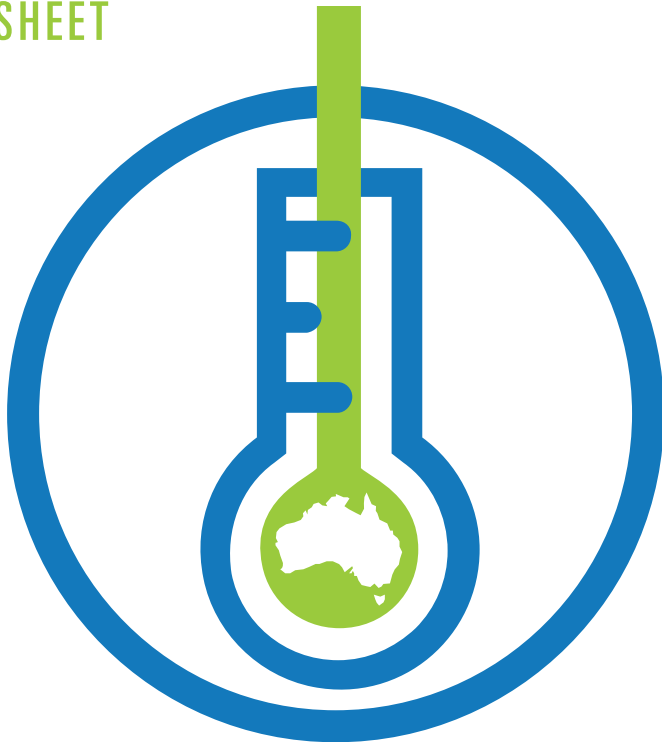


HEATWAVES AND HEALTH IN AUSTRALIA

FACT SHEET



BACKGROUND

Global temperatures have increased due to climate change (IPCC 2018). The mean surface temperature across Australia has increased by about 1.0°C since 1910 when Australia's weather records began. Increases have been observed in all seasons across Australia, affecting both day and night temperatures. Eight of Australia's ten warmest years on record have occurred since 2005, and the summer of 2018–2019 was the hottest on record.

Numerous records were set across the country for the summer of 2018–2019, both for highest ever recorded temperatures at many locations and the duration of the heatwaves. In addition, a new record was set in New South

Wales for the highest minimum temperature ever recorded within Australia (Bureau of Meteorology 2019b).

A working definition of a heatwave is 'three or more days of high maximum and minimum temperatures that are unusual for that location' (Bureau of Meteorology 2019a). In addition to daytime maximum temperatures, minimum temperatures and the ease with which heat can disperse overnight are of concern, as this affects how well people recover from heat. In densely built-up areas, with extensive roads or paved surfaces and few trees – so-called 'urban heat islands' – higher overnight temperatures are recorded compared with surrounding areas (Frumkin 2002).

IMPACTS OF HEATWAVES ON SOCIETY

Heatwaves have been called 'silent' killers and, without reduction in greenhouse gas emissions, they are predicted to become more frequent, more intense and longer in duration (Steffen et al. 2014; Carey et al. 2017).

The death toll from heatwaves in Australia has exceeded that for any other environmental disaster, including floods, bushfires and cyclones, and the same is true for Europe and the USA. In Victoria, in early 2009 the heatwave that preceded the Black Saturday bushfires resulted in 374 more deaths than would otherwise be expected (excess deaths), while 173 people perished in the fires themselves (State of Victoria 2009).

Direct ill effects of extreme heat may not always be officially identified as heat related if death is linked to the worsening of an underlying chronic illness, which is common during a heatwave. However, after a four-day heatwave in Victoria in 2014, when there were 167 excess deaths, 222 deaths were examined by the coroner. Of these, 94 (56%) were considered to be heat-related. In this study, older people were more at risk of

dying, as well as those with cardiovascular disease, mental disorders or lung disease (Pham et al. 2019).

In the 2014 Victorian heatwave, health services were significantly strained. There was a 7% increase in public hospital emergency department presentations for any cause and a 25% increase in the Ambulance Victoria emergency call-outs in the metropolitan area. The high number of emergency incidents also continued for several days after the heatwave. The NURSE-ON-CALL telephone service reported a three-fold increase in calls during the week of the heatwave: 60% were related to heat injury, 23% for sunburn and 17% were for dehydration (State of Victoria 2014).

Similar patterns were observed in Adelaide in 2009 (Nitschke et al. 2011) and Sydney in 2011 (Schaffer et al. 2012) during heatwaves. During 2018, a heatwave affected the north tropical and central coasts of Queensland from 24 November for up to five days. Numerous locations reported their highest daily maximum temperature on record for November, or for any month, with some locations breaking their previous record by a large margin. No data on health effects are available yet for this period (Bureau of Meteorology 2018).

In addition, the loss of productivity from extreme heat can be significant. In Australia during 2013–2014 this was estimated to cost the economy approximately \$7 billion; costs included days lost from work, impaired efficiency and poor health for both office and outdoor workers (Zander et al. 2015; Singh et al. 2013).

