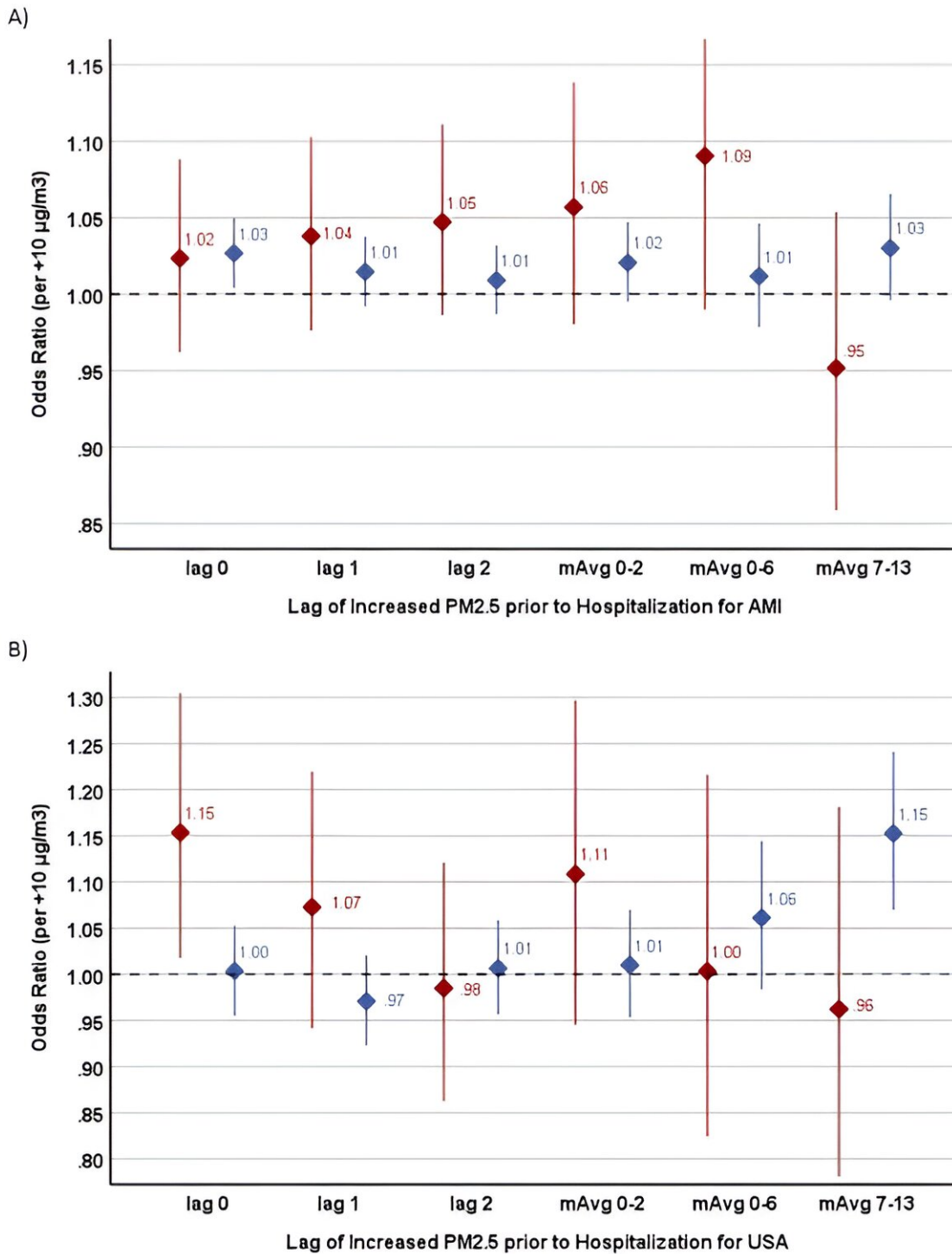


# **Air pollution-related hospitalization for chest pain, heart attack differed by seasons**

November 6 2023

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**Figure.** Association of increased PM<sub>2.5</sub> (by days of lag) with hospitalizations for: A) AMI and B) USA in seasons defined by wildfire (red, n=8,696) and inversion (blue, n=9,186) PM<sub>2.5</sub> sources (excluded: April/May n=3,532). (mAvg: moving average)



Benjamin D Horne et al, Ambient Fine Particulate Matter and Ozone Air Pollution Are Differentially Associated With Hospitalization for Unstable Angina and Acute Myocardial Infarction During Wildfire and Inversion Seasons. [https://www.abstractsonline.com/pp8/?\\_ga=2.247353410.7532578.1693882428-1949139275.1663003561#!/10871/presentation/8686](https://www.abstractsonline.com/pp8/?_ga=2.247353410.7532578.1693882428-1949139275.1663003561#!/10871/presentation/8686)

Short-term increases in fine particulate air pollution (PM<sub>2.5</sub>) during the summer and winter months in a mountain valley region of Utah were associated with increased health care visits for heart attack and unstable chest pain; however, the risk for each cardiac event differed by season, according to a [preliminary study](#) to be presented at the American Heart Association's [Scientific Sessions 2023](#). The meeting, to be held Nov. 11–13, in Philadelphia, is a premier global exchange of the latest scientific advancements, research and evidence-based clinical practice updates in cardiovascular science.

