

Climate change's heat—not cold—is the real killer

January 31 2014, by H. Roger Segelken

(Phys.org) —Chill with impunity through this winter's extreme cold – and brace for the next summer heat wave, when fiery temperatures and air pollution conspire to fill hospitals and morgues.

That's the advice from a team of climate-change researchers who studied 170 million [hospital admissions](#) and 8 million deaths (season by season, day by day, for 10 years) in Germany before issuing a report with global implications.

"We show that extreme heat events have a highly significant and largely adverse impact on both hospitalizations and deaths, whereas extreme cold seems to have a negligible real-world impact on [population health](#)," said Nicolas Ziebarth, assistant professor of policy analysis and management in Cornell's College of Human Ecology.

Ziebarth published "The Short-term Population Health Effects of Weather and Pollution: Implications of Climate Change" in the December 2013 *Journal of Economic Literature* with Maike Schmitt, Darmstadt Technical University, and Martin Karlsson, University of Duisburg-Essen. Ziebarth is also affiliated with the German Institute for Economic Research and the Institute for the Study of Labor (IZA).

The researchers gathered a decade's worth (1999-2008) of health, temperature and [air-pollution](#) data from a variety of sources – including 1,044 weather stations and 1,314 air quality monitors across Germany and all 17 million hospital admissions and 800,000 deaths that occur in

Germany per year. They were particularly interested in deaths from respiratory, infectious or metabolic causes that might be linked to heat stress and pollution.

An extreme "cold day," for study purposes, had temperatures below 14 degrees F, and a "cold wave" was four days of such temperatures. A "hot day" had temperatures above 86 degrees F, and a "heat wave" was four consecutive hot days.

Severe air pollution days had alert-level amounts of ozone, nitrate and particulate matter in the air (according to EU standards, which have much lower alert thresholds than the United States).

The analysis found temperature-and-pollution spikes tended to increase hospital admissions and deaths by 2 percent to 5 percent the first day. Adverse [health effects](#) and mortality mounted with each day of a [heat wave](#).

But extreme cold events typically had no effect on hospitalization and [death](#) numbers. In some cases, hospital admissions actually decreased during extreme cold days – probably, researchers speculate, because people have trouble traveling to hospitals on icy roads.

Their analysis of heat waves (averaging about one per year in Germany between 1999 and 2006) took into account the grimly named "harvesting effect," when the gravely ill, whose deaths were imminent, died during the first day or two of extreme heat.

"We showed that extremely high temperatures do not lead to a permanent increase in hospitalizations and deaths – just an 'instantaneous heat-health relationship' in the short term," Ziebarth noted.

Distributed across the entire population of a country like Germany or the

United States, Ziebarth estimated, the cost of a hot day is between 10 cents and 68 cents per resident in health care and lost productivity.

Looking ahead, other researchers link the melting arctic sea ice to colder winters (and occasional, atypically chilly summer days) in North America and Europe. Climate change is leading to more frequent, more severe heat and cold events in the mid-latitudes, and that trend is probably unstoppable, they say.

But, the researchers said, one factor in the heat/pollution/health connection could be controlled by national and municipal governments: air quality. "Lower pollution-alert levels would be beneficial for population health," they conclude in the report, "and would save lives."

More information: The paper, "The Short-term Population Health Effects of Weather and Pollution: Implications of Climate Change," is available online: <ftp.iza.org/dp7875.pdf>

Provided by Cornell University

Citation: Climate change's heat—not cold—is the real killer (2014, January 31) retrieved 20 September 2024 from <https://phys.org/news/2014-01-climate-heatnot-coldis-real-killer.html>

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