

## What is heat exposure?

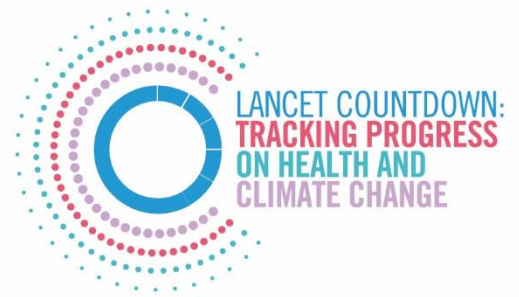
The human body maintains itself within a fairly narrow temperature range (around 37°C) for normal function and metabolic processes. When we are exposed to heat, a number of different defence mechanisms kick in to maintain our body temperature within a safe range. These include seeking a cooler environment, dilation of blood vessels to increase blood flow to the skin and sweating to create evaporative cooling. These defence mechanisms, however, have their limits (1,2) and there are particular populations who are more vulnerable to heat (see below).

The Lancet Countdown: Tracking Progress on Health and Climate Change studies heat exposure in the form of average temperature increase, heatwaves, and Wet Bulb Globe Temperature, affecting labour capacity (further information below).

## What is heat stress?

Heat stress is an overarching term for illnesses that occur when the body's defence mechanisms are unable to prevent the body's temperature from rising. These include diagnoses of heat syncope, heat cramps, heat exhaustion and heat stroke (3). On the milder end, dilation of blood vessels and salt and water loss from sweating can result in reduced blood flow to the brain, causing heat syncope (fainting) and salt and water loss can also cause muscle cramps. Further water and salt loss leads to dehydration and hyponatraemia (low sodium in the blood). These conditions are named heat exhaustion and the symptoms people experience include headache, tiredness, vomiting and confusion. The salt and water loss as well as the dilated blood vessels can also lead to heart failure (when the heart is unable to provide enough blood and oxygen to all the organs of the body) (1). The most severe form of heat stress is known as heat stroke. This usually occurs when the core body temperature is above 40°C and includes the failure of multiple organ systems, including the kidneys, the liver, the heart, the lungs, the blood clotting system and the brain. This can lead to seizures, coma and ultimately death (2). People with heat stroke require hospital admission (often in intensive care), body temperature control, water and salt replacement and management of organ failure (2).

In addition, or alongside the heat-specific diagnoses, heat exposure can increase the risk of many different illnesses. Higher temperatures and heatwaves lead to increased hospital admissions for lung disease, heart disease and kidney disease (4). Heat raises the risk of all types of death and specifically deaths from cardiovascular disease and respiratory disease (4). Heat also affects mental health, with studies showing increased admissions for bipolar disorder and schizophrenia, worsening of dementia symptoms as well as increased risk of suicide (5).



## Who are most vulnerable?

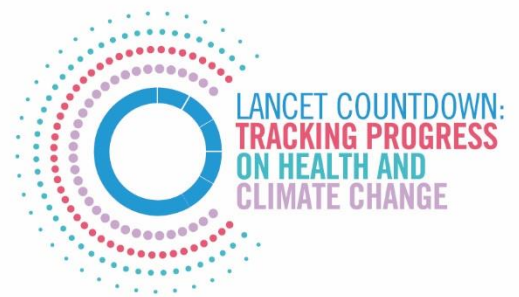
Those most vulnerable to heat-related risks are: the elderly (particularly in urban areas), who have weakened defences against heat; manual workers exposed to hot environments such as agriculture, construction work and manufacturing; and people with pre-existing medical conditions such as neurological and psychiatric illnesses heart disease, lung disease, kidney disease, diabetes (4,6).

## What is the new Lancet Countdown report telling us?

While some heat specific diagnoses such as heat exhaustion and heat stroke are recorded by countries, most illnesses caused by heat (such as lung diseases, kidney diseases, mental illnesses) are not currently documented. With the risk of heat stress and other illnesses rising as a result of climate change, the Lancet Countdown is tracking our exposure and vulnerability to temperature change and heatwaves.

In particular it is tracking the following:

- **1.1 Vulnerability to the heat-related risks of climate change.** This is a new indicator which looks at the populations around the world who are vulnerable to heat-related risks of climate change. It involves a heat vulnerability index in people aged over 65 years. Factors that are included in the index include heart disease, lung disease, diabetes and living in an urban area. The proportion of people over 65 who are vulnerable to heat exposure is highest in Europe (42%) and the East Mediterranean (43%).
- **1.2 Health effects of temperature change.** This indicator looks at the average temperature change to which people are actually exposed. By weighting the temperature change by the number of people who live in each area, people are exposed to an average summer temperature change of 0.8°C from the 1986-2005 average, compared with a global average temperature change of 0.3°C over the same time.
- **1.3 Health effects of heatwaves.** This indicator looks at the number of heatwaves that affected people over 65 in a given year, with each person affected by a single heatwave considered as a single exposure event. In 2017, there were 18 million more heatwave exposure events than in 2016 and 157 million more than the 1986-2005 average.
- **1.4 Change in labour capacity.** This indicator looks at the impact of labour capacity from Wet Bulb Globe Temperature, which is a measurement of heat stress felt by people in direct sunlight includes temperature, humidity, wind speed, sun angle and cloud cover. Three sectors affected by heat stress are service (indoor work at computers, in restaurants and in retail), industry and agriculture (outdoor work). In 2017 153 billion hours of labour were lost due to a high wet bulb globe temperature, which is 62 billion hours more than 2000. 80% of these labour losses were in the agricultural sector.



## References

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