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RAPID RESPONSE REPORT: STUDY OF HEATWAVE IMPACTS ON NSW NORTHERN RIVERS REGION 2017

Tofa, M., Gissing, A., Van Leeuwen, J. and Smith, C.
Risk Frontiers
Bushfire and Natural Hazards CRC

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ABSTRACT

Tofa, M., Gissing, A., Van Leeuwen, J., & Smith, C., *Risk Frontiers, Macquarie University, NSW*

During January and February 2017 there were three distinct periods of severe or extreme heat that affected eastern Australia. This study explores the impacts of the heatwaves in January, 2017 on residents in the northern rivers region of New South Wales (NSW). In this heatwave, daily maximum temperatures above 35°C were recorded in many sites, with temperatures in some parts of NSW and Queensland exceeding 40°C [1]. A maximum temperature of 41.3°C was recorded in Casino and Grafton, and Grafton experienced seven days over 35°C between 10 and 20 January. The Heatwave Service at the Bureau of Meteorology (BoM) provided forecasts and monitored conditions during this heatwave, and these forecasts were further disseminated by other agencies and organisations, as well as through the media. A telephone survey of 150 residents in northern NSW was conducted shortly after the heatwave to better understand the impacts of heatwaves, how heatwave warnings were used by residents in affected locations, what preparedness or protective actions were taken, and what further information and mediums residents would like to receive in future events. Key findings include that residents' main concerns about heatwaves are personal discomfort and effects on their health and wellbeing. The main coping strategies used are air-conditioning, fans, and keeping hydrated. Most residents received warning of the heatwave through traditional media (e.g., TV or radio), and 45% took actions to reduce the likely impact of the heat. Respondents who did not prepare for the heatwave explained that extreme heat is just a part of summer and that they adjust their activities accordingly during the heatwave. Suggested ways to support better preparedness and reduce the likelihood or severity of impacts tended to focus on making air-conditioning more affordable and accessible, particularly for vulnerable groups, as well as ensuring that cool refuges (e.g., swimming pools) are open and affordable during heatwaves. These suggestions indicate an emphasis on coping strategies during extreme heat events. However, some respondents also identified long term measures to reduce risks: for instance, guidelines and incentives for house design, solar panels and insulation, and the government 'taking action on' climate change.

INTRODUCTION

This research was conducted for the Bureau of Meteorology (BoM) by Risk Frontiers with the support of the Bushfire and Natural Hazards CRC . The BoM aims to use the findings of this study and future surveys to inform the development of its heatwave service, warnings, and updates. The study delivers valuable knowledge on key issues of risk perception and how residents respond to heatwave warnings and cope with extreme heat.

Despite growing recognition of heatwaves as Australia's most significant natural hazard in terms of lives lost [2], further research in the Australian context into the broader impacts of heatwaves and to understand how people cope and respond to heatwave warnings is needed. Research to understand residents' and communities' perspectives, experiences, and strategies, therefore, provides a valuable insight to community concerns and needs in relation to heatwaves. The BoM has developed a heatwave intensity index, known as the Excess Heat Factor (EHF), to define heatwaves in the Australian context [3, 4]. The BoM has subsequently introduced a heatwave service based on the EHF that provides regular updates and forecasts [5; see Figures 2 and 3 for examples]. However, relatively little is known about the impacts of these heatwaves on residents, or how heatwave warnings are used, what preparedness or protective actions are taken, and what information residents would like to receive in warnings. This research draws on the experiences of affected residents in the northern rivers region of NSW to support the development of effective warnings and public information about heatwaves, and focuses on 1) the impacts of heatwaves experienced by residents; 2) how warnings are received and understood; and 3) preparedness and protective actions taken to reduce the impacts of the heatwave.

BACKGROUND

The start to 2017 was characterised by three main heat events. The first was from 10-14 January and affected northern NSW and southern Queensland, the second was from 17-21 January and was experienced mostly in Queensland, and the final and most severe heatwave was from 31 January till 12 February [6]. Indeed, between 1 December 2016 and 20 February 2017, significant parts of NSW experienced more than 55 days where the temperature was over 35°C (Figure 1), and temperatures were often 8 to 12°C higher than the January and February averages [6]. This study considers the experiences of residents in the northern rivers region of NSW during the first of these events. Figure 2 and 3 show examples of warnings derived using the EHF, and that were provided by the BoM during these heatwaves. In January, peak temperatures were reached on 18 January, with Casino and Grafton recording 41.3°C, while Lismore reached 38.4°C. In Casino, there were seven days over 35°C between 10 and 20 January.