IMPACTS OF HEAT WAVES: ON HEALTH

Over-heating occurs when the body is surrounded by a temperature close to or exceeding body temperature of 37°C in the presence of dehydration. If the body's temperature is unable to be reduced adequately by evaporation of perspiration or moving to cooler surroundings, the resulting illness may range from mild to severe:

- **Heat stress** – a perception of discomfort related to heat exposure, with weakness, fatigue, cramps and dizziness.
- **Heat exhaustion** – associated with an elevated core body temperature above 38°C and a reduced amount of fluid in the body due to sweating without adequate fluid replacement.
- **Heat stroke** – a core body temperature above 40.5°C with confusion and impaired consciousness. It can be fatal if treatment is delayed (Better Health Channel 2018).

WHO ARE MOST VULNERABLE?

Everyone is at risk during extreme heat, but special care is needed in the following people and circumstances:

- **The aged** – their increased vulnerability relates to several factors including an impaired bodily response to heat, reduced thirst awareness, diminished ability to sweat and the presence of chronic disease.
- **Pregnancy and breast-feeding** – increased preterm birth rates are associated with extreme heat (Kuehn and McCormick 2017).
- **Taking medications which affect the way the body reacts to heat.** These include diuretics, many blood pressure and mood stabilizing drugs, anti-histamines and anti-cholinergic drugs (used for treating a variety of conditions including movement disorders and bladder problems).
- **Reduced mobility** – limited access to fluids due to disability or being bed-ridden, including nursing-home residents.
- **Social isolation**, including homelessness, or where cognitive impairment or language problems limit access to support or emergency alerts.
- **Low socio-economic status** – lack of air-conditioning, limited housing and transport options.

- **Outdoor work or recreation.**
- **Sustained, strenuous exercise** – even fit, healthy people can develop heat stroke. Fatalities have occurred among bushwalkers, especially tourists.
- **High humidity levels** – these reduce the ability of sweating to cool the body.
- **Over-heating may occur on extremely hot days** that are not necessarily within a defined heatwave but with similar harmful effects if there has been little chance to acclimatise (Hanna and Tait 2015).

All major Australian sporting bodies now have official heat policies which include criteria for postponing events when health risks are elevated.

FACTORS THAT WORSEN THE HEALTH EFFECTS OF HEATWAVES

The risks to health may be compounded by disruption to essential utilities such as transport and electricity supplies (affecting telecommunications, water production and waste water treatment) along with other services. Loss of refrigeration can compromise vaccine supply chains and medicines, as well as result in food spoilage with consequent food poisoning.

Extreme heat may also trigger asthma and other allergic reactions either directly or by increasing atmospheric

dust and other pollutants (National Asthma Council Australia 2019). Although rare, thunderstorm asthma, due to the combination of heat, high pollen counts and precipitation can result in high morbidity and be lethal (Carey 2016; Maxwell 2016).

Bushfires frequently coincide with heatwaves, worsening the hazards to health, both mental and physical. The resultant air pollution from bushfire smoke can extend for hundreds of kilometres beyond the fire scene. It contains fine particles and complex compounds which aggravate heart and lung conditions, including asthma (Doctors for the Environment Australia 2017).

Photochemical smog (including ozone) is a significant respiratory irritant and is intensified during heatwaves (Meehl et al. 2018) by ultraviolet radiation acting on pollutants such as nitrogen oxides and volatile organic compounds from car exhausts, industrial boilers and power generators. Levels can rise to be a significant health threat and The Bureau of Meteorology issues warnings to stay indoors when the risk is high.

In 2018, *The Lancet Countdown* report on health and climate change used 41 indicators to assess vulnerability, planning, mitigation actions, economics and public and political engagement (Watts et al. 2018). For instance, average annual maximum temperatures and suicide rates for all

Australian States and Territories between 2007 and 2016 showed that hot weather was detrimental to mental health with an effect equivalent to that of unemployment (Zhang et al. 2018).

The deadly impact of heatwaves, even with improved planning, is inevitable. Predicted demographic changes in Australia point to an increase in at-risk groups with a higher proportion of the population aged over 65 years, an increase in single-person households (including a third occupied by people over 75 years) as well as an increased density of habitation, with more than two-thirds of the population living in large cities by 2027 (Australian Bureau of Statistics 2018).

WHAT CAN WE DO?

General advice

It is important that all members of the community take steps to ensure that they and others are safe during periods of hot weather, especially as general understanding of the risks is poor. Health professionals and other carers should take the opportunity to educate others of the risks of hot weather.

The following advice applies to everyone:

- Increase fluids, especially cool water but avoid alcohol. Wear light, loose clothing.

- Modify activity, stay indoors where there is air-conditioning or go to a cool environment such as a shopping centre or local library.
- Stay in touch with friends and family, especially the elderly and those who are socially isolated.
- Modify medication or treatment if necessary, on medical advice. Store medications in a cool area.
- Do not leave anyone in cars, especially children and pets.
- Provide adequate water and shade for pets.
- Tune in to emergency advice, by phone app or radio.
- Plan ahead for hot weather, including power outages.
- Phone '000' in a life-threatening emergency.

