

Link between air pollution, increased deaths and increased deaths from heart disease affirmed

September 15 2015

In what is believed to be the largest, most detailed study of its kind in the United States, scientists at NYU Langone Medical Center and elsewhere have confirmed that tiny chemical particles in the air we breathe are linked to an overall increase in risk of death.

The researchers say this kind of air pollution involves particles so small they are invisible to the human eye (at less than one ten-thousandth of an inch in diameter, or no more than 2.5 micrometers across).

In a report on the findings, published in the journal *Environmental Health Perspectives* online Sept. 15, the scientists conclude that even minuscule increases in the amount of these particles (by 10 micrograms per cubic meter of air, for example) lead to an overall increased risk of death from all causes by 3 percent—and roughly a 10 percent increase in risk of death due to heart disease. For nonsmokers, the risk increase rises to 27 percent in cases of death due to respiratory disease.

"Our data add to a growing body of evidence that [particulate matter](#) is really harmful to [health](#), increasing overall mortality, mostly deaths from cardiovascular disease, as well as deaths from respiratory disease in nonsmokers," says lead study investigator and health epidemiologist George Thurston, ScD, a professor of population health and environmental medicine at NYU Langone. "Our study is particularly notable because all the data used in our analysis comes from

government- and independently held sources."

According to Thurston, fine particles can contribute to the development of potentially fatal heart and lung diseases because they slip past the body's defenses and can be absorbed deep into the lungs and bloodstream. They are not sneezed or coughed out the way larger natural particles, like airborne soil and sand, are removed from the body's airways. Moreover, Thurston says, [fine particles](#) are usually made of harmful chemicals such as arsenic, selenium, and mercury, and can also transport gaseous pollutants, including sulfur and nitrogen oxides, with them into the lungs.

For their research, Thurston and his colleagues evaluated data from a detailed health and diet survey conducted by the National Institutes of Health (NIH) and the American Association of Retired Persons (AARP). The NIH-AARP study involved 566,000 male and female volunteers, ages 50 to 71, from California, Florida, Louisiana, New Jersey, North Carolina, Pennsylvania, and the metropolitan areas of Atlanta and Detroit.

Analyzing information gathered about the participants between 2000 and 2009, the researchers calculated the death risk from exposure to particulate matter for people in each national census district by cross-referencing information about the amount and type of particulate matter from the Environmental Protection Agency's Air Quality System and other databases. The investigators then statistically ruled out other variables impacting health and longevity including age, race or ethnicity, level of education, marital status, body size, alcohol consumption, how much participants smoked or not, and socio-economic factors such as median neighborhood income and how many people in the neighborhood did not graduate from high school.

Indeed, the team did not find any significant difference in the effect of

particulate matter exposure between different sexes or age groups or by level of education.

The researchers also noted that limiting the analysis to only the state of California, which has the most rigorous controls on air pollution, did not produce a different overall level of risk; instead, they found the same association between particulate matter exposure and increase in risk of death from all nonaccidental causes and from cardiovascular disease.

Senior study investigator and health epidemiologist Richard B. Hayes, DDS, PhD, MPH, says the team next plans to study which components of particulate matter are most harmful and whether they come from auto exhaust, chemical plants, or coal-burning power plants.

"We need to better inform policymakers about the types and sources of particulate pollution so they know where to focus regulations," says Hayes, a professor of [population health](#) and environmental medicine at NYU Langone. "It is especially important to continue monitoring health risks as national standards for [air pollution](#) are strengthened."

Provided by New York University School of Medicine

Citation: Link between air pollution, increased deaths and increased deaths from heart disease affirmed (2015, September 15) retrieved 13 March 2024 from <https://medicalxpress.com/news/2015-09-link-air-pollution-deaths-heart.html>

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