

# Burden of Cardiovascular Disease Attributable to Hot Weather in Australia: Current Attributable Risk and Future Burden

Jingwen Liu<sup>1</sup>, Blesson Varghese<sup>1</sup>, Alana Hansen<sup>1</sup>, Peng Bi<sup>1</sup>

<sup>1</sup>School of Public Health, The University of Adelaide, Adelaide, South Australia



## Background

Associations between high temperatures and increases in cardiovascular mortality and morbidity have been previously reported. Warming temperatures might therefore pose substantial challenges to population health, especially in the context of climate change and ageing population.<sup>1</sup> However, no comprehensive assessment of the burden of cardiovascular disease (BoCVD) that is attributable to high temperature has been undertaken. This study quantified the BoCVD attributable to high temperature, using disability-adjusted life years (DALY), and projected how this would change over time in Australia by state and territory.

## Methodology

Figure 1 depicts the data inputs and steps involved in the calculation. The required population-level BoCVD data 2003-2018 i.e., years of life lost (YLL) and years lived with disability (YLD), is provided by the Australian Institute of Health and Welfare (AIHW).

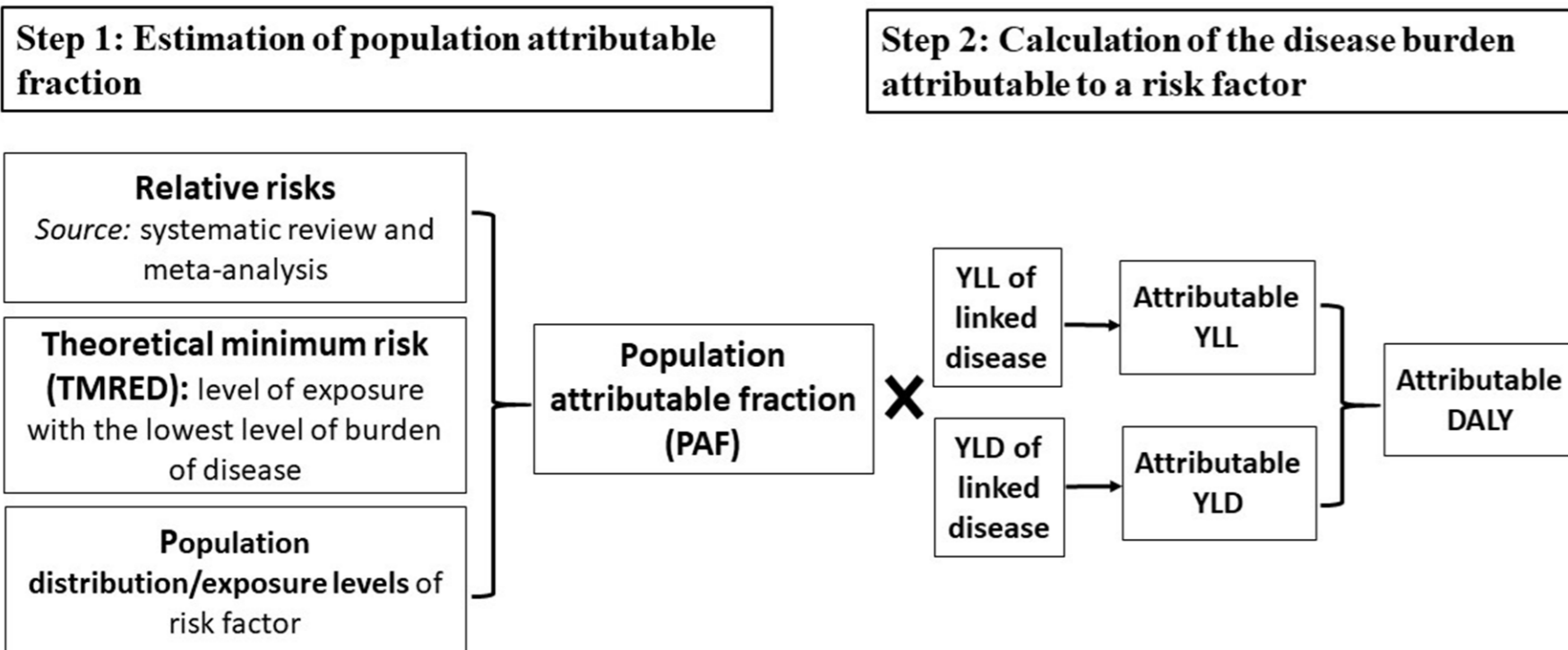
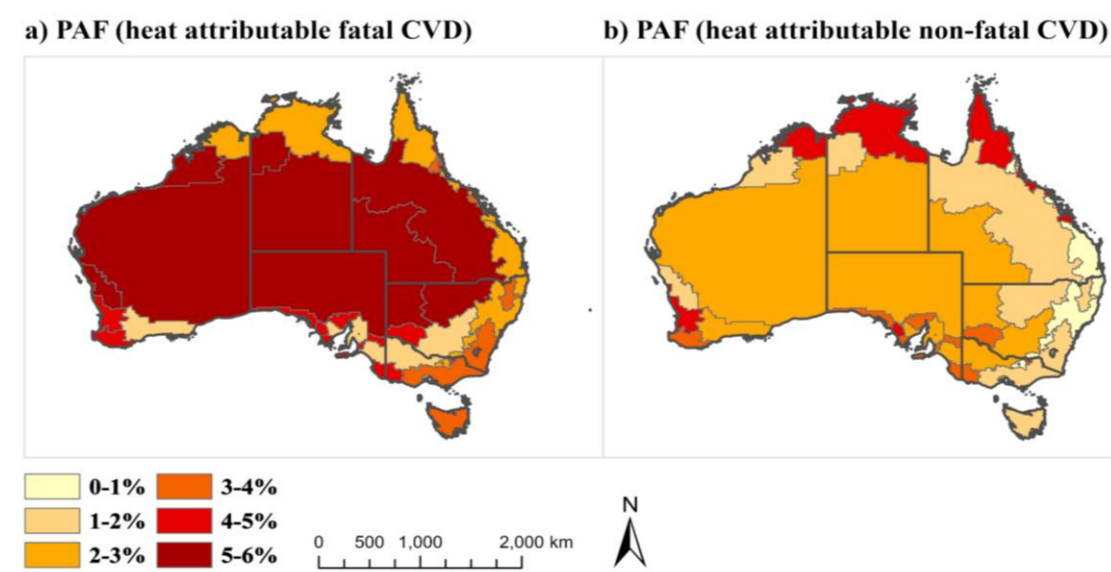


