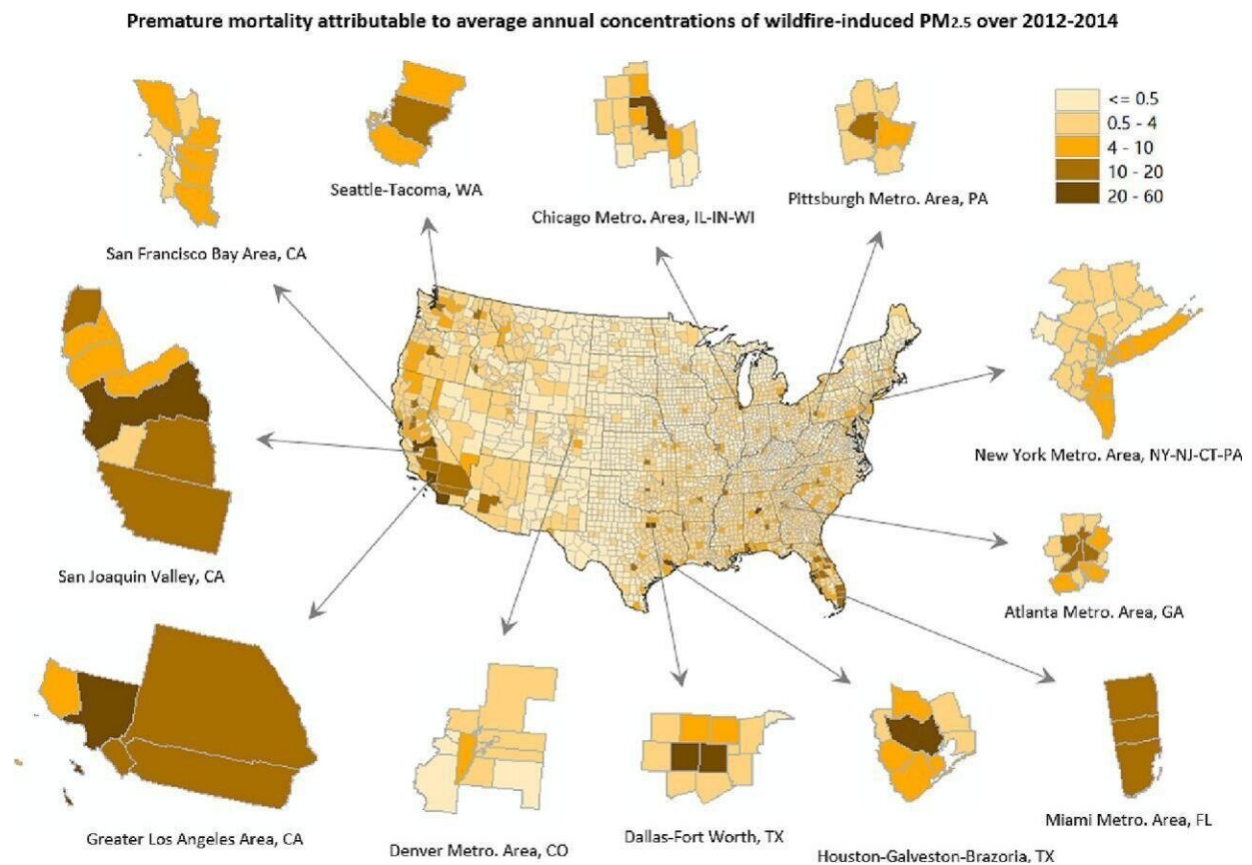


Wildfire smoke downwind affects health, wealth and mortality: Study

June 20 2023, by Blaine Friedlander



Graphical abstract. Credit: *Science of The Total Environment* (2023). DOI: 10.1016/j.scitotenv.2023.162614

Smoke particulates from wildfires could lead to between 4,000 and 9,000 premature deaths and cost \$36 to \$82 billion per year in the

United States, according to new research by Cornell, Nanjing University of Information Science and Technology (NUIST) and the University of Houston.

The study, "Quantifying the Premature Mortality and Economic Loss From Wildfire-Induced PM_{2.5} in the Contiguous U.S.," was published June 1 in *Science of the Total Environment*.

"We think of automobile tailpipes and factory emissions polluting our air," said Oliver Gao, the Howard Simpson Professor in the Department of Civil and Environmental Engineering, a senior author on the study.

"We don't necessarily think about air pollution from [natural sources](#) like [wildfires](#)."

"Climate change is leading to weather extremes like more storms and hurricanes, but it can also lead to more wildfires," Gao said. "The Quebec wildfires in early June affected human health hundreds of miles away in the distant cities New York, Philadelphia, Baltimore and Washington."

The study's first author is Shuai Pan, a former Cornell postdoctoral researcher, now in the Emergency Management College at NUIST, China. Senior author is Yunsoo Choi, associate professor of atmospheric chemistry at the University of Houston.

Wildfires release [fine particulate matter](#)—called PM_{2.5}, which consists of inhalable organic compounds, aerosols and metals that are 2.5 microns or less—substantially smaller than a [human hair](#), which can enter the lungs and bloodstream.

"The smoke and particulate matter from wildfires can pose human health risks," Pan said. "Epidemiological studies suggested that exposure to wildfire-related PM_{2.5} was positively associated with mortality and

some common respiratory diseases."

The researchers used satellite wildfire emission and air quality (PM2.5) data gathered from 2012 to 2014 for their current updated model and assessed how smoke from wildfires could impact human health and economies.

Metropolitan regions located near fire sources, such as Los Angeles, Houston and Atlanta, will likely see a large health burden and corresponding economic loss, according to the study.

Los Angeles—downwind from fires in the western U.S.—may see 119 premature deaths annually, and \$1.07 billion in financial burden, according to the new model. Downwind from southern U.S. fires, Atlanta could have 76 premature deaths annually with \$690 million in economic fallout, while Houston, estimated to have 65 premature deaths attributable to fire-induced particulate matter, may see \$580 million in economic fallout.

In the model, the researchers estimated New York City [metropolitan area](#)—recently affected by the Quebec wildfire in early June—would incur 86 premature deaths resulting from similar events, and see \$780 million in associated economic costs.

California, Florida, Texas, Georgia, Alabama and North Carolina likely would be the states with the highest number of [premature deaths](#) due to the volume of particulate matter distributed by the smoke.

Law and regulations—such as planned events to thin forests—could reduce and mitigate the harmful effects of wildfires, Gao said.

"Wildfire affects our health," he said. "In this era of [climate change](#), if we remove flammable vegetation and do things like create green fire

breaks and reduce the fuel for the fires, we can substantially decrease the harm of smoke downwind in populated areas."

"In addition to law and regulations," Pan said, "local policies and guidance are also important to reduce wildfire risk and to protect health from the adverse health effects of exposure."

More information: Shuai Pan et al, Quantifying the premature mortality and economic loss from wildfire-induced PM2.5 in the contiguous U.S., *Science of The Total Environment* (2023). [DOI: 10.1016/j.scitotenv.2023.162614](https://doi.org/10.1016/j.scitotenv.2023.162614)

Provided by Cornell University

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