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Heat could kill as many as infectious diseases by 2100, study finds

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Climate change is bringing heat waves that are longer, more intense and more frequent, and some researchers predict that heat will take a worsening toll in human lives as temperatures continue to rise.

In a new study, a team of researchers found that without

significant reductions in greenhouse gas emissions, extreme heat could become a major global killer by the end of this century, matching recent death rates for all infectious diseases combined, including tuberculosis, HIV and malaria.

Some experts questioned the findings. But the researchers projected that by 2100, in a scenario of unbridled planet-warming emissions, the risks of deaths due to higher temperatures would hit especially hard in the poorest and hottest parts of the world, including countries such as Pakistan, Bangladesh, Ghana and Sudan.

Wealthier countries like the U.S., they found, would be able to spend more to adapt — through everything from air conditioning to health care — and would likely see smaller, though still substantial, increases in heat-related deaths.

The research team concluded that curbing greenhouse gas emissions would bring big benefits. Under a scenario in which the world's nations achieve the goals of the Paris climate accord, an estimated 84% of the additional heat-associated mortality would be avoided as compared to the high-emissions scenario. And even efforts that fall short of the Paris accord's targets would significantly reduce the projected increases in death rates.

“We know some adaptation strategies and we know, ultimately, how to reduce CO₂ from the atmosphere and decarbonize our energy system,” said Amir Jina, a co-author and assistant professor at the University of Chicago's Harris School of Public Policy. “We know how to do these things. We

just need to make the investments now. We shouldn't be waiting until we see death on this level."



In a scenario of continued high emissions, the researchers projected hotter temperatures caused by climate change would increase global mortality rates by 73 deaths per 100,000 people annually in 2100, a level on par with the 2018 global death rate of 74 per 100,000 people for all infectious diseases, from dengue to yellow fever.

In their analysis, the team examined the effects of hot and cold temperatures on health and economies. They divided the world into more than 24,000 regions and calculated the projected effects in each area.

The study found stark differences. In poor countries, the researchers estimated increased death rates of about 107 deaths per 100,000 people each year at the end of the century under a business-as-usual emissions scenario — approaching

today's global death rate for all types of cancer of approximately 125 deaths per 100,000 people.

In wealthy countries, in contrast, they projected an increase of 25 deaths per 100,000 people, with those countries spending significant amounts to prevent higher death tolls.

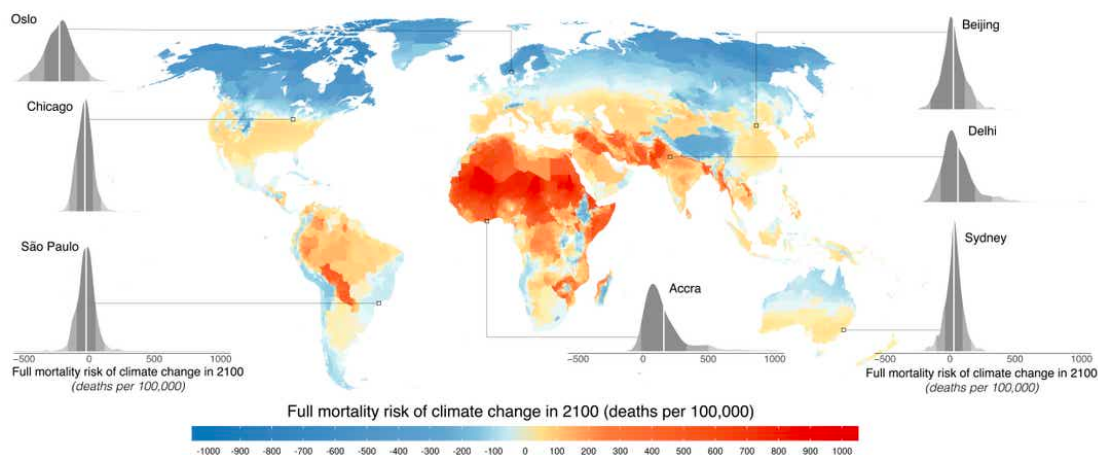


“The death risk of climate change disproportionately falls on regions that are poorest and hottest today, exacerbating existing inequality,” the researchers wrote in the study. They said wealthy countries now pay about three times more than poor countries “to adapt to rising temperatures and prevent additional deaths.”

The authors contrasted the poor, tropical city of Accra, Ghana, and its projected increase of 160 deaths per 100,000 people — a 19% increase in its mortality rate — with the wealthy northern city of Oslo, Norway, where they calculated that fewer cold days (plus the Norwegians’ ability to pay to adapt to

hotter temperatures) would end up saving an estimated 230 lives per 100,000 people by century's end.

A map depicting their results shows regions with high mortality risks in dark orange and red stretching across much of tropical Africa and parts of the Middle East, Asia and South America. Lighter shades of orange reflect lower projected increases in death rates in the United States, southern Europe and other wealthy countries.



