Te Whatu Ora
Health New Zealand

This is an extract from the Te Whatu Ora Heat Health Plans Guidelines.

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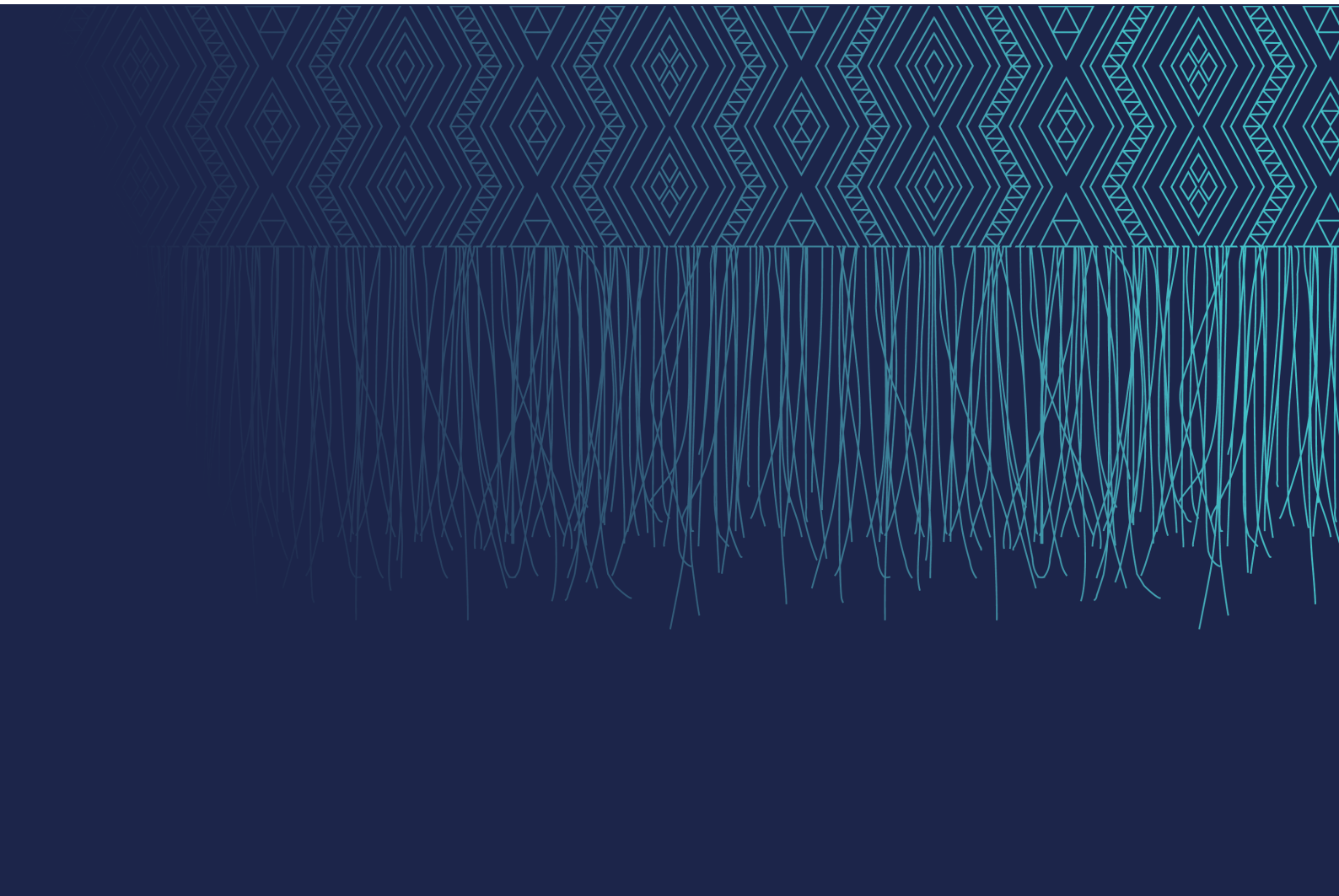
Full guideline and references available from:
https://www.tewhatuora.govt.nz/publications/heat-health-plans-guidelines/



Health Effects of Heatwaves

Heatwaves can be serious events that cause death and illness. In Australia, heatwaves are responsible for more deaths than any other natural hazard (Nairn and Fawcett 2013). A heatwave in Europe in 2003 was estimated to cause over 70, 000 deaths across the continent (Robine et al 2008). In New Zealand, heatwaves of this magnitude are rarely experienced, but even so in Auckland and Christchurch an average of 14 high-heat-related deaths occur per year in people aged over 65 years (McMichael et al 2003). This number is likely to increase as climate change causes temperature levels in New Zealand to rise (McMichael et al 2003; Royal Society of New Zealand 2017).

This section describes the health impacts of heatwaves and which sectors of the population are most vulnerable.

Effects of heat on health

Many of the adverse health effects from excessive heat are preventable. Under normal warm conditions, the body regulates temperature by producing sweat that evaporates and cools the body. However, when a combination of high heat and high humidity occurs, the evaporation slows and the body must work harder to maintain a normal temperature. This extra work stresses the body and can lead to illness and death (Hajat et al 2010; Kjellstrom et al 2016; Kravchenko et al 2013; Public Health England 2015b).

The main causes of illness and death during a heatwave are related to cardiac conditions and to asthma and respiratory illness. Specifically, the cardiovascular system can experience stress from increased pumping of blood to the skin to cool the body, while higher levels of air pollution exacerbate respiratory symptoms. Kidney disease, diabetes, nervous system disease and cancer have also been identified as factors contributing to death during extreme heat events (Bunker et al 2015; Hajat et al 2010; Public Health England 2015b).

