Harm in many cities, both hot and cold weather extremes and reveal a significant association between heatwaves capture attention, statistical and response systems. However, although deadly heatwaves are relatively common, studied weather-related public health issue. 2°C above pre-industrial levels. Temperature-related death could become risky at both cold and warm extremes. So it seems that temperature can be risky at both cold and warm extremes. What might happen with increasing temperatures as climate changes? Writing in Nature Climate Change, Huang and colleagues extend our understanding of temperature effects on health in an interesting new direction by analysing temperature in relation to a new measure of health impact: years of life lost (YLL). In contrast to the conventional daily death count, which makes no distinction between deaths occurring for persons of differing ages, YLL accounts for the remaining years of life that are lost when an acute death occurs, thus weighting more heavily deaths occurring in younger individuals. They computed YLL for each day by integrating daily death counts with life expectancy per death, based on standard life tables. Using time-series analysis, the researchers observed a U-shaped relationship between daily YLL and daily temperatures from 1996 to 2004 in Brisbane, Australia (Fig. 1), accounting for long-term and seasonal trends in the data. They then calculated future YLL under 1°C, 2°C and 4°C average warming above year-2000 levels. Although reduced health impacts in winter outweighed increases in summer under the 1°C scenario, at 2°C there were 381 YLL and at 4°C this figure increased to 3,242 YLL.

By giving more weight to temperature-related deaths occurring in younger people, these findings provide decision-makers with a potentially useful new tool. However, the

A new measure of health effects
It has long been known that temperature extremes are associated with an increased risk of death. Research now directly relates future climate warming to people’s lifetime.

Patrick L. Kinney

Heatwaves can be fatal, as shown by the August 2003 heatwave that killed upwards of 35,000 people across Europe. Though striking in its intensity, the notion of heat-related deaths is not a big surprise. What is more surprising is the fact that far more deaths occur in winter than in summer, especially for older adults with respiratory and cardiovascular problems. So it seems that temperature can be risky at both cold and warm extremes. But what might happen with increasing temperatures as climate changes? Writing in Nature Climate Change, Huang and colleagues suggest that net increases in years of life lost as a result of premature, temperature-related death could become significant if future temperatures exceed 2°C above pre-industrial levels.

Health effects of extreme temperatures represent the largest and most thoroughly studied weather-related public health issue. Deadly heatwaves are relatively common, and have become the focus of heat warning and response systems. However, although heatwaves capture attention, statistical analyses of long records of daily observations reveal a significant association between both hot and cold weather extremes and mortality in many cities. The risk of death as a function of temperature is different depending on local climate; for example, responses to high temperatures are more pronounced in cities that are accustomed to cooler temperatures. Furthermore, considerable evidence suggests that responses to heat differ depending on individual conditions, including age, race, socio-economic factors, acclimatization to prevailing conditions, and adaptive measures.

Although present-day associations between temperature and mortality are fairly well understood, projecting these effects onto future, warmer temperatures is challenging. One crucial question is that of mortality displacement. How much life is really lost when a person dies in a heatwave? If most heatwave-related deaths were anticipated by just a few days, this would imply minimal impacts on annual death rates and a reduced public health significance than if deaths were anticipated by years. Another challenge is to understand the extent to which the association between cold and death represents a direct temperature effect as opposed to seasonal impacts of influenza and other respiratory diseases. Finally, how might cities adapt as temperatures become warmer? Will the heat effect decrease and the cold effect increase?

Huang et al. extend our understanding of temperature effects on health in an interesting new direction by analysing temperature in relation to a new measure of health impact: years of life lost (YLL). In contrast to the conventional daily death count, which makes no distinction between deaths occurring for persons of differing ages, YLL accounts for the remaining years of life that are lost when an acute death occurs, thus weighting more heavily deaths occurring in younger individuals. They computed YLL for each day by integrating daily death counts with life expectancy per death, based on standard life tables. Using time-series analysis, the researchers observed a U-shaped relationship between daily YLL and daily temperatures from 1996 to 2004 in Brisbane, Australia (Fig. 1), accounting for long-term and seasonal trends in the data. They then calculated future YLL under 1°C, 2°C and 4°C average warming above year-2000 levels. Although reduced health impacts in winter outweighed increases in summer under the 1°C scenario, at 2°C there were 381 YLL and at 4°C this figure increased to 3,242 YLL.

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SOIL SCIENCE

Fungal friends against drought

Fungal-based food webs of undisturbed grasslands resist and adapt to the effects of drought more than bacterial-based food webs of agricultural soils, indicating how soil biota might be able to withstand long-term climate change.

Johan Six

There are still many unknowns about how the earth under our feet will respond to future changes in climate. At the heart of the issue lies the question of how much or even if soil-living creatures and their functions will be able to resist and/or adapt and/or bounce back from the perturbation caused by droughts. This question is extremely important, because if soil biota can withstand drought in the longer term, then we as a society have one less worry within the realm of climate change. Writing in *Nature Climate Change*, Frankiska de Vries and colleagues\(^1\) provide such a reassurance, provided that we manage our lands sustainably. Their study shows that soil biota can resist and adapt to prolonged drought, but only if we maintain diverse and fungal-based food webs in our soils by reducing anthropogenic disturbances such as tilling and over-fertilizing.

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