Air pollution may affect severity and hospitalization in COVID-19 patients with respiratory disease

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Angelico Mendy, MD, PhD, shown in the UC College of Medicine. Credit: Colleen Kelley/UC Creative + Brand

Patients who have preexisting respiratory conditions such as asthma or chronic obstructive pulmonary disease (COPD) and live in areas with high levels of air pollution have a greater chance of hospitalization if they contract COVID-19, says a University of Cincinnati researcher.

Angelico Mendy, MD, Ph.D., assistant professor of environmental and public health sciences, at the UC College of Medicine, looked at the health outcomes and backgrounds of 1,128 COVID-19 patients at UC Health, the UC-affiliated health care system in Greater Cincinnati.

Mendy led a team of researchers in an individual-level study which used a statistical model to evaluate the association between long-term exposure to particulate matter ? 2.5—it refers to a mixture of tiny particles and droplets in the air that are two-and-one half microns or less in width—and hospitalizations for COVID-19. Medical records allowed researchers to use patients' zip codes for estimating their particulate exposure over a 10-year period.

"Particulate matter is very small, small enough to be inhaled deep into the lungs, they cross into the blood and also affect other organ systems," says Mendy. "Air pollution as a result of emissions from automobiles, factories or other sources is a generator of particulate matter."

"Our study didn't find any correlation between severity of COVID-19 and particulate matter in general, but we found something for people who had asthma and COPD," says Mendy. "People who have preexisting asthma and COPD, when they are exposed to higher levels of particulate matter, they are more likely to have severe COVID-19, severe enough to be hospitalized."

Researchers found that a one-unit increase in particulate matter 2.5 was associated with a 60% higher chance of hospitalization for COVID-19 patients with pre-existing respiratory disease. For patients without respiratory disease, no association was observed.

The study's findings were published online in the scholarly journal *Respiratory Medicine*.

It is the first study to look at an association between air pollution, COVID-19 and individual patients, says Mendy. A study co-author, Xiao Wu, Ph.D., in the Department of Biostatistics at Harvard University, led a study last year looking at air pollution and COVID-19 mortality in the United States.

"This study may have policy implications such as reducing particulate exposure," says Mendy. "Many people want to have more clean energy and

reduced emissions into the atmosphere."

Mendy says the findings of his pilot study are preliminary and he hopes to use it to generate support for a larger more comprehensive study of patients. The UC Health patients in the study were diagnosed with COVID-19 between March 13, 2020 and July 5, 2020. The dataset was stripped of all Health Insurance Portability and Accountability Act (HIPAA) identifiers. The median age for patients was 46 and 96.6% were residents of Ohio with the remaining 3.4% coming from Kentucky, Indiana, New York, South Carolina, West Virginia and Iowa.

More information: Angelico Mendy et al. Long-term exposure to fine particulate matter and hospitalization in COVID-19 patients, *Respiratory Medicine* (2021). DOI: 10.1016/j.rmed.2021.106313

Provided by University of Cincinnati

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