Table 1 describes other effects of high heat on health and how to treat them. General actions that can prevent or mitigate these health effects include staying cool and out of the heat, limiting physical activity and keeping hydrated (Public Health England 2015b).

Table 1: Heat-related conditions

Condition	Symptoms	Cause	Treatment
Heat rash	Small, red, itchy bumps	Excessive sweating	Move to a cooler, less humid environment. Keep the affected area dry. Dusting powder may be used to increase comfort but avoid ointments or creams
Heat cramps	Muscular pains and spasms, usually in the abdomen, arms or legs	Low salt level in the muscles due to dehydration and electrolyte imbalance causes painful cramps. Heat cramps may be the first sign of heat exhaustion and are often the first sign the body is having trouble with the heat	**Those with heart conditions or on a low-sodium diet need medical attention**. Otherwise: • replenish fluids (drink water or electrolyte replacement solutions) • rest in a cool environment • do not return to strenuous activity for a few hours after the cramps subside • seek medical attention if cramps do not subside within one hour
Sunburn	Red painful skin that is warm to the touch. Severe sunburn may result in fever, blistering and severe pain	Overexposure to UV radiation	Sunburn leads to an increased risk of skin cancer. Severe sunburn may require medical attention. Otherwise: • avoid repeated sun exposure • apply cold compresses or moisturising lotion (not salve, butter or ointment) to affected area • do not break blisters

Condition	Symptoms	Cause	Treatment
Heat exhaustion	Heavy sweating, paleness, muscle cramps, tiredness, weakness, dizziness, vomiting, headache, fast and weak pulse, fast and shallow breathing	Dehydration. Blood flow to the skin increases while blood flow to vital organs decreases, resulting in a mild form of shock. If left untreated, may evolve into heatstroke	**Medical attention is required if symptoms are severe or for those with heart problems or high blood pressure**. Otherwise: • replenish fluids • rest in a cool environment • cool down by taking a cool shower or bath • seek medical attention if symptoms worsen or last longer than one hour
Heatstroke/ sunstroke	High body temperature (above 39.4 degrees Celsius), confusion, disorientation, unconsciousness, red hot dry skin (no sweating), throbbing headache, nausea, rapid strong pulse	Failure of body's thermoregulation mechanism. Can result in cell death, organ failure, brain damage or death	**Immediate medical attention required**. • Call for medical assistance. • Cool down in whatever way possible. • Monitor body temperature and continue cooling efforts until body temperature drops below 38.5 degrees Celsius.

Source: Adapted from Victoria State Government Health and Human Services (2009), National Emergency Management Agency (2022), and Public Health England (2015b)

Vulnerable populations

Some people's ability to regulate body temperature is compromised, which makes the body more vulnerable to overheating. This could be due to age, the effects of some medications or chronic illness. Risk factors for heat-related illness include (Kravchenko et al 2013; Public Health England 2015b; Victoria State Government Health and Human Services 2015):

- **older age** – especially those over 65 years of age, or living on their own and socially isolated
- **chronic, acute and severe illness** – including heart conditions, diabetes, respiratory or renal insufficiency, Parkinson's disease and severe mental illness. Medicines that potentially affect renal function, the body's ability to sweat, thermoregulation or electrolyte imbalance can make people in this group more vulnerable to the effects of heat
- **pregnant women** – who are more susceptible to heat exhaustion and heatstroke, which may in turn lead to birth defects and other reproductive problems (National Institute for Occupational Safety and Health 2018)
- **young age** – with infants vulnerable due to their immature thermoregulation and high level of dependency
- **homelessness** – due to higher rates of chronic disease, smoking, respiratory conditions, substance dependencies and mental illness among this group, as well as social isolation, lack of shelter and vulnerability to the effects of urban heat islands
- **alcohol and/or drug dependence** – which is associated with poorer overall health and social isolation
- **inability to adapt behaviour to keep cool** – which may include, for example, those with Alzheimer's disease, a disability or mental illness or who are bed bound
- **environmental factors and overexposure** – for example, living in urban areas, undertaking outdoor activities or jobs[1] that involve a high level of physical exertion, and attending outdoor public events
- **language barriers** – difficulty in understanding heat health messages and warnings.

Inadequately ventilated housing and lack of access to mechanical cooling systems can be other exacerbating factors (Hajat et al 2010), which may disproportionately affect those of lower socioeconomic status. In a moderate heatwave, it is generally vulnerable people that are affected; in a severe heatwave, however, fit and healthy people can also be affected (Public Health England 2015b).

[1] For WorkSafe New Zealand guidance on temperatures in the workplace and employers' obligations, go to: **https://worksafe.govt.nz/topic-and-industry/temperature-at-work/**

Equity

The effects of heatwaves will not be evenly distributed in New Zealand. Some regions are expected to see a greater increase in the number of hot days than others. For example, the top half of the North Island, Gisborne and Hawke's Bay are projected to have the greatest number of hot days in the future. These regions have large populations of Māori and Pacific peoples, as well as higher proportions of people living in areas of socioeconomic deprivation. Heatwaves could potentially increase the levels of inequity in these areas.

Rural communities

Heatwaves also disproportionately affect primary industries such as farming. Rural communities are more vulnerable during periods of hot weather than those living in urban and suburban centres, particularly in terms of water and food security and access to health services. Because drought also disproportionately affects them, heatwave planning and drought planning in rural communities should inform each other.