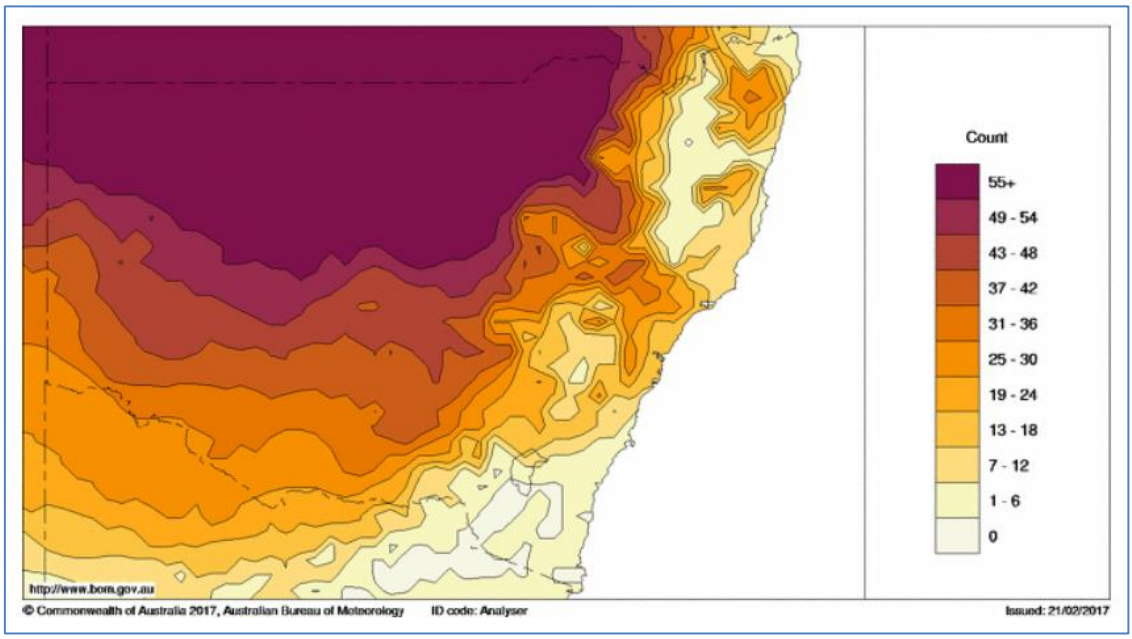

FIGURE 1. NUMBER OF DAYS WITH A MAXIMUM TEMPERATURE OVER 35°C, 1 DEC. 2016 TO 20 FEB. 2017 [6: 15].

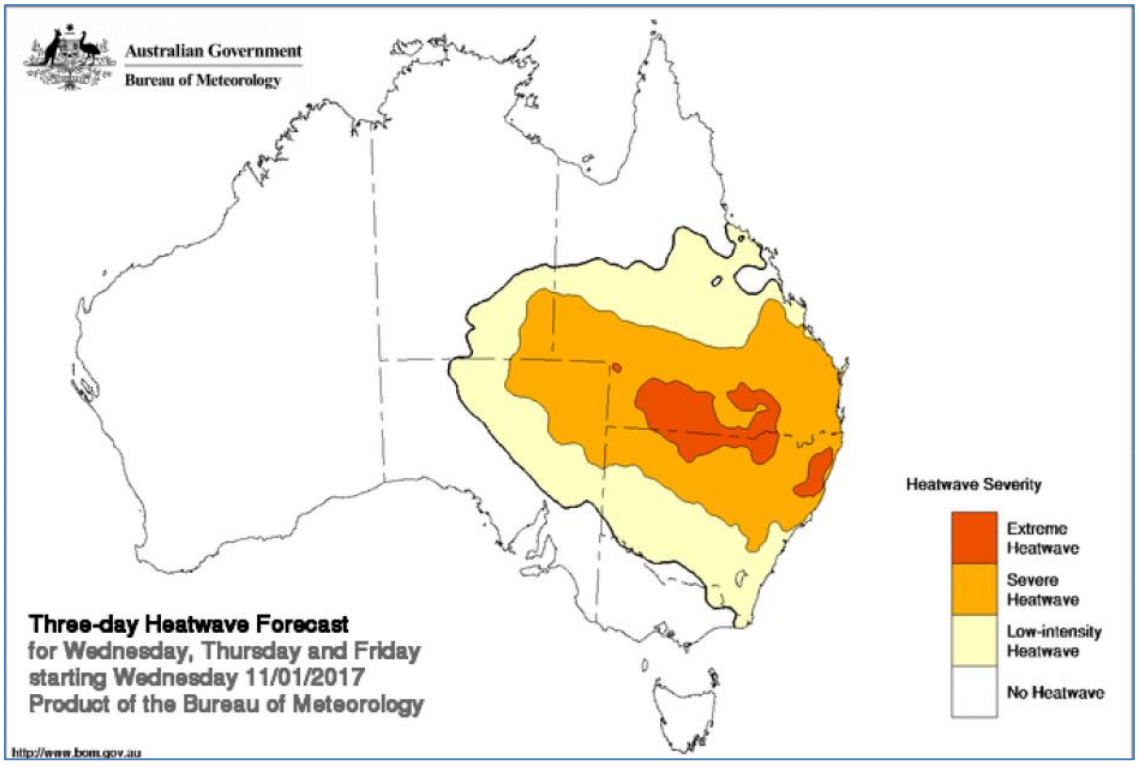

FIGURE 2. HEATWAVE FORECAST 11 JAN. 2017 [5].

