Air pollution and cardiovascular disease: Increased risk for women with diabetes

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Air pollution is a major risk factor for cardiovascular disease, and some people may be more susceptible to its effects than others. Investigators from Brigham and Women's Hospital (BWH) and Harvard T. H. Chan School of Public Health used data from a nationwide study of nurses to look for factors that made people more vulnerable to the effects of long-term air pollution exposure. One factor in particular stood out to the researchers: type 2 diabetes. The team reports its findings in a paper published November 25 in the *Journal of the American Heart Association Report*.

"We didn't expect diabetes to be the strongest factor in determining susceptibility," said study lead author Jaime E. Hart, Sc.D., an epidemiologist in the Channing Division of Network Medicine at BWH and the Department of Environmental Health at Harvard Chan School. "We looked at age, family history of cardiovascular disease, weight, smoking status and region of the country but diabetes was the most consistent across diseases and across different size fractions of particulate matter."

The research team explored data from more than 100,000 participants in the Nurses' Health Study (NHS), looking at rates of cardiovascular disease, specifically incidence of coronary heart disease and stroke. They assessed long-term exposure to three different sizes of particulate matter air pollution from 1989 to 2006.

Among women with diabetes, increased risk was statistically significant for all cardiovascular outcomes measured and across all sizes of particulate matter. (For the general population of women in the study, the researchers found that long-term exposure to air pollution led to small, but not statistically significant, increases in risk of cardiovascular events.)

The team found that for each increase of 10 micrograms per cubic meter of air pollution (the equivalent of the difference in air quality between a city like Los Angeles, CA and a city like St. Louis, MO), a woman's risk of cardiovascular disease increased by 44 percent if she had type 2 diabetes. The team found that these effects were greater in women over the age of 70, obese, and/or living in the northeast or south.

The researchers note that exposure data may be less accurate for earlier time points in their study due to fewer air pollution monitoring stations before 1999, and that these results are based on participants' residential addresses, which may not necessarily be where they spent most of their time. In addition, since the NHS is predominantly made up middle-aged to elderly white women, further studies will be needed to determine if these patterns are also seen in men and in racially and socioeconomically diverse populations.

"Continuing to identify subgroups that are most susceptible to the effects of air pollution is critically important for setting pollution standards and regulations so that those who are most vulnerable can be protected," said Hart. "Individuals, especially those who may be at greater risk, can also take precautions to help limit their exposure. And we would always recommend that individuals don't smoke, eat a healthy diet, and get regular exercise to reduce their risk for cardiovascular disease." Senior author Francine Laden, ScD, Professor in the Departments of Environmental Health and Epidemiology at Harvard Chan School, added, "We are currently working to determine if individuals who make healthier lifestyle choices are less susceptible to the adverse impacts of air pollution, and to determine if similar patterns of susceptibility are seen in men."

More information: *Journal of the American Heart Association*, dx.doi.org/10.1161/JAHA.115.002301

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