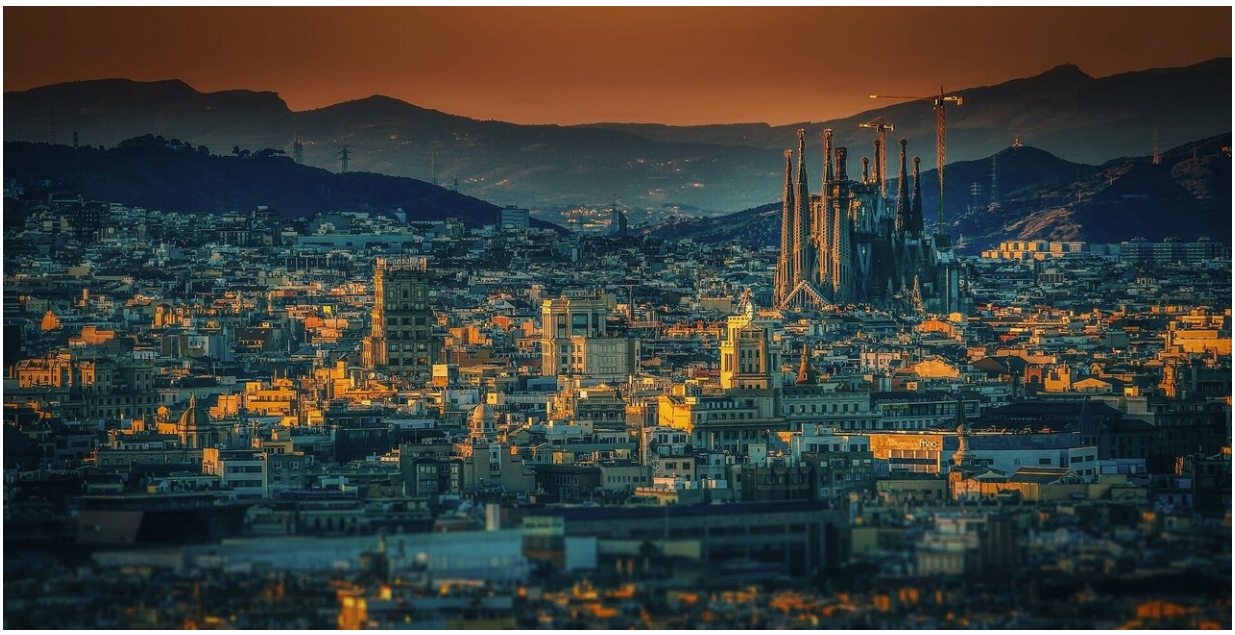
Modeling study suggests heat-related deaths in Europe could triple by century's end under current climate policies

August 21 2024



Credit: CC0 Public Domain

Deaths from heat could triple in Europe by 2100 under current climate policies, mostly among people living in southern parts of the continent, according to a study published in *The Lancet Public Health* journal.

The findings highlight the need to strengthen policies to limit global

warming to protect vulnerable regions and members of society from the effects of higher temperatures.

In recent years, Europe has experienced some of its hottest summers, which have coincided with high mortality rates. Elderly people are at heightened risk of death from extreme temperatures, and the number of people reaching old age is projected to increase over time.

Most previous studies projecting deaths from hot and cold temperatures in Europe have contained little local-level detail or have been in-depth assessments for individual countries, mostly in Western Europe. This study is the first in-depth analysis of the current and future health risks from hot and cold temperatures across Europe to look at the predicted impact on regions within countries.

Overall, with 3°C global warming—an upper estimate based on current climate policies—the number of heat-related deaths in Europe could increase from 43,729 to 128,809 by the end of the century. In the same scenario, deaths attributed to cold—currently much higher than from heat—would remain high with a slight decrease from 363,809 to 333,703 by 2100.

Dr. Juan-Carlos Ciscar, of the Joint Research Centre at the European Commission, said, "Our analysis reveals that the ratio of cold-heat deaths will shift dramatically over the course of this century, with those attributed to heat increasing in all parts of Europe and surging in some areas. At the same time, cold-related deaths will decline slightly overall. Our study looks at more than 1,000 regions across 30 countries, enabling the identification of hotspots where people will be worst affected in the future."

