

Racial, ethnic minorities and low-income groups in US exposed to higher levels of air pollution

January 12 2022



Credit: Unsplash/CC0 Public Domain

Certain groups in the U.S.—Blacks, Asians, Hispanics, Latinos, and low-income populations—are being exposed to higher levels of dangerous

fine particulate air pollution (PM_{2.5}) than other groups, according to new research from Harvard T.H. Chan School of Public Health.

In collaboration with the Environmental Systems Research Institute, the study authors developed a new platform linking 17 years' worth of [demographic data](#) with data on fine particulate pollution from across the U.S., and created unique visualizations, that shine a light on the stark disparities in [air pollution exposure](#) among racial/ethnic and income groups in America.

The study will be published on January 12, 2022, in the journal *Nature*.

"Our study, which highlights the relative disparities in PM_{2.5} [exposure](#) in the U.S., is particularly timely given current crises the country is facing, such as a reckoning with racism as well as disparities in COVID-19 outcomes," said Francesca Dominici, Clarence James Gamble Professor of Biostatistics, Population and Data Science at the Harvard Chan School and senior author of the study.

Previous research has shown that racial and ethnic minorities and lower-income groups in the U.S. are at higher risk of premature death from exposure to PM_{2.5} air pollution than other [population](#) and income groups. It's also been shown that there are disparities in exposure to air pollution among these groups.

The new study took a deeper dive into the issue of exposure by focusing on relative disparities across income groups and racial/ethnic groups. The researchers linked demographic data from the U.S. Census Bureau and American Community Survey for the years 2000 through 2016 with U.S.-wide PM_{2.5} data estimated from machine learning models based on satellite observations and atmospheric chemistry models. The data was analyzed for the nation's 32,000 zip code tabulation areas (ZCTA).

Under current federal air pollution standards, the annual maximum recommended exposure to PM_{2.5} is 12 micrograms per cubic meter of air ($\mu\text{g}/\text{m}^3$). The researchers found that, on average across the U.S., PM_{2.5} concentration levels fell from 2000 to 2016, with average exposure falling from $12.6 \mu\text{g}/\text{m}^3$ to $7.5 \mu\text{g}/\text{m}^3$ —a 40.4% drop. They also found that the percentage of the population exposed to PM_{2.5} levels higher than $12 \mu\text{g}/\text{m}^3$ decreased from 57.3% in 2000 to 4.5% in 2016.

But the findings showed that, despite reductions in PM_{2.5} levels over the years, disparities in exposure have persisted.

The researchers found that areas of the U.S. where the white and Native American populations are overrepresented have been consistently exposed to average PM_{2.5} levels that are lower than those in areas where Black, Asian, and Hispanic or Latino populations are overrepresented.

For example, in 2016, the average PM_{2.5} concentration for the Black population was 13.7% higher than that of the white population and 36.3% higher than that of the Native American population. Further, the study found that, as the Black population increased in a particular ZCTA, so did the PM_{2.5} concentration, with a steep incline seen for ZCTAs where more than 85% of the population was Black. The trend for Hispanic and Latino populations was similar. But for the white population, the opposite was seen: The PM_{2.5} concentration decreased as the density of the [white population](#) increased in a particular ZCTA.

The researchers also found that, from 2004 to 2016, areas of the U.S. with lower income groups have been exposed to higher average PM_{2.5} levels than areas with higher income groups. In addition, relative disparities in exposure to PM_{2.5} in relation to safety standards set by the U.S. Environmental Protection Agency and the World Health Organization have been increasing over time among racial/[ethnic groups](#), according to the study.

"Our findings regarding relative disparities indicate the importance of strong, targeted air-pollution-reduction strategies, not only to reduce overall air-pollution levels but also to move closer toward the EPA's aim to provide all people with the same degree of protection from environmental hazards," said Abdulrahman Jbaily, a former postdoctoral researcher at Harvard Chan School and first author of the study.

More information: Abdulrahman Jbaily, Disparities in air pollution exposure across population and income groups, *Nature* (2022). [DOI: 10.1038/s41586-021-04190-y](https://doi.org/10.1038/s41586-021-04190-y).
www.nature.com/articles/s41586-021-04190-y

Provided by Harvard T.H. Chan School of Public Health

Citation: Racial, ethnic minorities and low-income groups in US exposed to higher levels of air pollution (2022, January 12) retrieved 21 June 2024 from <https://phys.org/news/2022-01-racial-ethnic-minorities-low-income-groups.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.