

Drought linked with human health risks in US analysis

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A photograph of a farmer showing his affected plot due to drought in Karnataka, India, 2012. Credit: Pushkarv/Wikipedia

A new Yale-led study reveals a distinct connection between drought exposure and adverse human health among older adults.

In a retrospective study of health claims for 618 U.S. counties over 14 years, researchers found that severe drought conditions increased the

risk of mortality among adults 65 or over. They also found that individuals in places where [droughts](#) were rare, such as counties in Minnesota, showed a larger risk of mortality and cardiovascular disease compared with counties where drought is more common.

"There's a lot of research on how different kinds of environmental disasters—such as forest fires, hurricanes, air pollution, or heat waves—impact human health, but the most widespread natural disaster is drought," said Jesse Berman, a postdoctoral fellow at the Yale School of Forestry & Environmental Studies (F&ES) and lead author of the study published in the journal *The Lancet Planetary Health*. "And yet there's been limited research looking at the health impacts of drought—particularly here in the U.S."

"For this study we looked at a large geographic area over multiple years, encompassing different types of environments, and many drought periods. And even with all of this variability, we still observed an association between drought and health effects."

Michelle Bell, Professor at Yale School of Forestry & Environmental Studies and senior author of the study, noted, "These findings are critically important given that climate change is anticipated to increase the frequency and severity of droughts."

The study was conducted in collaboration with researchers at the Johns Hopkins Bloomberg School of Public Health and the Harvard T.H. Chan School of Public Health.

For the study, the researchers examined U.S. Drought Monitor data compiled across 22 western states from 2000 to 2013. They identified periods of periods of "non-drought," "full drought," and periods when droughts were "worsening." In the case of periods when droughts were worsening, they further broke down the drought days into "low severity"

and "high severity." They then used Medicare claims made between Jan. 1, 2000 and Dec. 31, 2013, to calculate daily rates of cardiovascular admissions, respiratory admissions, and deaths among individuals 65 and over.

From there, the researchers estimated the percentage change in health risks during drought compared to non-drought days (controlling for daily weather and seasonal trends).

According to their findings, respiratory admissions decreased by 1.99 percent during full drought periods. But when drought escalated to periods of "high severity worsening" conditions, the researchers found, mortality risk increased by 1.55 percent. In counties where droughts occurred less frequently, both mortality and [cardiovascular disease](#) risk increased during worsening drought conditions.

This study does not address how drought specifically triggers these health outcomes. However, one possibility is that drought changes growing seasons or impacts the allergens that influence respiratory illnesses. Dry conditions also trigger more dust and particulate matter in the air. Then there are the mental health-related stressors associated with drought, including for farmers or ranchers whose livelihoods are affected by dry conditions.

While further research can examine these different factors, Berman said, the new findings provide an important basis. "Because this was an initial study, we wanted to capture as wide a picture as we could and not isolate ourselves to a tiny snapshot," he said.

The good news, Berman says, is that droughts, unlike other extreme weather events, are slow moving. "Since health risks appear to increase with drought severity, you have time to enact clinical interventions to help avoid some of these adverse [health](#) outcomes," he said. "Once we're

able to identify the mechanisms behind these effects, we can intervene before drought reaches that severe stage. Other environmental hazards, such as heat waves, occur without warning and we are not afforded this opportunity."

"I am so delighted to have had the opportunity to collaborate with the Yale and the Hopkins teams to conduct such important study," said co-author Francesca Dominici, Professor of Biostatistics and co-Director of the Harvard Data Science Initiative.

Provided by Yale University

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