

New research finds air pollution from wildfire smoke increases suicide risk in rural counties

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Air pollution poses well-established risks to physical health, but an emerging body of research says that it may also have adverse effects on mental health. New research co-written by a University of Illinois Urbana-Champaign economist examining the relationship between air pollution via drifting wildfire smoke exposure and suicide risk found large-scale evidence that air pollution disproportionately elevates the risk of suicide among rural populations in the U.S.

Each 10% increase in airborne particulate matter in rural counties causes monthly suicide rates to rise by 1.5% on average, according to David Molitor, a professor of finance at the Gies College of Business at Illinois and co-author of the study.

"Air pollution has long been recognized as bad for physical health, but there's now evidence that links it to [mental health](#) problems such as anxiety, depression and suicide," he said.

"Given that wildfires are expected to become more frequent and severe in the coming decades because of warmer and drier climate conditions and ongoing human development in previously wild areas, it's imperative that we fully understand the impact of wildfire smoke pollution. Most of the global population is regularly exposed to unhealthy levels of air pollution, and the emerging evidence suggests that this exposure is not only detrimental to physical health, but to mental health as well."

The paper, published in the *Proceedings of the National Academy of Sciences*, was co-written by Jamie T. Mullins of the University of Massachusetts, Amherst, and Corey White of Monash University in Australia and the IZA Institute of Labor Economics in Germany.

Using data on all deaths by suicide, satellite-based measures of wildfire smoke and ambient fine particulate matter concentrations in the U.S. from 2007-2019, the researchers compared year-over-year fluctuations

in county-level monthly smoke exposure to changes in suicide rates, and then analyzed the effects across local areas and demographic groups.

They found that worse air quality leads to higher rates of suicide—although the data show that effect emerged only among certain demographic groups in [rural areas](#), Molitor said.

According to the paper, the effects were concentrated among demographic groups with both a high baseline [suicide risk](#) and high exposure to outdoor air: rural white males of working age, and rural adults with no college education. By contrast, the researchers found no evidence that smoke pollution increases suicide risk among any urban demographic group.

"In fact, we don't detect any relationship between air quality and suicide in urban areas," said Molitor, also the Hewitt Faculty Fellow and RC Evans Data Analytics Scholar at Illinois. "Suicide rates were about 36% higher in rural versus urban counties during our sample period. All of the effects seem to be concentrated in the rural populations."

The results provide important insight for identifying and protecting vulnerable groups—and for accurately quantifying the full costs of air pollution and wildfires, Molitor said.

"As we all experienced over the summer, air pollution poses a major threat to human health and well-being," he said. "Long recognized for its impacts on [physical health](#), our findings also suggest that air pollution exposure harms mental health—which, in turn, leads to greater loss of life by [suicide](#). Taken together, it's something that policymakers can't ignore."

The research also reflects the ongoing "national mental health crisis" in the U.S. referenced recently by the Surgeon General and the White

House, Molitor said.

"Suicide rates have increased by approximately 30% over the past two decades, positioning it as the fourth leading cause of years of potential life lost before age 65 in 2020," he said. "It's far too prevalent, and highly unequal across demographic groups. It's systematically higher in rural counties than in urban ones, and the urban-rural gap in [suicide rates](#) has been widening."

The results have broad implications for environmental as well as mental health policy in the U.S., Molitor said.

"Understanding the overall and disparate impacts of [air pollution](#) on mental health is crucial for developing effective strategies to protect [vulnerable groups](#) and increase population resilience to poor air quality," he said.

Molitor was appointed as a 2023-24 Center for Advanced Study associate to study climate-related environmental hazards such as pollution, [severe weather](#) and natural disasters pose.

More information: Molitor, David et al, Air pollution and suicide in rural and urban America: Evidence from wildfire smoke, *Proceedings of the National Academy of Sciences* (2023). [DOI: 10.1073/pnas.2221621120](#). doi.org/10.1073/pnas.2221621120

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