

Air pollution major risk for cardiovascular disease regardless of country income, says study

23 June 2020



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From low-income countries to high-income countries, long-term exposure to fine particulate outdoor air pollution is a major contributor to cardiovascular disease and death, a new Oregon State University study found.

But even small reductions in [air pollution levels](#) can result in a reduction of disease risk.

The study shows that countries don't have to immediately eradicate all air [pollution](#) to make a difference for people's health, said researcher Perry Hystad, an environmental epidemiologist in OSU's College of Public Health and Human Sciences. Hystad was the lead author on the international study, which also included fellow OSU public health researcher Andrew Larkin. Michael Brauer of the University of British Columbia was the senior author.

"If you reduce the concentration of [outdoor air pollution](#), you're going to see benefits for

[cardiovascular disease](#)," Hystad said. "Before this study, we were not sure if this was the case. Some studies suggested that at high concentration, as seen in many developing countries, levels would have to be reduced by very large amounts before health benefits would occur."

The massive study, published last week in *The Lancet Planetary Health* journal, used data from the long-running Prospective Urban Rural Epidemiology (PURE) study. For the current paper, researchers analyzed 157,436 adults between 35 and 70 years old in 21 countries from 2003-2018.

Overall, the study found a 5% increase in all cardiovascular events for every 10 microgram-per-cubic-meter increase in concentration of air pollutant particles under 2.5 microns in size (PM2.5). Factoring in the vast range of concentrations in PM2.5 recorded across the globe, that means 14% of all cardiovascular events documented in the study can be attributed to PM2.5 exposure.

"That's a big number," Hystad said. "That's a substantial portion of the cardiovascular disease burden."

The risks in low- and [middle-income countries](#) were mostly identical to the risks found in [high-income countries](#).

The PURE study chose multiple countries from low, middle and high-income brackets to address a gap in existing research, as most air pollution studies have centered on people in high-income countries with relatively low concentrations of air pollution.

The current study looked at PM2.5 particles because they are small enough to be breathed deep into the lungs where they can cause chronic

inflammation, Hystad said. These particles come from a range of combustion sources, including car engines, fireplaces and coal-fired power plants.

Provided by Oregon State University

Researchers worked with a set of cardiovascular disease risk factors, including individual variables like smoking status, eating habits and pre-existing cardiovascular disease; and household factors like household wealth and use of dirty fuels for indoor cooking. Previous research in the PURE cohort found links between solid fuel use and kerosene use and cardiovascular disease. They also referenced geographical variables, including whether a person's location was rural or urban and general access to quality health care within each country.

In the data's 15-year period, in which participants were followed for roughly nine years each, 9,152 people had cardiovascular disease events, including 4,083 heart attacks and 4,139 strokes. There were 3,219 deaths attributed to cardiovascular [disease](#).

The strongest association between air pollution exposure and health outcomes was for strokes. Hystad says a growing body of research finds that the risk of stroke is strongly impacted by exposure to PM2.5, especially at high concentrations.

Over the study's time frame, some countries' pollution levels improved, while some got worse, Hystad said. He pointed to the U.S.'s Clean Air Act of 1963 and how different air pollution levels are today compared to where they were in the 1970s.

"What I hope—and this is actually what is happening—is that developing countries can take these lessons and apply them and reduce the time it takes to achieve some of these air pollution reduction successes," he said. "Maybe instead of 30 years, you can do it in 10 years."

More information: Perry Hystad et al, Associations of outdoor fine particulate air pollution and cardiovascular disease in 157 436 individuals from 21 high-income, middle-income, and low-income countries (PURE): a prospective cohort study, *The Lancet Planetary Health* (2020). [DOI: 10.1016/S2542-5196\(20\)30103-0](https://doi.org/10.1016/S2542-5196(20)30103-0)

APA citation: Air pollution major risk for cardiovascular disease regardless of country income, says study (2020, June 23) retrieved 6 March 2021 from <https://medicalxpress.com/news/2020-06-air-pollution-major-cardiovascular-disease.html>

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