This study compared hospital visits for heart attack and unstable [chest pain](#) in a mountain valley of Utah during spikes in PM<sub>2.5</sub> due to summertime wildfire smoke versus rising levels of PM<sub>2.5</sub> during winter inversions—a weather phenomenon where a mix of cold and warm fronts trap air [pollution](#) from motor vehicles, factory emissions and other human sources.

"Summertime wildfire smoke does not cause the PM<sub>2.5</sub> to rise as much as pollution from human sources during the winter inversions. However, the biological response to the particulate matter that is produced by wildfire smoke has been shown to be different from the response of PM<sub>2.5</sub> produced by other sources, such as cars and businesses," said lead study author Benjamin D. Horne, Ph.D., M.P.H., FAHA, director of cardiovascular and genetic epidemiology for Intermountain Health at the Intermountain Medical Center Heart Institute in Salt Lake City, Utah.

Previous research has linked air pollution with seeking same-day treatment for sudden, life-threatening heart conditions. This study examined heart attack and unstable chest [pain](#) separately.

"With a heart attack, you feel crushing chest pain, have difficulty breathing and symptoms where you call for an ambulance and go to the hospital right away," Horne explained. "With unstable chest pain, people experience pain when they are at rest or doing low-intensity physical activity. They can still function and may stay home for a week or so thinking about it. When symptoms don't go away, they decide to seek medical attention, sometimes up to two weeks after symptoms began."

"Interestingly, in the summertime when  $PM_{2.5}$  rose, the data indicates people did not feel the need for hospitalization for heart attacks, but there was an immediate awareness of the need for hospitalization for unstable chest pain," he said.

$PM_{2.5}$  levels were measured at [air quality](#) monitoring stations along a valley region in Utah known as the Wasatch Front.  $PM_{2.5}$  spikes in both seasons were then cross-referenced with health records for people admitted to hospitals in the region. The analysis evaluated pollution on the day of admission as well as pollution two weeks prior to hospitalization. These data were compared to days in the same month when people were not admitted to the hospital.

The study found:

- For heart attacks, there was a significant association between elevations in  $PM_{2.5}$  air pollution and increased same-day hospitalizations during the wintertime—10% higher for each person in the population on each day they were exposed to an orange-level air quality index for  $PM_{2.5}$  air pollution compared to the green-level air quality index. (Orange-level air quality is

categorized as unhealthy for people in sensitive populations—people with heart or lung disease, children and teens, people who are active outdoors and older adults. Green-level air quality is considered as posing little to no public health risk.)

- However, during the summer wildfire season, there was no significant increase in hospitalizations for heart attacks.
- For unstable chest pain, the summertime, same-day risk of hospitalization was about 45% higher for each person in the population on each day they were exposed to an orange-level air quality index for PM<sub>2.5</sub>, compared to an air quality index at the green level during the summertime.
- When people experienced unstable chest pain during the winter inversion, they waited up to two weeks before seeking medical treatment.

"During the summertime, [health care professionals](#) should be aware of increased risks of chest pain brought on from wildfire smoke," Horne said. "If someone describes chest pain, it may be due to wildfire smoke, and they should go to the hospital as soon as possible."

Horne added, the study results raise two questions that need to be explored: is there a difference between the composition of fine particulate pollution from wildfire smoke and the airborne pollution from human sources that spikes during the winter inversion season, and is there a behavioral component that leads people with chest pain to wait for up to two weeks to go to the hospital during a winter inversion, yet they go to the hospital immediately in the summer?

"The public should be aware, especially if they have chronic health conditions, that when wildfire smoke elevates PM<sub>2.5</sub> levels, they should limit outdoor physical activities and exercise indoors," he said. "When you exercise, you increase the amount of air you are inhaling, so

exercising outdoors leads to increased levels of air pollution inside your body. If you are taking medications such as [blood thinners](#), or medications for blood pressure, Type 2 diabetes or cholesterol, be sure to take them on days of elevated PM<sub>2.5</sub> levels because they can reduce risk for heart attack and unstable angina."

Study details:

- The study evaluated health records for nearly 22,000 adults (average age of 66 years; 31% female; 89% white adults) who were treated for [heart](#) attack or unstable chest pain between 1999 and 2022 at 11 hospitals throughout Utah's Wasatch Front region.
- The Wasatch Front is an area in Utah bordered on both sides by mountains and includes the cities of Salt Lake City, Ogden and Provo.
- Through its design, the study controlled for other individual-specific factors such as smoking and other long term health conditions such as [high blood pressure](#) and Type 2 diabetes.

In a [2020 scientific statement](#) and a [2020 policy statement](#), the American Heart Association details the latest science about air pollution exposure and the individual, industrial and policy measures to reduce the negative impact of poor air quality on cardiovascular health.

"Air pollution is widely recognized as a significant contributor to cardiovascular disease and death and one we can modify by reducing exposure. Reversing the negative impacts of poor air quality on cardiovascular health is essential," said Joel D. Kaufman, M.D., M.P.H., FAHA, a professor of environmental and occupational health sciences, professor of epidemiology and professor of medicine—[general internal medicine](#) at the University of Washington in Seattle, and chair of the writing group for the Association's 2020 [policy statement](#) "Guidance to

## Reduce Cardiovascular Burden of Ambient Air Pollutants."

While this study observed risks associated with hospital visits for [heart attack](#) and unstable chest pain during spikes of [air pollution](#), individual data on pollution exposure was not available, which limits the interpretation of the findings.

Provided by American Heart Association

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