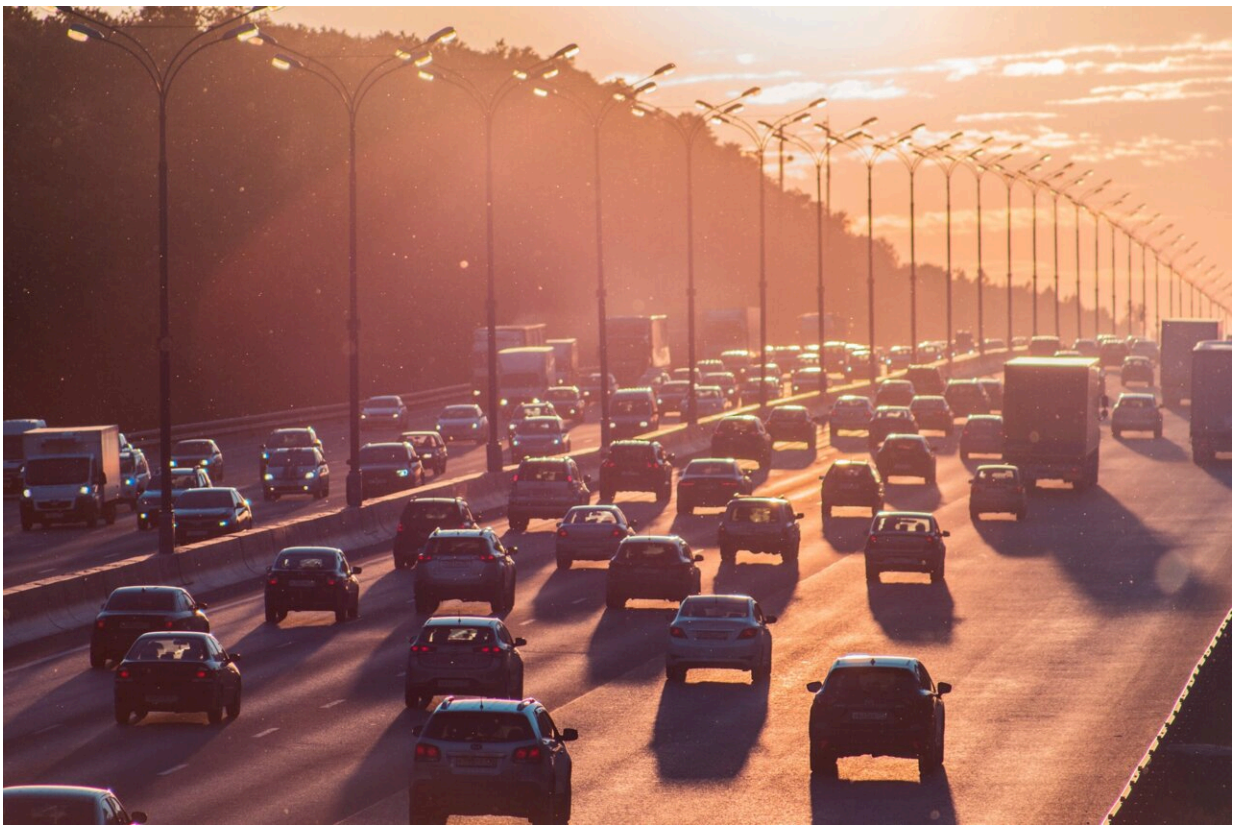


Particulate air pollution a growing risk for premature CVD death and disability worldwide

August 9 2023



Credit: Unsplash/CC0 Public Domain

The impact of particulate matter air pollution on death and disability is on the rise worldwide, according to new research published today in the

Journal of the American Heart Association.

Previous research established the association of particulate matter (PM) pollution to [cardiovascular disease](#) (CVD) death and disability. However, questions remain about the worldwide impact from this type of pollution and how it has been changing over time, the study authors noted.

"We focused on examining the burden globally because particulate matter pollution is a widespread environmental risk factor that affects all populations worldwide, and understanding its impact on cardiovascular health can help guide public health interventions and [policy decisions](#)," said Farshad Farzadfar, M.D., M.P.H., D.Sc., senior author of the study and a professor of medicine in the [non-communicable diseases](#) research center of the Endocrinology and Metabolism Research Institute at Tehran University of Medical Sciences in Iran.

The researchers analyzed PM pollution as a risk factor for death and disability using freely available data from 204 countries collected between 1990 and 2019 and detailed in the Global Burden of Disease (GBD) study. Exposure to PM pollution was estimated [using a tool](#) from the 2019 update to the GBD study that incorporated information from satellite and ground-level monitoring, computer models of chemicals in the atmosphere and land-use data.

Among the many types of heart disease, the current analysis of cardiovascular disease is restricted to stroke and [ischemic heart disease](#) (a lack of blood and oxygen supply to portions of the heart, usually due to plaque build-up in the arteries) because the 2019 GBD study on the global burden of disease attributed to PM pollution only examined these two diagnoses. The Institute for Health Metrics and Evaluation (IHME), which provides the GBD estimates, only reports data for a certain risk factor if there is a large body of evidence about its association with a disease, Farzadfar noted.

