Heatwaves and population health in Australia

Associate Professor Peng Bi

Background

- Numerous studies have associated high ambient temperatures with adverse health outcomes.
- Extreme environmental heat can trigger the onset of acute conditions as well as exacerbate a range of underlying illnesses.
- Australians are largely acclimatised to hot summers and regular heatwaves
- However morbidity and mortality associated with extreme heat is a regular occurrence and may in the absence of adaptation, increase in a warming climate.

What is currently known about this issue for Australia?

- A retrospective study for the period 1979-1990 suggested increased vulnerability in the population 65 years and older in 5 Australian cities (Guest et al, 1999);
- Still focusing on this age group: annual heat related deaths of 1115 for the combined temperate cities (Perth, Adelaide, Brisbane, Melbourne, Canberra, Sydney, and Hobart), and 6 deaths annually for the three tropical cities (Darwin, Cairns and Townsville) (McMichael et al, 2003);

Sydney

- Mortality increases between 0.45% and 1.21% were associated with a 1°C increase in daily maximum temperature (Vaneckova et al, 2008);
- A 0.9% increase in total daily mortality was associated with a 1°C daily maximum temperature increase, increasing to 7.8% when maximum temperature reached 32°C (Hu et al, 2008);
- In a four-day heatwave in Sydney during January 1994, with daily maximum temperatures exceeding 32°C, there were 110 excess deaths, with a short-term mortality displacement of 59% for this event (Gosling et al, 2007).
- The hot and dry Synoptic Category (SC)7 and warm and humid SC3 were associated with higher all cause, circulatory and cerebro-vascular mortality, especially for the 65 and older age group and women (Vaneckova et al, 2008)

Melbourne

- An increase of 15-17% in average daily mortality of people aged 65 years or more was observed when the mean daily temperature (mean of today's maximum and tonight's minimum temperature) exceeded a threshold of 30ºC. A similar increase in excess deaths was observed when minimum temperature exceeded 24ºC (Nicholls et al, 2007).
- In 2009 heatwaves, there was a 62% increase in total all-cause mortality; a 46% increase in deaths in the 65-74, and a 55% increase in the 5-64 years age groups; Emergency Department presentations showed a 12% overall increase and a 37% increase in those 75 years or older; ambulance emergency cases increased by 46% (Victorian Chief Health Officer, 2009)

Brisbane

- A 1^{o}C increase in monthly mean minimum temperature in summer was associated with a 7% increase in all-cause mortality in the 65 years and older population (Bi et al, 2008);
- The association of temperature and particulate matter with cardio-respiratory mortality and morbidity has been also investigated for Brisbane, with evidence of interactions between daily temperatures and PM_{10} concentrations (Ren et al, 2006)

Adelaide

- For Adelaide heatwave during the period 1993 and 2006, defined as 3 or more days of 35ºC or above, a 4% increase in ambulance transports was observed compared to non heatwave periods (Nitschke and Bi, 2007); 2.6 callouts per 1ºC rise in T_{max} above 34.6 ºC (Hansen and Bi, 2009)
- There were significant increases in all age renal and mental hospital admissions (7% and 13% respectively) and an 8% increase in IHD admissions in the 65-74 years group (Hansen and Bi, 2007; 2008);
- All age mortality was not increased during heatwave periods (Nitschke and Bi, 2007; Hansen and Bi, 2007; 2008);
- Many older people do not turn on their air-conditioners during heatwave because of worrying about their power bills (Bi et al, 2009)

What else should we do in the health assessment

- Very few Australian studies characterising those people hospitalised or dying during periods of heat;
- Few studies have focussed on the population from rural and remote regions
- Using multiple exposure variables

Threshold temperature detection

- Identifying threshold temperatures is important to protect population health, especially vulnerable groups
- Different regions might have different threshold temperatures due to various climatic characteristics
- Threshold identification has been conducted in Adelaide, Sydney, Melbourne and 10 regional centres in Victoria (Nicholls et al, 2007) to date, using different approaches

What are the likely projections?

- The Garnaut Review predicted annual net temperature-related deaths (winter and summer) for the unmitigated climate change scenario would increase by 1250 deaths in 2070, and 8628 deaths in 2100, nationally ;
- The greatest negative impacts were predicted for Queensland, Northern Territory and Western Australia (Bambrick et al, 2008);
- Annual heat-related deaths for the combined temperate capital cities in the range of 2,300-2,500 in 2020, and 4,300-6,300 in 2050. For the tropical cities of Darwin, Townsville and Cairns, an estimated 58 to 186 annual heat-related deaths in 2050 was predicted, compared to 6 per year at baseline (McMichael, 2002); For 2100, the estimate of future heat-related deaths combined for all cities was in the range 4,200-15,100 (Woodruff et al, 2003)
- In Sydney, a 344% increase from current mortality (1961-1990) was predicted for 2050 (Gosling et al, 2009)

Who are the most vulnerable

- The elderly and children;
- The people with existing chronic conditions;
- People with lower SES
- Homeless people
- People in rural and remote communities including Indigenous Australians

Response mechanism

- International experience and expertise provides a wealth of responses to heat waves from early warning systems and alerts
- Queensland has the country's only heatwave plan: Queensland Heatwave Response Plan. This plan is located within emergency services and focuses on multi agency responses to heatwave
- Other states, particularly Victoria, New South Wales and South Australia are currently considering heatwave plans and planning as part of a broader public health and emergency management approach to heatwave.
- More research is necessary in this area to better understand the knowledge, altitude and behaviour of local communities, government, NGOs, relevant industries etc