

# Climate change likely to be more deadly in poor African settlements

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Conditions in crowded urban settlements in Africa make the effects of climate change worse, pushing temperatures to levels dangerous for children and the elderly in those areas, according to a new study led by a Johns Hopkins University scientist.

The study suggests that [climate change](#) will hit people living in these

"slum" settlements harder because their living conditions often create a warmer "micro-climate" due to home construction materials, lack of ventilation, sparse green space and poor access to electrical power and other services.

The study published by the online journal *PLOS ONE* focused on three settlements in Nairobi, Kenya. The largest of them is Kibera, a neighborhood of narrow alleyways and homes with mud walls and iron sheet roofs and concrete slab floors, that is home to as many as a million people. It's the largest of these neighborhoods in Africa, often called "informal settlements."

Conducted by seven institutions including three Red Cross organizations, the study shows the need for more targeted heat alerts and assistance. High temperatures in Kibera and two other nearby neighborhoods are shown in the study to be between 5 and nearly 10 degrees Fahrenheit higher than those reported at Nairobi's official weather station less than half a mile away.

Previous research by other scientists cited in the study found that deaths for children up to 4 years old and people over 50 increased by 1 percent for every nearly 2-degree increase above 68 degrees Fahrenheit.

Extreme heat can be a cause of heat stroke, which can damage the brain and other organs. Heat can also raise the likelihood of death from a heart condition, stroke or difficulty breathing.

The higher temperatures found in the study are "certainly consistent with excess deaths," said climate scientist Anna Scott, the lead author, who is studying for her doctorate in the Department of Earth and Planetary Sciences at Johns Hopkins University. She said there is not enough information to show how many deaths would result from [temperature](#) differences of the magnitude reported in this research, especially as the

summer studied for this report was hotter than previous years.

Roughly a third to 60 percent of the 3.1 million people who live in Nairobi, the largest city and capital of the East African country, make their homes in settlements such as Kibera, Mukuru and Mathare, the areas studied for this report.

In Mathare, homes are commonly built with iron walls and roofs. Houses in Mukuru are a mix of some high-rise buildings and houses built of iron sheets. There are few paved streets, trees or vegetation in any of these areas.

The 11-member research team - including two Johns Hopkins students and two faculty members - looked at temperature information they gathered over 80 days from Dec. 2, 2015, to Feb. 20, 2016. That period turned out to be Nairobi's hottest summer since the 1970s, which is as far back as available records go, Scott said.

Team members posted 50 thermometers on trees and wooden posts in the three settlements, most of them in partial or full shade. They also put one sensor at the University of Nairobi, an area about 7 miles northeast of Kibera that has more trees and [green space](#).

At the end of the 80 days, researchers compared the information gathered in the neighborhoods to temperatures recorded at the Kenya Meteorological Department headquarters, located on a grassy wooded campus less than a half-mile from Kibera.

The results were striking. The average daytime high temperature recorded by the government site for the period was a bit over 25 degrees Celsius, or 78 degrees Fahrenheit. The average was a bit over 82 in Kibera, 85 in Mathare, and 87 in Mukuru.

The information showed that grass and trees help to keep temperatures down, and suggests that as the Earth warms, the burden of climate change will not fall equally from one part of the planet to another. The impact of heat exposure is understood as a function of both temperature and population, both of which are expected to rise faster in Africa than in Europe. As a result, the burden of climate change is expected to be 100 times greater in Africa.

Provided by Johns Hopkins University

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