

Heat-related deaths in Manhattan projected to rise

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Heat-related fatalities are projected rise steeply in Manhattan due to warming climate. This man rode a subway car during an August 2006 heat wave. Credit: Environmental Health Perspectives

Residents of Manhattan will not just sweat harder from rising temperatures in the future, says a new study; many may die. Researchers

say deaths linked to warming climate may rise some 20 percent by the 2020s, and, in some worst-case scenarios, 90 percent or more by the 2080s. Higher winter temperatures may partially offset heat-related deaths by cutting cold-related mortality—but even so, annual net temperature-related deaths might go up a third. The study, published this week in the journal *Nature Climate Change*, was done by a team at Columbia University's Earth Institute and the Mailman School of Public Health.

Studies of other cities have already projected [adverse health effects](#) from rising temperatures, but this is one of the most comprehensive so far. Unlike many others, it combines data from all seasons, and applies multiple scenarios to a local area—in this case, the most densely populated county in the United States. "This serves as a reminder that heat events are one of the greatest hazards faced by urban populations around the globe," said coauthor Radley Horton, a climate scientist at the Earth Institute's Center for Climate Systems Research. Horton says that people need look no further for the potential dangers than the record 2010 heat wave that hit Russia, killing some 55,000 people, and the 2003 one that killed 70,000 in central and western Europe.

Daily records from Manhattan's Central Park show that average monthly temperatures already increased by 3.6 degrees Fahrenheit from 1901 to 2000—substantially more than the global and U.S. trends. Cities tend to concentrate heat; buildings and pavement soak it up during the day and give it off at night. Many records have been set in Manhattan recently; 2012 was its warmest year on record, and in each of the past three years, it has seen temperatures at or above 100 degrees F. Projections for the future vary, but all foresee steep future average increases : 3.3 to 4.2 degrees F more by the 2050s, and 4.3 to 7.1 degrees by the 2080s.

To make mortality estimates, the researchers took temperature projections from 16 global climate models, downscaled these to

Manhattan, and put them against two different backdrops: one assuming rapid global population growth and few efforts to limit emissions; the other, assuming slower growth, and technological changes that would decrease emissions by 2040. As a baseline for estimating temperature-related deaths, they used the 1980s, when an estimated 370 Manhattanites died from overheating, and 340 died from cold.

No matter what scenario they used, the projections suggested increased mortality. In the 2020s for instance, numbers produced from the various scenarios worked out to a mean increase of about 20 percent in deaths due to heat, set against a mean decrease of about 12 percent in deaths due to cold. The net result: a 5 or 6 percent increase in overall temperature-related deaths. Due mainly to uncertainties in future greenhouse emissions, projections for the 2050s and 2080s diverge more—but in all scenarios mortality would rise steeply. The best-case scenario projects a net 15 percent increase in temperature-related deaths; the worst, a rise of 30-some percent. Assuming Manhattan's current population of 1.6 million remains the same, the worst-case scenario translates to more than 1,000 annual deaths.

The study also found that the largest percentage increase in deaths would come not during the traditionally sweltering months of June through August, but rather in May and September—periods that are now generally pleasant, but which will probably increasingly become incorporated into the brutal dog days of summer.

Senior author Patrick Kinney, an environmental scientist at the Mailman School and Earth Institute faculty member, pointed out several uncertainties in the study. For instance, he said, things could be made better or worse by demographic trends, and how well New York adapts its infrastructure and policies to a warmer world. On one hand, future Manhattanites may be on average older and thus more vulnerable; on the other, New York is already a leader in efforts to mitigate warming,

planting trees, making surfaces such as roofs more reflective, and opening air-conditioned centers where people can come to cool off. Kinney said there is already some evidence that even as city heat rose during the latter 20th century, heat-related deaths went down—probably due to the introduction of home air conditioning. "I think this points to the need for cities to look for ways to make themselves and their people more resilient to heat," he said.

The lead author of the study is Tiantian Li, an epidemiologist now at the Chinese Center for Disease Control and Prevention in Beijing, who did the work while serving as a postdoctoral researcher at the Columbia Climate and Health Program at Mailman, which Kinney directs.

More information: Paper: [dx.doi.org/10.1038/nclimate1902](https://doi.org/10.1038/nclimate1902)

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