"Until now, only the association of PM pollution with ischemic heart disease and stroke has been demonstrated in a large number of studies," Farzadfar said. "The IHME may include other CVDs in the future. Moreover, ischemic heart disease and stroke contribute to a significant majority of CVDs, and our estimates, despite having limitations, may be used as a good estimate of PM pollution burden on CVDs."

The investigators analyzed changes over time in years of life lost due to [premature death](#) (YLLs), years lived with disability (YLDs) and disability-adjusted life years (DALYs). DALYs is a measure that considers both the loss of life and the impact on quality of life to assess the full impact of a health condition on a population. The cardiovascular disease burden was assessed both overall and with age standardization, which compares health outcomes across a population with a wide range of ages.

The analysis found:

- The total number of premature deaths and years of cardiovascular disability from cardiovascular diseases attributable to PM air pollution rose from 2.6 million in 1990 to 3.5 million in 2019, a 31% worldwide increase.
- The increase in overall deaths was unevenly distributed, with a 43% increase among men compared to a 28.2% increase among women.
- Between 1990 and 2019, there was a 36.7% decrease in age-standardized premature deaths attributed to PM pollution, meaning that while fewer people had died from cardiovascular disease, people are living longer with disability.
- Regions with higher socioeconomic conditions had the lowest number of lost years of life due to cardiovascular disease attributed to PM pollution, yet also the highest number of years lived with disability. The opposite was true in regions with lower

socioeconomic conditions, with more lives lost and fewer years lived with disability.

- Between 1990 and 2019, changes in the cardiovascular impact of PM pollution differed between men and women. In all measures, increases in disability and death from ambient PM air pollution were higher in men than women, while declines in disability and death from household PM air pollution were lower in women than men.

"The declines in deaths may be considered positive news, as they indicate improvements in health care, air pollution control measures and access to treatment. However, the increase in disability-adjusted life years suggests that although fewer people were dying from cardiovascular disease, more people were living with disability," Farzadfar said.

The researchers also found that between 1990 and 2019, age-standardized CVD death and disability attributed to outdoor PM pollution rose by 8.1%, while age-standardized cardiovascular death and disability attributed to household PM pollution, which is produced by solid cooking fuels such as coal, charcoal, crop residue, dung and wood, fell by 65.4%.

"The reason for the decrease in the burden of household air pollution from solid fuels might be better access and use of cleaner fuels, such as refined biomass, ethanol, liquefied petroleum gas, solar and electricity. Moreover, structural changes, such as improved cookstoves and built-in stoves, chimney hoods and better ventilation, might be effective in reducing pollution exposure to solid fuels. Finally, the effects of educational and behavioral interventions should be considered," Farzadfar said. "The shifting pattern from household air pollution due to solid fuels to outdoor, ambient PM pollution has important public policy implications."

In a [2020 scientific statement](#) and a [2020 policy statement](#), the American Heart Association details the latest science about air pollution exposure and the individual, industrial and policy measures to reduce the negative impact of poor air quality on cardiovascular health. Reducing exposure to air pollution and reversing the negative impact of poor air quality on [cardiovascular health](#), including heart disease and stroke, is essential to reducing health inequities in Black and Hispanic communities, those that have been historically marginalized and under-resourced, and communities that have the highest levels of exposure to air pollution.

The study has several limitations. Because the assessment of exposure to particulate matter pollution in the study is based on regional estimates, it may not accurately reflect individual exposure. In addition, results from this analysis of the association between particulate matter pollution and cardiovascular outcomes may not be generalizable to other health conditions or other pollutants.

Background:

- PM pollution consists of small particles of liquid and solids suspended in the air and inhaled into the lungs, such as vehicle emissions, smoke, dust, pollen and soot. Some particles are large enough to see (such as wildfire smoke) and may irritate the eyes, nose or throat, while others are too small to be visible but can reach deep into the lungs and even the bloodstream. Outdoor (or ambient) PM air [pollution](#) can come from vehicle emissions, industrial activities or natural sources such as pollen or dust; indoor PM often derives from heating, cooking or lighting the home with solid fuels such as coal, wood or other crop residues, especially when there is poor indoor ventilation.
- The Global Burden of Disease (GBD) study is led by the Institute for Health Metrics and Evaluation, an independent population health research center focused on quantifying changes in

population health worldwide. Data from the study can help policymakers look at hundreds of diseases, their risk factors and their impact on death and disability in various regions and throughout the world collectively.

More information: Particulate Matter Pollution Remains a Threat for Cardiovascular Health: Findings From the Global Burden of Disease 2019, *Circulation* (2023). [DOI: 10.1161/JAHA.123.029375](https://doi.org/10.1161/JAHA.123.029375)

Provided by American Heart Association

Citation: Particulate air pollution a growing risk for premature CVD death and disability worldwide (2023, August 9) retrieved 2 May 2024 from <https://medicalxpress.com/news/2023-08-particulate-air-pollution-premature-cvd.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.