

People of color hardest hit by air pollution from nearly all sources

April 28 2021



Illinois civil and environmental engineering professor Christopher Tessum collaborated with colleagues on a study that finds that nearly all major emissions categories contribute to the systemic air pollution exposure disparity experienced by people of color. Credit: L. Brian Stauffer

Various studies show that people of color are disproportionately exposed

to air pollution in the United States. However, it was unclear whether this unequal exposure is due mainly to a few types of emission sources or whether the causes are more systemic. A new study that models peoples' exposure to air pollution—resolved by race-ethnicity and income level—shows that exposure disparities among people of color and white people are driven by nearly all, rather than only a few, emission source types.

The study led by University of Illinois Urbana Champaign civil and environmental engineering professor Christopher Tessum is published in the journal *Science Advances*.

"Community organizations have been experiencing and advocating against environmental injustice for decades," Tessum said. "Our study contributes to an already extensive body of evidence with the new finding that there is no single air [pollution](#) source, or a small number of sources, that account for this [disparity](#). Instead, the disparity is caused by almost all of the sources."

The team used an air quality model to analyze Environmental Protection Agency data for more than 5,000 emission source types, including industry, agriculture, coal electric utilities, light- and heavy-duty gasoline vehicles, diesel vehicles, off-road vehicles and equipment, construction, residential sources, road dust and other miscellaneous small emissions sources. Each source type studied contributes to fine particle air pollution, defined as particles being 2.5 micrometers or less in diameter, the study reports.

To identify patterns of air pollution exposure associated with race-ethnicity and income, the researchers combined the spatial air pollution patterns predicted in their air quality model with residential population counts from the U.S. Census Bureau to identify differences in exposure by race-ethnicity and income.

The researchers found that for the 2014 U.S. total population average, fine particle air pollution exposures from the majority of source types are higher than average for people of color and lower than average for white people. The data indicate that [white people](#) are exposed to lower-than-average concentrations from emissions source types that, when combined, cause 60% of their total exposure, the study reports. Conversely, people of color experience greater-than-average exposures from source types that, when combined, cause 75% of their total exposure. This disparity exists at the country, state and city level and for people within all income levels.

"We find that nearly all emission sectors cause disproportionate exposures for people of color on average," said co-author Julian Marshall, a professor of civil and environmental engineering at the University of Washington. "The inequities we report are a result of systemic racism: Over time, people of color and pollution have been pushed together, not just in a few cases but for nearly all types of emissions."

The researchers found that air pollution disparities arise from a more systemic set of causes than previously understood.

"We were struck by how these systemic disparities exist for people of color not only in certain neighborhoods but at every spatial scale in the U.S.," said co-author Joshua Apte, a professor of civil and environmental engineering at the University of California, Berkeley. "The problem exists within urban and rural areas, many distinct U.S. regions, and for people living within almost all American cities."

"This new study adds context to our previous work, which showed that a disproportionate consumption of goods and services—which is an underlying cause of pollution—compounds the exposure of people of color to air pollution," said co-author Jason Hill, a professor of

bioproducts and biosystems engineering at the University of Minnesota.

The study results come with caveats, the researchers said. The emissions data, air quality modeling and population counts all contain previously quantified uncertainty. However, because the team's findings are consistent across states, urban and rural areas, and concentration levels, they are unlikely to be an artifact of model or measurement bias. This study focuses on outdoor air pollution concentrations in places where people reside and does not account for variability in mobility, access to health care and baseline mortality and morbidity rates, among other factors.

"Some assume that when there is a systematic racial-ethnic disparity, such as the one we see here, that the underlying cause is a difference in income," Tessum said. "Because the data shows that the disparity cross-cuts all income levels, our study reinforces previous findings that race, rather than income, is what truly drives [air pollution](#)-exposure disparities."

The researchers say they hope these findings will highlight potential opportunities for addressing this persistent environmental inequity.

More information: C.W. Tessum at University of Illinois at Urbana-Champaign in Urbana, IL et al., "PM2.5 pollutants disproportionately and systemically affect people of color in the United States," *Science Advances* (2021). [advances.sciencemag.org/lookup ...](https://advances.sciencemag.org/lookup...)
[.1126/sciadv.abf4491](https://doi.org/10.1126/sciadv.abf4491)

Provided by University of Illinois at Urbana-Champaign

Citation: People of color hardest hit by air pollution from nearly all sources (2021, April 28)

retrieved 25 April 2024 from

<https://phys.org/news/2021-04-people-hardest-air-pollution-sources.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.