

# Climate change-related disturbances linked to worse cardiovascular health, researchers show

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Credit: AI-generated image

Cardiovascular disease (CVD) is the leading cause of death worldwide,

accounting for approximately one in every three deaths, with more than 20 million deaths reported in 2021 according to a [2024 World Heart Federation report](#).

Improvements in heart disease prevention, treatment and intervention have led to substantial declines in [cardiovascular deaths](#) in recent decades, but climate change caused by the continued combustion of fossil fuels may undermine this progress.

Over the last century, [NASA confirms](#) the average global temperature has risen by more than two degrees Fahrenheit, leading to long-term shifts in average weather patterns, disturbance of ecosystems, and rising sea levels. Additionally, the 10 hottest years on record have all occurred in the past decade.

In a new study, researchers at Beth Israel Deaconess Medical Center (BIDMC) conducted a [systematic review](#) of 492 observational studies to determine whether there is a link between climate change-related environmental stressors and [cardiovascular disease](#).

The investigators found that [extreme temperatures](#) and hurricanes are strongly associated with increased CVD mortality and incidence of disease, and that older adults, individuals from racial and ethnic minoritized populations, and those from lower wealth communities are disproportionately affected.

The findings appear in [JAMA Cardiology](#).

"Climate change is already affecting our [cardiovascular health](#); exposure to [extreme heat](#) can adversely affect heart rate and blood pressure; exposure to ozone or wildfire smog can trigger systemic inflammation;

living through a natural disaster can cause psychological distress; and hurricanes and floods may disrupt [health care delivery](#) through power outages and supply chain disruptions; and in the long-term, the changing climate is projected to produce declines in agricultural productivity and the nutritional quality of the food supply, which could also compromise cardiovascular health," said corresponding author Dhruv S. Kazi, associate director of the Richard A. and Susan F. Smith Center for Outcomes Research at BIDMC.

"We know that these pathways have the potential to undermine the cardiovascular health of the population, but the magnitude of the impact, and which populations will be particularly susceptible, need further study."

Kazi and colleagues screened nearly 21,000 peer-reviewed studies published between 1970 and 2023 that evaluated associations between acute cardiovascular events, cardiovascular mortality and CVD health care utilization and climate change-related phenomena, including extreme temperatures; wildfires and the resulting air pollution; ground-level ozone; extreme weather events including hurricanes dust storms and droughts; sea level rise; salt-water intrusion, and climate-related migration.

Of the 492 global [observational studies](#) that met the team's inclusion criteria, 182 examined extreme temperature, 210 looked at the effects of ground-level ozone, 45 investigated wildfire smoke and 63 studied extreme weather events such as hurricanes, dust storms and droughts. The studies presented findings from 30 high-income and 17 [middle-income countries](#) and one low-income country.

The investigators determined that exposure to extreme temperature was strongly linked with increased incidence of cardiovascular disease and CVD mortality, but the impact varied depending on the temperature and

the duration of exposure.

Extreme weather events such as tropical storms, hurricanes/cyclones, floods and mudslides were also linked to increased cardiovascular risk, which often outlasted the severe weather event by months, if not years.

Kazi and colleagues note that one study of Hurricane Sandy, which caused close to \$20 billion dollars' worth of damage in New York City alone in 2012, showed that the risk of death from cardiovascular disease remained elevated up to 12 months after the storm.

Some studies showed that exposure to wildfire smoke—which can affect populations hundreds of miles from the source—increased the risk of events like cardiac arrest, while others did not find such an effect.

"Given how many Americans are now being exposed to wildfire smoke every year—as was the case of wildfire smoke from Canadian fires affecting New York city last summer—further studies to accurately quantify this risk are urgently needed," said Kazi.

The researchers also found concerning gaps in knowledge with respect to climate change-related impacts on cardiovascular risk in lower income nations. Just one study was conducted in a low-income country and only five were based in Africa, where climate change is expected to have disproportionate effects.

"Though data on outcomes on low-income countries are lacking, our study shows that several of the environmental stressors that are already increasing in frequency and intensity with climate change are linked with increased cardiovascular risk," said senior author, Mary B. Rice, MD, MPH, a pulmonary and critical care physician in the division of Pulmonary and Critical Care Sleep Medicine at BIDMC.

The authors note that these findings suggest that clinicians should consider evaluating each patient's CVD risk from climate change-exposures based on individual, community, and health system attributes.

Clinicians should also be aware of environmental exposure-related cardiovascular risk in their community, whether related to extreme temperature, wildfire smoke, or [extreme weather events](#).

For instance, in areas prone to hurricanes or flooding, clinicians should assist patients in developing contingency plans to ensure uninterrupted access to medications and health care as needed. And health systems should evaluate the resilience of their infrastructure to climate change.

Kazi added, "Climate change is already adversely affecting cardiovascular health in the U.S. and worldwide. Urgent action is needed to mitigate climate change-related [cardiovascular risk](#), particularly among our most vulnerable populations."

**More information:** Climate Change and Cardiovascular Health, *JAMA Cardiology* (2024). [DOI: 10.1001/jamacardio.2024.1321](https://doi.org/10.1001/jamacardio.2024.1321). [jamanetwork.com/journals/jamacardio.2024.1321](https://jamanetwork.com/journals/jamacardio.2024.1321)

Provided by Beth Israel Deaconess Medical Center

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