The authors of the new study used data on 1,368 regions in 30 European countries to model present disparities in deaths from hot and cold

temperatures and estimate how risks could change by 2100. The dataset—generated by analyzing the epidemiological and socioeconomic characteristics of 854 European cities with populations over 50,000—was used to model regional mortality risk for different age groups (from 20 to over 85 years). Estimates of current and future temperature-related deaths were produced for four levels of global warming (1.5°C, 2°C, 3°C and 4°C) using a combination of 11 different climate models.

The study estimates that hot and cold temperatures currently lead to 407,538 deaths across Europe each year, with 363,809 related to cold and 43,729 to heat. Deaths from cold are highest in Eastern Europe and the Baltic states and lowest in Central and parts of Southern Europe, with rates ranging from 25 to 300 deaths per 100,000 people. Heat-related deaths range from 0.6 to 47 deaths per 100,000 people, with lowest rates in the UK and Scandinavian countries and highest in Croatia and the southernmost parts of the continent.

With 3°C warming, temperature-related deaths are projected to rise by 13.5%, leading to 55,000 more deaths each year, driven by an increase in deaths from heat. Most deaths will be among people aged over 85 years.

Around eight times more people in Europe currently die from cold than heat (8.3:1 ratio), but the ratio is projected to decrease greatly by the end of the century. With 3°C global warming, it is estimated to fall to 2.6:1 by 2100. In contrast, under a scenario based on the Paris Agreement target of 1.5°C warming, the ratio would fall to 6.7:1.

By 2100, cold-related deaths under a scenario of 3°C warming, are projected to have negligible decreases on average across Europe and to range from 29 and 225 deaths per 100,000 people across European countries. There is predicted to be moderate reductions in cold-related deaths in Eastern Europe and slight falls in parts of Germany, France,

Italy and Portugal. However, cold-related deaths are estimated to increase in Ireland (where they will almost double), Norway and Sweden, all of which are predicted to see large increases in citizens aged 85 years and older.

Heat-related deaths are estimated to increase across all regions of Europe under 3°C warming, with mortality rates rising sharply with a three-fold increase in mean rate across Europe to between 2 and 117 deaths per 100,000 people across European countries. Hotspots that will be particularly affected by greater warming and increasing elderly populations include Spain, Italy, Greece and parts of France.

Dr. David García-León, also of the Joint Research Centre at the European Commission, said, "We find that deaths in Europe from hot and cold temperatures will rise substantially as many more heat-related deaths are expected to occur as the climate warms and populations age, while deaths from cold decline only slightly in comparison.

"Our study also identifies hotspots where the risk of death from high temperatures is set to drastically increase over the next decade. There is a critical need for the development of more targeted policies to protect these areas and members of society most at risk from temperature extremes."

The authors acknowledge some limitations. Their results are based on data for people living in urban areas (who typically face higher levels of temperature stress, particularly heat, than those in rural areas), meaning the estimates may be slightly overstated. The results also do not account for gender, ethnicity or effects on infants (another vulnerable group).

Writing in a linked Comment, Dr. Matteo Pinna Pintor, of the Luxembourg Institute of Socio-Economic Research (LISER), said, "[...] while increases in heat-related mortality are largely attributable to

greater heat exposure, an aging and thus more susceptible population will substantially inhibit reductions in cold-related mortality. Cold-related mortality is expected to increase in approximately half of the countries assessed, especially at northern latitudes but also in some areas of southern, central, and eastern Europe.

"These results reinforce previously expressed skepticism about large, unconditional reductions in cold-related mortality as temperate regions become warmer. This skepticism is, in turn, consistent with age-dependent vulnerability to cold and with the persistence of a degree of excess mortality risk, notably due to respiratory tract infections and associated complications, over an extended range of so-called mild cold temperatures (approximately 9–18°C). This means that the mortality burden of exposure to cold in an aging population will respond slowly to shifts in the temperature distribution."

More information: Temperature-related mortality burden and projected change in 1368 European regions: a modelling study, *The Lancet Public Health* (2024). DOI: 10.1016/S2468-2667(24)00179-8

Provided by Lancet