Figure 1. Inputs and steps in the calculation of the disease burden attributable to a risk factor, Adapted from AIHW 2018.<sup>2</sup>

## Results

### A) BoCVD attributable to high temperature (2003-2018)



Jurisdiction (state and territory)	2003-2018 (BoCVD attributable to high temperature) <sup>1</sup>		
	Fatal	Non-fatal	DALYs rates (per 100,000 persons)
New South Wales	4,929 (700)	534 (82)	76.1 (12.5)
Queensland	3,176 (425)	387 (67)	81.5 (13.9)
Victoria	3,761 (422)	689 (96)	80.4 (9.8)
Western Australia	2,209 (204)	564 (57)	121.3 (14.3)
South Australia	1,147 (110)	372 (40)	93.4 (10)
Tasmania	380 (43)	59 (7)	87.1 (10.7)
Australian Capital Territory	266 (30)	39 (5)	83.4 (10.6)
Northern Territory	168 (19)	68 (13)	104.5 (16.3)
<b>National</b>	<b>16,036 (1,316)</b>	<b>2,712 (278)</b>	<b>84.9 (9.4)</b>

<sup>1</sup> Annual average total across baseline period, and standard deviation (SD)

Figure 2. Population attributable fraction (PAF) of CVD to high temperature, averaged across 2003 to 2018.

### B) Future BoCVD attributable to high temperature

Table 1. Projected percentage increase of BoCVD attributable to high temperature centred on 2030, 2040, 2050, and 2060, compared to the baseline (2003-2018), under two greenhouse gas emissions (RCP4.5 and RCP8.5).

Jurisdiction (state and territory)	RCP4.5 (BoCVD attributable to high temperature, anomaly) <sup>1</sup>				RCP8.5 (BoCVD attributable to high temperature, anomaly) <sup>1</sup>			
	2030	2040	2050	2060	2030	2040	2050	2060
New South Wales	24.8%	68.3%	96.2%	145.5%	37.8%	78.7%	118.0%	172.3%
Queensland	34.5%	77.8%	110.3%	162.8%	47.1%	89.8%	135.1%	195.0%
Victoria	25.4%	71.1%	87.3%	142.3%	39.6%	77.5%	105.3%	171.4%
Western Australia	59.1%	80.8%	125.8%	157.6%	61.0%	83.2%	135.3%	176.2%
South Australia	15.9%	43.1%	59.9%	101.0%	19.1%	47.1%	71.9%	122.7%
Tasmania	12.5%	53.0%	68.5%	117.7%	25.7%	59.1%	83.7%	144.7%
Australian Capital Territory	23.1%	69.9%	86.2%	141.6%	38.9%	76.8%	104.0%	171.8%
Northern Territory	53.5%	90.9%	130.7%	192.3%	62.4%	100.4%	159.5%	240.2%
<b>National</b>	<b>31.2%</b>	<b>70.5%</b>	<b>97.8%</b>	<b>146.1%</b>	<b>42.0%</b>	<b>78.4%</b>	<b>116.5%</b>	<b>173.2%</b>

<sup>1</sup> Annual average for each decade centred on 2030, 2040, 2050, and 2060.

**Conclusion:** Higher temperatures are expected to contribute to a higher burden of CVD across Australia. Western Australia and Northern Territory with relatively warmer climates, had the highest rate of high temperature-related BoCVD in both baseline and future periods. Our findings demonstrate that adaptation and mitigation strategies are urgently needed to minimize the negative health impacts of the future warming climate on CVD.

## References:

- Liu J, Varghese BM, Hansen A, et al. Heat exposure and cardiovascular health outcomes: a systematic review and meta-analysis. *Lancet Planetary Health*. 2022;6(6):e484-e495.
- Australian Institute of Health and Welfare. Australian Burden of Disease Study: Impact and causes of illness and death in Australia 2018. Canberra: AIHW; 2021.

For more information please contact:  
jingwen.liu@adelaide.edu.au