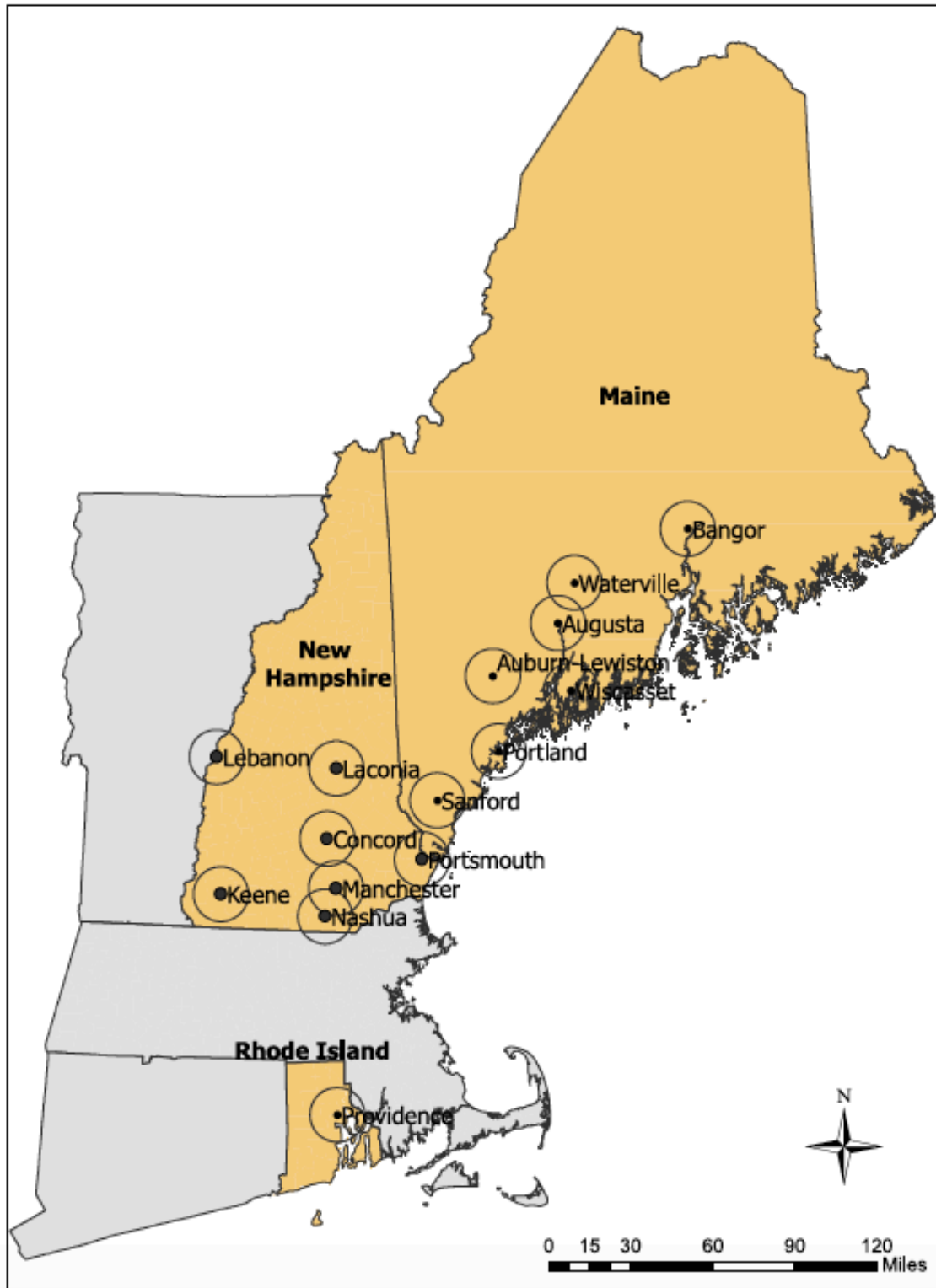


As heat index climbs, emergency visits, deaths rise in New England

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Researchers looked at regions around 14 New Hampshire and Maine weather stations and all of Rhode Island. Credit: Wellenius et. al./*Environmental Research*

Better known for leaf peeping on crisp autumn days and the nor'easter blizzards that follow, New England is nevertheless subject to spells of punishing summer heat and humidity. A new study that analyzed the health effects of summer weather in small to midsize population centers in three states shows that deaths and emergency department visits begin to rise significantly across the region well before the heat index hits the triple digits.

