

# Air pollution and depression linked with heart disease deaths in middle-aged adults

April 26 2024

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A study in more than 3,000 US counties, with 315 million residents, has suggested that air pollution is linked with stress and depression, putting under-65-year-olds at increased risk of dying from cardiovascular disease. The research is presented today at [ESC Preventive Cardiology 2024](#).

"Our study indicates that the air we breathe affects our mental well-being, which in turn impacts heart health," said study lead author Dr. Shady Abohashem of Harvard Medical School, Boston, US.

According to the World Health Organization, air pollution is estimated to have caused 4.2 million [premature deaths](#) worldwide in 2019. Mental illness has also been linked with premature death. This study examined whether air pollution and poor mental health are interrelated and have a joint impact on death from cardiovascular disease.

The study focused on particles less than 2.5 micrometers in diameter, also referred to as [fine particles](#) or PM2.5. They come from vehicle exhaust fumes, power plant combustion, and burning wood, and present the highest health risk. To conduct the study, county-level data on annual PM2.5 levels were obtained from the Centers for Disease Control and Prevention (CDC). PM2.5 exposure was categorized as high or low according to World Health Organization (WHO) standards.

The researchers gathered data on the average number of days (age-standardized) that county residents experienced mental health issues—including stress, depression, and emotional problems—from the CDC. Each county was then categorized into three groups based on these numbers. Counties in the top third reported the most days of poor mental

health (PMH). Age-adjusted premature cardiovascular mortality rates (under 65 years of age) per county, were obtained from the CDC. County characteristics were sourced from the County Health Rankings project.

The study included 3,047 US counties, representing 315,720,938 residents (with over 207 million aged 20 to 64 years and 50% females) in 2013. Between 2013 and 2019, some 1,079,656 (0.34%) participants died from [cardiovascular disease](#) before the age of 65 years. The researchers analyzed the associations among pollution, mental health, and premature cardiovascular mortality after adjusting for factors that could influence the relationships.

Counties with dirty air (high PM<sub>2.5</sub> concentrations) were 10% more likely to report high levels of PMH days compared to counties with clean air (low PM<sub>2.5</sub> concentrations). That risk was markedly greater in counties with a high prevalence of minority groups or poverty. The link between PMH and premature cardiovascular mortality was strongest in counties with higher levels (above WHO recommended levels:  $\geq 10 \mu\text{m}^2$ ) of air pollution. In these counties, higher levels of PMH were associated with a three-fold increase in premature cardiovascular mortality compared to lower PMH levels. Further, one-third of the pollution-related risk of premature cardiovascular deaths was explained by increased burden of PMH.

Dr. Abohashem said, "Our results reveal a dual threat from [air pollution](#): It not only worsens mental health but also significantly amplifies the risk of heart-related deaths associated with poor mental health. Public health strategies are urgently needed to address both air quality and [mental well-being](#) in order to preserve cardiovascular health."

**More information:** The abstract 'Air pollution associates with poor mental health and amplifies the premature cardiovascular death in the

United States: longitudinal nationwide analysis' will be presented during the session 'Young Investigators Award - Population Science and Public Health' which takes place on 26 April 2024.

Provided by European Society of Cardiology

Citation: Air pollution and depression linked with heart disease deaths in middle-aged adults (2024, April 26) retrieved 7 May 2024 from <https://medicalxpress.com/news/2024-04-air-pollution-depression-linked-heart.html>

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