How dangerous is extreme heat to humans?

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The media reporting around heat waves that have hammered the northern hemisphere has been unequivocal: the simultaneous record-breaking heat has "pushed the limits of human survival."

Perhaps more alarmingly, "the UK may become too hot to endure within three decades", which would surely be a concern to the 97% of humanity who live in places with hotter summers than the UK.

The good news: Britons won't have to move to Sweden by 2050. The bad news: deadly heat is already here, is getting worse, and soon may become a vastly bigger problem than it is even now in nearly every part of the world.

Heat is the silent killer that is responsible for more deaths than any other natural disaster: several severe European heat waves in recent decades, including last summer, have claimed tens of thousands of excess deaths.

Death tolls in developing countries are not properly counted and probably much larger.

But worse is coming and we need to prepare for it.

The average surface temperature on Earth is now at its highest level since records began and probably before the last ice age.

Recent heat waves show clear fingerprints of global warming, more so than any other climate change impact such as flood or drought. And global warming will continue at least until we reach net zero.

There is a fundamental limit to the body's coping ability: it is a fixed goalpost.

Research in 2010 demonstrated that a 'wet-bulb' temperature of 35° Celsius or higher would make it impossible for humans to exhaust metabolic heat, due to our fixed core body temperature.

It proposed this was an effective survivability limit.

The wet-bulb temperature measures the ability to cool by evaporation; it equals normal temperature if relative humidity is 100 percent, and otherwise is lower. 35C is extreme—most places on Earth never experience wet bulbs above 30°C.

But enough global warming could push heat waves in many areas past 35° C. This upended the widely held assumption at the time that humans could adapt to any amount of increased heat, i.e., that the goalposts would move. This goalpost will not.

Wet-bulb temperature is used by meteorologists and climatologists to quantify heat stress. It is a combination of heat and humidity: a high wet bulb can occur in humid places at lower temperatures, as well as in dry places at extremely high temperatures.

New studies are beginning to chart out the road to 35° C.

One study in the US last year found that young, healthy subjects exposed to very hot conditions started to enter hyperthermia (inability to regulate core body temperature) well below 35°C wet bulb, closer to 32° C or less.

This is an important reminder that 35° C was a theoretical upper limit, not a practical one.

On the other hand they would undoubtedly have found a higher tolerance had they done the study in India or Brazil, because physiology does adjust to heat over time (up to a point).

The UK has a long way to go before reaching 32° C and could acclimatize for a while. Wet-bulb temperatures above 32° C appear only very rarely today in coastal areas of the Middle East and for very short periods, but these will gradually spread as warming continues.

The heat will force us to change how we live, for example shifting outdoor summertime activities to nighttime or just eliminating them.

Severe heat may already be putting people off traveling to Europe or other locations in the summer.

Researchers at the University of Sydney are developing a heat warning system, and conducting exposure studies similar to the US one. It looks like we'll soon have a clearer picture of the direct effects of severe heat on physiology.

It remains challenging to measure or predict extreme heat's overall cost to the community in terms of health, work and quality of life.

To do this, climate and health researchers need to develop models that factor in human behavior and adaptation along with physiology, weather, and climate information. We also need to understand what will happen to nature, and seek ways to protect wildlife.

Above all we need to reach net zero carbon emissions as soon as we possibly can to arrest the continuing rise in heat.

Provided by University of New South Wales