Data from the study, published in *Environmental Research*, has helped to shape a new National Weather Service policy for the New England region, according to a recently posted statement from the service's eastern region headquarters.

"The old threshold of 100 to 104 degrees Fahrenheit for two or more consecutive hours has been lowered to 95 to 99 degrees Fahrenheit occurring for two or more consecutive days, or any duration of [heat](#) index 100 to 104 degrees Fahrenheit," the statement says.

Heat index is a measure that combines temperature and humidity to express what the heat actually feels like. An 86-degree day with 70 percent humidity, for example, is enough to produce a heat index of 95.

In the new analysis, researchers at Brown University and the state [health](#) departments of Maine, New Hampshire and Rhode Island found that compared to days with a comfortable heat index of 75, days with a heat index of 95 resulted in 7.5 percent more heat-related emergency department visits and 5.1 percent more heat-related deaths over the following week. In absolute numbers, the health impact of all days with a heat index of at least 95 degrees among the 2.7 million residents in the study area was 784 additional emergency department visits per year and 22 more deaths per year attributable to heat.

A regional focus

"This hasn't been looked at in New England specifically, and New England has a very different set of characteristics and population than some other parts of the country," said study lead author Gregory Wellenius, an associate professor of

epidemiology at the Brown University School of Public Health. "We provided local evidence to local policy makers, and they have acted to improve the heat warning system in the area."

Many prior studies have shown the health dangers of excessive heat in the U.S. and around the world, Wellenius said, but the impetus for the new study was a desire among state health officials for data specific to the region.

Geographically, much of New England is characterized by small towns and midsize communities embedded within open areas, rather than densely urban or entirely rural landscapes. Meanwhile, the population is less acclimated to stretches of extreme heat than areas further south. For example, the region has a notably lower adoption and use of air conditioning than the rest of the Northeast or the U.S. as a whole

"People often think that in New England or in cooler climates, heat isn't as big a threat because it doesn't get that hot, or get that hot very often, but in fact it still feels hot to the people here," Wellenius said.

To conduct the study, the team focused on the populations living within 10 miles of 14 National Weather Service stations in New Hampshire and Maine and on the entirety of Rhode Island. Looking at datasets mostly spanning the period 2000 to 2010, they combined May-to-September weather information from each station with health, death and demographic data from state health departments.

Statistically controlling for possible confounders such as day of the week and federal holidays, the researchers calculated the association between daily heat index and the number of heat-related emergency visits and deaths, as designated in state administrative records.

Compared to a "baseline" of days with a 75-degree heat index, emergency visits climbed with statistical significance starting with 80-degree heat index days, especially when researchers considered visits occurring during the full week following such hotter days. Visits rose 2 percent following an 80-degree heat index day, 4 percent after 85, 5.8 percent after 90, 7.5 percent after 95, 9.1 percent after 100, and 10.7 percent after 105.

Excess deaths followed a similar pattern of increasing relative risk, though with

thankfully fewer absolute numbers, measures of statistical significance did not emerge until the heat index soared higher. At a heat index of 95, deaths were 5.1 percent higher, at 100 they were 9.4 percent higher, and at 105 they were 14.4 percent higher.

Wellenius said it is worth noting that emergency visits in particular continue to rise for days after an elevated heat index event.

"Much of the burden on health is on a day other than the same day," he said. "This is not something that is part of our health response plans right now."

Heeding heat

Wellenius said he hopes the study and the related National Weather Service policy change will help New Englanders better understand the health risks of heat and motivate them to take steps to protect themselves and others. In future research, he said, he and collaborators would like to track the impact heat warnings and other public response measures have on reducing emergency visits and deaths.

"How many lives are these efforts actually saving?" he asked.

Another question is how climate change might exacerbate the situation.

"Under the temperatures projected through the end of the century, New England is going to see large increases in the number of days where we exceed 90, 95 or 100 degrees of heat [index](#)," he said.

More information: Gregory A. Wellenius et al, Heat-related morbidity and mortality in New England: Evidence for local policy, *Environmental Research* (2017). [DOI: 10.1016/j.envres.2017.02.005](https://doi.org/10.1016/j.envres.2017.02.005)

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