

# How effectively do heatwave definitions capture mental health outcomes? A population-based longitudinal investigation from rural Australia



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## Background and rationale

Heatwaves are a common natural hazard in Australia. While the association between heatwaves and decreased mental health is recognised, little is known about the differences in mental health impacts of heatwaves for different demographics.

The main aim of this chapter is to answer two questions:

- (1) Do recently experienced heatwaves affect individuals' mental health?
- (2) Is there a different relationship between heatwaves and mental health for different demographics?

## Data and methods

**Participants:** Our study population comprised participants in the Australian Rural Mental Health Study (ARMHS), a postal survey which aimed to study mental health and its determinants in rural people in New South Wales (NSW), Australia.

The ARMHS data was collected through four waves (from 2007-2013) including a baseline survey and three follow-up surveys administered at 1-, 3-, and 5-years after baseline.

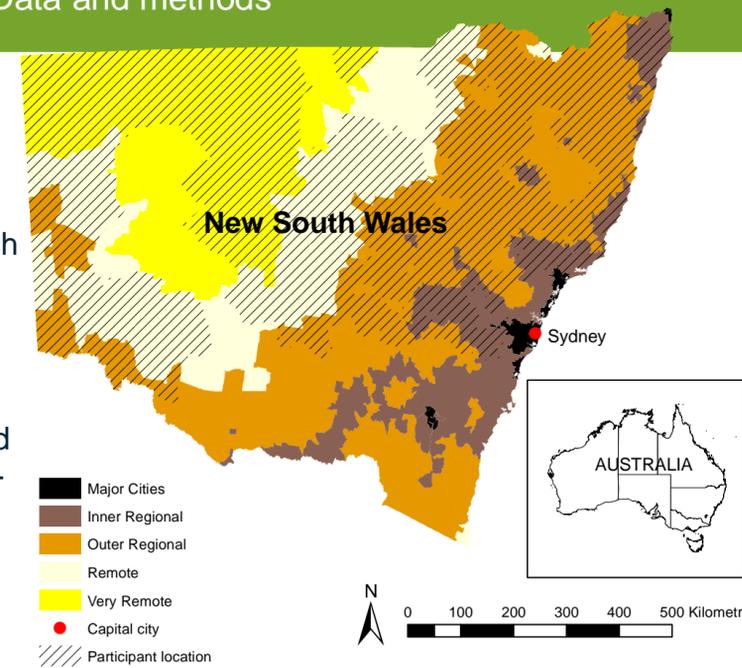


Figure 1: Participant location

## Data and methods

**Heatwaves exposure** was measured by two binary variables representing the presence (coded 1) or absence (coded 0) of heatwave events during the four weeks before the day participants completed the survey. In which, a heatwave event is defined when the daily maximum temperature (Tmax) reaches or exceeds 35°C for at least three consecutive days or the Excess Heat Factor (EHF) is positive for at least three consecutive days.

**Mental health** are assessed using the Kessler-10 (K10) (asking the frequency of ten symptoms of distress in the last month such as feeling tired out for no good reason, etc).

**The main method of data analysis** is regression models in generalised estimating equation (GEE) framework.

## Heatwaves and psychological distress

The measure of heatwaves basing on Tmax did not detect negative effects of heatwaves on mental health, while the measure basing on EHF (that accounts for the heat which is not sufficiently discharged overnight due to unusually high overnight temperature) confirmed a significant relationship between heatwaves and mental health.

In other words, the maximum temperature was not important on its own, but be a matter where the temperature did not cool down overnight. This is important to recognise and consider when using results from empirical studies to inform funding and policy decisions.

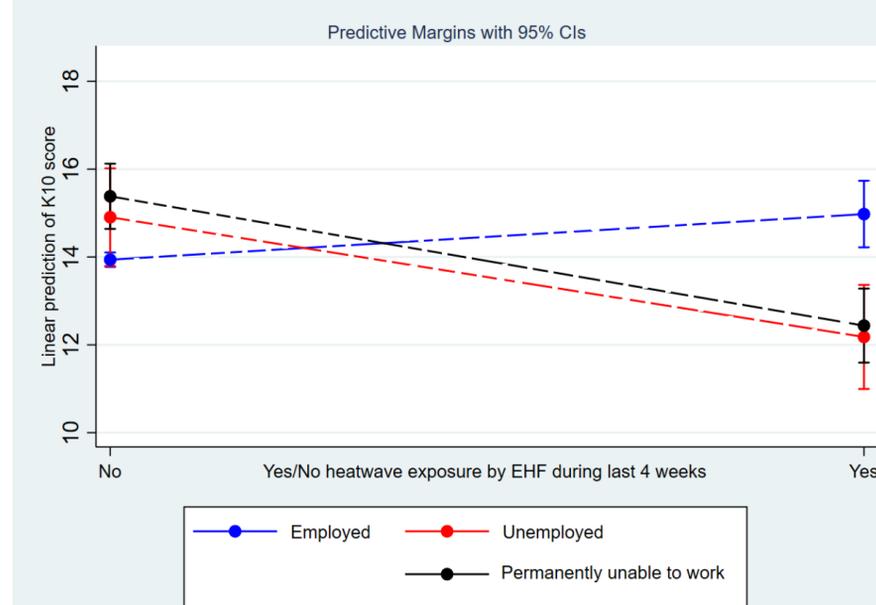


Figure 2 : Interactions effect of heatwave exposure and employment on distress score

## Mental health among different groups

The mental health effects of heatwaves were found to differ considerably according to heatwave definitions, marital status, and employment status.

For example, the measure of heatwave based on Tmax indicates that people who are separated/divorced/widowed are more sensitive to heatwave exposure than the married; or the measure of heatwave based on EHF shows that the employed are more affected by heatwave exposure than people who are permanently unable to work because of illness (Figure 2).

This reinforce the difference between Tmax and EHF in studying mental health impacts of heatwaves.