Frederica Perera, DrPH, Ph.D., director of translational research at the Columbia Center for Children's Environmental Health and professor of environmental health sciences at Columbia Mailman School.

The researchers estimated a citywide 23-percent reduction in fine particulate matter ($PM_{2.5}$) concentrations during the COVID-19 shutdown period (March 15-May 15, 2020) compared to the average level for those months in 2015-2018 (the business-as-usual period) using air quality monitoring data from the New York State Department of Environmental Conservation. Based on 2020 data, they extrapolated ambient levels of $PM_{2.5}$ for a five-year period. They then used BenMAP, a publicly available computer tool supported by the U.S. Environmental Protection Agency, to estimate the number of avoided air pollution-related illnesses and deaths and quantify their economic value using methods the researchers developed in earlier research. Specifically, they estimate potential avoided cases of infant and adult mortality, adverse birth outcomes, autism spectrum disorder, and childhood asthma.

More information: Frederica Perera et al, Potential health benefits of sustained air quality improvements in New York City: A simulation based on air pollution levels during the COVID-19 shutdown, *Environmental Research* (2020). DOI: 10.1016/j.envres.2020.110555

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