

Long-term exposure to low levels of air pollution increases risk of heart and lung disease

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Exposure to what is considered low levels of air pollution over a long period of time can increase the risk of heart attack, stroke, atrial

fibrillation and pneumonia among people ages 65 and older, according to new research published today in the American Heart Association's flagship journal *Circulation*.

Air pollution can cause harm to the cardiovascular and respiratory systems due to its effect on inflammation in the heart and throughout the body. Newer studies on the impact of [air pollution](#) on health are focused on understanding the potential harm caused by long-term exposure and are researching the effects of multiple air pollutants simultaneously. Research on air pollution is critical to informing recommendations for national environmental and health guidelines.

"People should be conscious of the air quality in the region where they live to avoid harmful exposure over long periods of time, if possible," said Mahdieh Danesh Yazdi, Pharm.D., M.P.H., Ph.D., a post-doctoral research fellow at the Harvard T.H. Chan School of Public Health and lead author of the study. "Since our study found harmful effects at levels below current U.S. standards, air pollution should be considered as a risk factor for cardiovascular and respiratory disease by clinicians, and policy makers should reconsider current standards for air pollutants."

Researchers examined hospitalization records for more than 63 million Medicare enrollees in the contiguous United States from 2000 to 2016 to assess how long-term exposure to air pollution impacts hospital admissions for specific cardiovascular and respiratory issues. The study measured three components of air pollution: [fine particulate matter](#) (PM_{2.5}), nitrogen dioxide (NO₂) and ozone (O₃). Using hundreds of predictors, including meteorological values, satellite measurements and [land use](#) to estimate daily levels of pollutants, researchers calculated the study participants' exposure to the pollutants based upon their residential zip code. Additional analysis included the impact of the average yearly amounts of each of the pollutants on hospitalization rates for non-fatal heart attacks, ischemic strokes, [atrial fibrillation](#) and flutter, and

pneumonia.

Statistical analyses found thousands of hospital admissions were attributable to air pollution per year. Specifically:

The risks for heart attacks, strokes, atrial fibrillation and flutter, and pneumonia were associated with long-term exposure to particulate matter.

Data also showed there were surges in hospital admissions for all of the [health outcomes](#) studied with each additional unit of increase in particulate matter. Specifically, stroke rates increased by 2,536 for each additional ug/m^3 (micrograms per cubic meter of air) increase in fine particulate matter each year.

There was an increased risk of stroke and atrial fibrillation associated with long-term exposure to nitrogen dioxide.

Pneumonia was the only health outcome in the study that seemed impacted by long-term exposure to ozone; however, researchers note there are currently no national guidelines denoting safe or unsafe long-term ozone levels.

"When we restricted our analyses to individuals who were only exposed to lower concentrations of air pollution, we still found increased risk of hospital admissions with all of the studied outcomes, even at concentration levels below current national standards," added Danesh Yazdi. "More than half of the study population is exposed to low levels of these pollutants, according to U.S. benchmarks, therefore, the long-term health impact of these pollutants should be a serious concern for all, including policymakers, clinicians and patients."

The researchers further stratified the analyses to calculate the

cardiovascular and respiratory risks associated with each of the pollutants among patient subgroups including gender, race or ethnicity, age and socioeconomic factors, detailed in the study.

The causality in the study could only be interpreted and not proven definitively due to the limitations of the data available, which may have not included other known CVD [risk factors](#). In addition, coding errors can occur in the Medicare database, which would impact the analyses.

More information: *Circulation* (2021). [DOI: 10.1161/CIRCULATIONAHA.120.050252](https://doi.org/10.1161/CIRCULATIONAHA.120.050252)

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