Workplaces

Prepare adaptation plans:

- Provide adequate fluids.
- Provide cooling measures such as iced drinks and rest in an air-conditioned area.
- Alter workloads during extreme heat (Victorian Trades Hall Council 2015).
- Stop work if the temperature reaches 35°C, or 28°C with 70% humidity.

Urban planning and house design

Close attention to:

- insulation and ventilation.
- increased tree canopy and awnings in the built environment.

- minimal concreted areas close to buildings.
- improved public transport.

State and territory measures

All Australian states and territories now have emergency response plans to alleviate the effects of extreme heat and avert a disaster-within-a-disaster, such as transport failure or power outage.

For example, following the disastrous 2009 heatwave in Victoria, the Victorian Government developed a *Heatwave plan for Victoria* (Carnie 2009) involving communities and local government and subsequently a *Heat health plan* system was established (Department of Health and Human Services 2018). The Bureau of Meteorology issues forecasts for a seven-day period and, if threshold temperatures for different regions are likely to be exceeded, the DHHS alerts hospitals, local government and other health providers. There is also state-wide liaison to activate emergency response plans for the police, public transport operators, the Department of Education and Training, the Australian Energy Market Operator (AEMO), and animal welfare organisations.

In New South Wales, the *State Heatwave Sub Plan* is managed by the NSW Police Emergency Management Unit (Emergency Management Unit 2018). Advice from other states is listed overleaf.

DOCTORS FOR THE ENVIRONMENT AUSTRALIA

Doctors for the Environment Australia has long advocated for decisive leadership in climate policy at all levels of government. Some local and state governments are setting their own agendas to reach net-zero emissions by 2050, but to achieve this within this time frame there needs to be strong federal support. For decades, federal policies to mitigate climate change have been inadequate and do not provide security for investment in a low emissions energy sector, which the states are willing to pursue.

Many studies have shown that transition to a low emissions economy is possible without imposing undue hardship on industry, agriculture, energy generation or the economy. Only ambitious and determined policies on a world-wide scale will prevent run-away global heating. Australia is part of this global community and must contribute its share.

MORE INFORMATION

General

- Heatwave service for Australia (Bureau of Meteorology)
<http://www.bom.gov.au/australia/heatwave/about.shtml>
- The silent killer: Climate change and the health impacts of extreme heat (Climate Council)
<https://www.climatecouncil.org.au/resources/silentkillerreport/>
- Action on climate change and health: governance and strategy (Doctors for the Environment Australia)
<https://www.dea.org.au/wp-content/uploads/2018/09/DEA-Policy---Action-on-Climate-Change-and-Health-Governance-and-Strategy-09-18.pdf>
- Climate change and health in Australia fact sheets (Doctors for the Environment Australia)
<https://www.dea.org.au/climate-change-and-health-in-australia-fact-sheets/>
- Bushfires and health in a changing environment fact sheet (Doctors for the Environment Australia)
<https://www.dea.org.au/wp-content/uploads/2017/12/DEA-Bushfires-Fact-Sheet.pdf>
- Hot weather risks and staying cool (Healthdirect)
<http://www.healthdirect.gov.au/hot-weather-risks-and-staying-cool>
- Heatwaves – community resources (Victorian Department of Health and Human Services)
<https://www2.health.vic.gov.au/public-health/environmental-health/climate-weather-and-public-health/heatwaves-and-extreme-heat/heatwave-community-resources>
- Emergencies and safety – heatwave (SA Government)
<https://www.sa.gov.au/topics/emergencies-and-safety/types/heatwave>
- Heat (WA Department of Health)
http://healthywa.wa.gov.au/Articles/F_I/Heat
- Beat the heat (NSW Health)
<http://www.health.nsw.gov.au/environment/beattheheat/pages/default.aspx>
- Staying healthy in the heat (Queensland Health)
<https://www.health.qld.gov.au/disaster/heat/heat-wave.asp>
- Heatwave action guide TASALERT Tasmanian Government
<http://alert.tas.gov.au/GetReady/Pages/Heatwave.aspx>
- Maintaining a safer Northern Territory through our Emergency Service (NT Emergency Service)
<https://pfes.nt.gov.au/emergency-service>

For health professionals

- Heatwaves – advice for clinicians (Victorian Department of Health and Human Services)
<https://www2.health.vic.gov.au/public-health/environmental-health/climate-weather-and-public-health/heatwaves-and-extreme-heat/heatwaves-advice-for-clinicians>
- Residential aged care services heatwave ready resource (Victorian Government Department of Health)
https://www2.health.vic.gov.au/~media/health/files/collections/%20policies%20and%20guidelines/r/resi_heatwave_2013.pdf
- Information for health professionals (NSW Health)
<https://www.health.nsw.gov.au/environment/beattheheat/Pages/information-for-health-professionals.aspx>
- Healthy in the heat (SA Health)
<https://www.sahealth.sa.gov.au/wps/wcm/connect/Public+Content/SA+Health+Internet/Healthy+living/Protecting+your+health/environmental+health/Stay+healthy+in+the+heat/>

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