“In those wealthier countries, there’s an increase in mortality, but people are able to spend on adaptation to decrease that impact,” Jina said. “The way that poorer countries are paying for it is with their lives.”

The study from the Climate Impact Lab was published Monday by the National Bureau of Economic Research. The interdisciplinary team of 16 authors included researchers from the University of California, Rutgers University, Rhodium Group, London School of Economics and other institutions.

The findings, Jina said, point to one of the difficult problems at the heart of efforts to address climate change: “The people who have low emissions at the moment, who haven’t been the

causes of climate change, are the ones who are going to get hurt most by it.”

And if parts of the world become increasingly difficult to live in as the worst-case projections suggest, he said, the hotter temperatures could eventually drive some people to pick up and move elsewhere as a way of coping.

The study also said that where people have been exposed to a hot climate for a long time, they may be better adapted to cope with more heat. In sunny Houston, for example, the effect of a hot 95-degree day on the annual mortality rate was calculated to be half the size of the effect of a 95-degree day in the colder city of Seattle.

In the United States, heat represents the deadliest type of extreme weather, claiming more lives than floods and hurricanes combined. Older people, young children and people with chronic illnesses are particularly vulnerable, as are homeless people living on the streets, those who work outdoors or those who don't have air conditioning.

In Phoenix, the urban heat-island effect contributes to higher temperatures. The city's vast areas of concrete and asphalt soak up heat from the sun during the day and radiate it at night, pushing the city's temperatures higher than other areas of Arizona.

More: Phoenix tries 'cool pavement' to curb heat island effect





National Weather Service data for Phoenix shows that during the summer months from June through August, the average temperature during the 2010s was 3.1 degrees hotter than during the 1970s. And nights have been getting warmer faster than the days.

Last month, Phoenix tied its record for the longest stretch of time in which temperatures never fell below 90 degrees. The temperature was 90 or above for seven straight days, even at night. That helped make July the hottest month on record in Phoenix.

Last year, Maricopa County reported 197 heat-associated deaths, up from 182 the previous year. The number of deaths in 2019 broke the county's record for the fourth straight year.

The latest weekly data from Maricopa County Public Health shows there have been 15 confirmed heat-associated death so far this year, while an additional 197 deaths are "under investigation."

More: More people are dying from heat in the Phoenix area,

data shows

The study projects that Arizona could face 29 additional deaths per 100,000 people each year during the last 20 years of the century under a scenario of continued high emissions.

“The projections for Arizona do show an increase in mortality under this high-emissions scenario. But here (in the U.S.) we’re able to stave off the worst of that increase by expending a lot of resources on adaptation,” Jina said.

Other previous research has focused on estimating the increased risks of heat-related deaths with climate change.

The most recent National Climate Assessment, published in 2018, said that in a high-emissions scenario, “the Southwest would experience the highest increase in annual premature deaths due to extreme heat in the country, with an estimated 850 additional deaths per year and an economic loss of \$11 billion (in 2015 dollars) by 2050.” Under a lower-emissions scenario, the projected deaths and costs would be reduced by half.

In the latest study, the researchers used historical records to study how death rates around the world have been affected by changes in climate. They compiled a database with records of 399 million deaths in 41 countries that make up more than half the world’s population.





The team looked at the costs and benefits of adaptation efforts, projections from 33 climate models and two possible trajectories of emissions.

David Hondula, an Arizona State University scientist who studies heat and health and who wasn't involved in the research, said a shortcoming of these types of studies is that they do not account for how the sensitivity of populations to heat can change over time. He pointed to another study that found mortality risks due to heat decreased in the United States and other countries in 2006 as compared with 1993.

"Our society seems to be quite capable of adapting to warming, although of course it is unclear the extent to which such adaptation would remain effective in the future," Hondula said in an email.

"In the absence of effective mitigation and adaptation strategies, climate change poses serious health risks for cities across the world," Hondula said. "Fortunately, many cities are demonstrating remarkable adaptive capacity to temperature

increases and other climate challenges, and it will be important to continue to identify and invest in successful strategies as we move forward."



Jina said the findings show that investing in addressing climate change and reducing emissions now would bring lower death rates and reduce "the need to spend a lot to protect ourselves later."

Jina is a founding member of the Climate Impact Lab, a collaborative effort involving climate scientists, economists and other researchers that examines the socioeconomic effects of climate change.

The study was prepared with data from before the coronavirus pandemic. Death rates from COVID-19 this year have varied widely from country to country.

According to COVID data compiled by researchers at Johns

Hopkins University, some of the countries with relatively high reported death rates have included Belgium (86 deaths per 100,000 people), Peru (62 deaths per 100,000) and the United States (47.5 deaths per 100,000).

Jina said the team's findings point to a parallel between acting to curb planet-warming pollution and taking steps to combat the virus.

"Just like with COVID, we shouldn't be waiting to respond to the pandemic," he said. "It's cheaper to do it now, and the time to stop this thing — which lives in the atmosphere for hundreds of years — is as soon as possible."

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