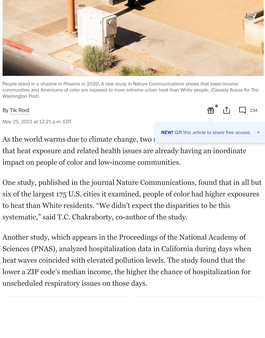
Climate and Environment

Heat and smog hit low-income communities and people of color hardest, scientists say



People stand in a shadow in Phoenix in 2020. A new study in Nature Communications shows that lower-income communities and Americans of color are exposed to more extreme urban heat than White people. (Cassidy Araiza for The Washington Post)

By Tik Root

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As the world warms due to climate change, two r
that heat exposure and related health issues are already having an inordinate impact on people of color and low-income communities.

One study, published in the journal Nature Communications, found that in all but six of the largest 175 U.S. cities it examined, people of color had higher exposures to heat than White residents. "We didn't expect the disparities to be this systematic," said T.C. Chakraborty, co-author of the study.

Another study, which appears in the Proceedings of the National Academy of Sciences (PNAS), analyzed hospitalization data in California during days when heat waves coincided with elevated pollution levels. The study found that the lower a ZIP code's median income, the higher the chance of hospitalization for unscheduled respiratory issues on those days.

"Knowing where to prioritize resources can hopefully inform policies that protect the most vulnerable," said Lara Schwarz, co-lead author of the PNAS paper.

The new studies reinforce other recent research highlighting environmental inequities in minority and low-income communities. And the authors, as well as outside experts, say they hope their work will bring greater attention to heat as a climate risk.

Psychological research shows that climate change can alter an individual's mental health both directly and indirectly, impacting how we respond to this crisis. (John Farrell/The Washington Post)

[Deadly air pollutant 'disproportionately and systematically' harms Americans of color, study finds]

"Heat is the number-one weather-related killer," said Ladd Keith, assistant professor of planning and sustainable built environments at the University of Arizona, who reviewed both reports. But he said the problem often doesn't get as much attention as hurricanes, sea level rise or other events being exacerbated by climate change. Both studies clearly highlight how the damage from climate change is worse for minority and poor neighborhoods, Ladd said. "Bolstering evidence in that area is really important," he said.

The Nature Communications paper explored what researchers call the "heat island effect," in which urban areas with little tree cover and a concentration of materials such as concrete and asphalt that absorb the sun's energy experience higher temperatures. Using satellite temperature readings between 2013 and 2017 and demographic data from the U.S. Census Bureau, the study compared the temperature of undeveloped and developed land within 175 urban areas.

In majority-White neighborhoods, the urban heat island effect was an average of 1.47 degree Celsius. For people of color and those living below the poverty line, it was nearly double that, 2.77 degrees Celsius. Blacks saw the highest urban heat exposure increase, at 3.12 degrees Celsius.

Even when incomes were equal, people of color saw greater heat exposure than Whites. "We thought it would be explained by income," said Chakraborty, the study's co-author and a PhD candidate at Yale University. "But it was not."

The reason, he said, probably has to do with how American cities are organized. "Generally urban temperatures are higher in the middle of the city," he said. That's historically been where minority and low-income communities are located, a pattern aggravated by phenomena such as "white flight." And whether race or income is the driver, Chakraborty said he expects exposures to become even more problematic as more people move to cities. "You're looking at a lot more people exposed to that higher heat," he said.

Brian Stone, director of the urban climate lab at the Georgia Institute of Technology, said he agrees with the general conclusions of the Nature Communications study, but he took issue with its use of satellite data, which measures land surface temperature, not air temperature. "Surface temperature isn't shown to drive health outcomes. Air temperature does," Stone said. "And the two often don't align."

Stone said he understands why researchers went that route — there is a dearth of thermometers across the country, making satellite data the simplest and most cost-effective way to do a sweeping spatial analysis. But he said it means the findings may not hold on a granular level, where air temperatures are most important.

"I just would not want to see a city take the actual data set, or the approach used, to design their own potential programs," Stone said. "That means you're planting your trees in the wrong neighborhood."

Extreme heat exacerbates the health impacts of ozone pollution, which can lead to higher hospitalization rates. And over the past decade, there have been about five days each year in California when heat waves and higher pollution levels collide.

The PNAS study found that lower incomes and higher unemployment rates were associated with higher hospitalization rates on days when heat and ozone events occurred. Unlike the Nature Communications study, though, the PNAS paper did not find that race influenced whether someone was more likely to be affected. "The racial disparities we see are driven by median income," Schwarz said.

Stone said he sees potential for Schwarz's work to help inform early-warning systems for heat and pollution exposure, and for Chakraborty's to draw attention to the need for more equitable risk mitigation.

"We tend to not be very-well-positioned to respond to heat" Stone said. While noting that some cities, such as New York, which has mapped heat inequality, and Miami, which recently appointed a "chief heat officer," are making progress, he said that "there's not a single city in the United States that's well-positioned for the heat risk we're facing this summer."

It's a problem that is intensified in poorer or minority communities, where residents may lack access to air conditioning, health care and other tools to cope with heat exposure.

[Facing rising temperatures, Miami appoints chief heat officer]

Experts point to potential improvements, such as more equitable deployment of cooling centers in underserved areas, or increased tree coverage in minority neighborhoods. A study last month found that 92 percent of low-income communities have less tree cover than wealthier ones.

Whatever the path forward, Adrienne Hollis, senior climate justice and health scientist at the Union of Concerned Scientists, emphasizes that effective policy must incorporate the lived experiences of those being most effected. "Everyone who's impacted has to be at the table," she said. "It's only going to get hotter."