NSW GOVERNMENT

THE UNIVERSITY OF SYDNEY

Human Health and Social Impacts Node

Climate change, housing, and health: Thermal discomfort, air conditioner use and electricity consumption during hot weather

Air conditioner use will increase dramatically in the coming decades, as people respond to rising global temperatures and personal income growth.

Photo: Pexels/Sergei Akulich

Air conditioners create a vicious cycle: the more the Earth warms, the more these machines get used. But the more they get used, the warmer the Earth becomes (The Economist 2018).

Air conditioners chill ambient air to a comfortable temperature. During a prolonged heatwave, as more people switch on their air conditioners to get relief from the heat, collective use of these machines can strain electricity networks.

The fraction of households with air conditioners is expected to increase from 13% to more than 70% by the end of the century under modest assumptions of income growth (Davis et al. 2015).

Recent studies indicate that air-moving devices such as electric fans can effectively reduce thermal (and cardiovascular) strain during a heatwave (Ravanelli & Jay 2015). Electric fans require 50-times less electricity than air conditioners, making them more cost-effective and less energy intensive. Used effectively, electric fans have the potential to improve indoor thermal comfort and reduce peak and cumulative electricity consumption during heatwaves and hot weather.

This study will investigate solutions for reducing the use of air conditioners by considering fans which can achieve the same physical and perceived

cooling effect under certain conditions. We will use an adaptive thermal comfort model, which predicts the upper temperature at which thermal discomfort is reached, to undertake sustainability assessments to quantify electricity reductions with fan use at different airspeed and estimate associated reductions in greenhouse gas emissions. This study will focus on New South Wales, with its analysis extended across Australia.

Research outcomes

From this study, we expect to:

- Define upper air conditioner set-point for thermal comfort with different fan speeds.
- Quantify the extent to which electricity consumption associated with air conditioner use can be reduced throughout the year in New South Wales and Australia with fan use while maintaining similar levels of indoor thermal comfort.

Who will use this information?

- Housing and energy policy makers in NSW.
- Urban planners and architects.
- Heat-health policy makers in NSW.

Human Health and Social Impacts Node

Building on current sources of health and climate change information, The University of Sydney hosted Human Health and Social Impacts Node will support the NSW Government by:

1. delivering robust, sector specific information targeting the health system, vulnerable communities and government agencies
2. establishing baselines for monitoring, evaluation and analysis of adaptation programs that seek to protect and promote health, and strengthen the delivery of health services, in the face of a changing climate
3. improving understanding of vulnerability in the context of exposure, sensitivity and adaptive capacity
4. providing practical information on building resilience in communities and in the health sector.

The work program of the Node is informed by eco-social understandings of relationships between climate change and health. The approach taken acknowledges the range of environmental, social and economic consequences of climate change, including regional variation in impacts and vulnerability.

The Node is a partnership between:

- **Department of Planning, Industry and Environment**
- **University of Sydney**
- **NSW Health**

More information
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