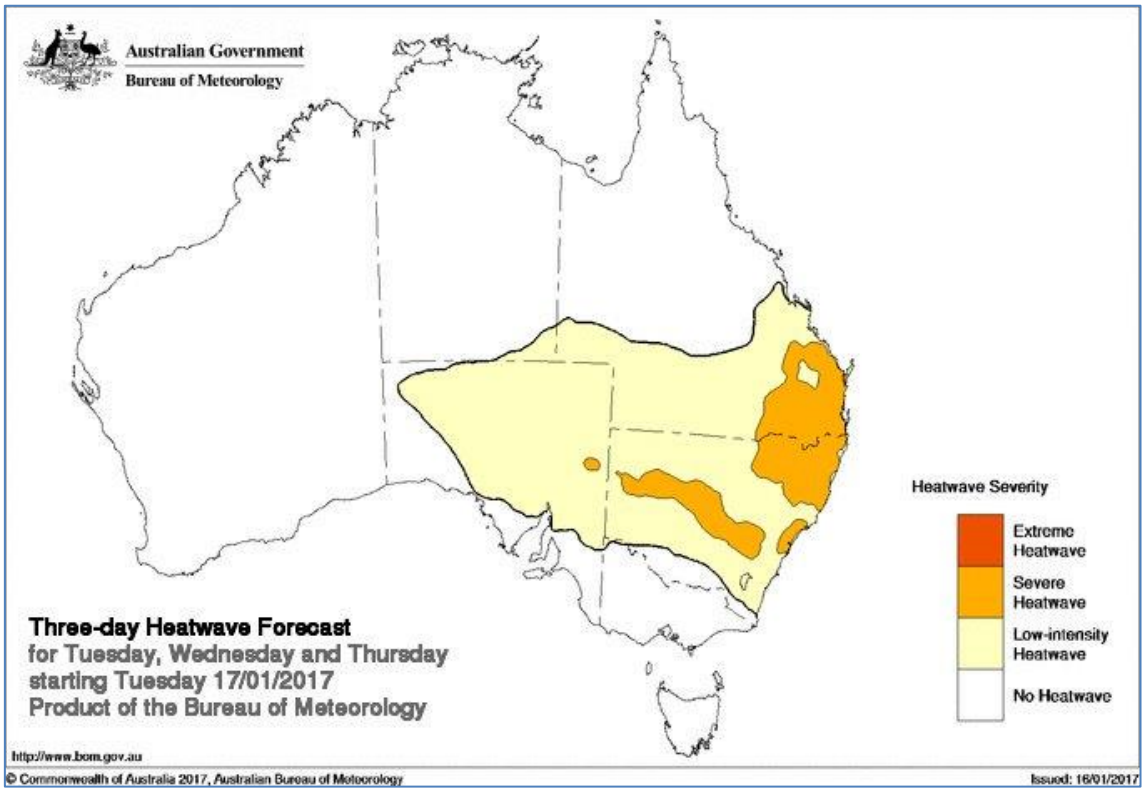

FIGURE 3. HEATWAVE FORECAST 17 JAN. 2017 [5]

RESEARCH APPROACH

Heatwaves are increasingly recognized as a major public health concern [7-9], and within Australia heatwaves have been linked to more fatalities than all other natural hazards combined [2]. Standardised definitions of heatwaves, and heatwave warning systems within Australia and internationally, are relatively new and there is much research interest in evaluating warning systems [9, 10] and in understanding how affected communities perceive the risks of extreme heat, their preparedness and coping strategies, and the impacts they experience during heatwaves [11, 12].

Here we report on the findings of a rapid response project. A telephone survey of 150 residents affected by the heatwaves in the North Rivers Region of New South Wales (NSW) on 10-14 and 17-21 January 2017 was conducted in February. This region was chosen as it experienced severe and extreme heatwave conditions during these heat events. Respondents were randomly selected using a name generator, and then the White Pages to call only those who reside within the target locations. Surveying was carried out by two research assistants between 11am and 7pm on weekdays. Survey questions were developed in consultation with the BoM. The survey collected information about residents' perceptions of heatwaves and other hazards, the impacts they and their household experienced during the recent heatwave, if and how residents received heatwave warnings, and the actions they took as a result of the warning (see Appendix 1 for survey questions). Survey respondents were from Casino, Grafton, Lismore, Goonellabah and surrounding towns, and had lived in the area for an average of 22.7 years. Fifty-five percent of respondents were female. The majority of respondents were retired (61%), and the average age was 65 years old. This likely reflects the fact that the survey was conducted primarily during the day and was limited to landline phones.

FINDINGS

PERCEPTIONS AND CONCERNS ABOUT HEATWAVES

As shown in Figure 5, half of the respondents considered the risk of heatwaves to personal health and safety to be high or extreme. Notably, heatwaves are generally considered a greater risk than severe storms and bushfires. Figure 4 illustrates the risk perception of heatwaves by age group. Notably, over 60% of residents aged between 60 and 79 perceived heatwaves as a being a high or extreme risk for their health and wellbeing, whilst almost 40% of respondents over 80 years perceived heatwaves to be of low or extremely low risk. Sixty-two percent of respondents reported that temperatures over the 2017 summer were either slightly hotter (21.3%) or very much hotter (40.6%) than previous years (see Figure 6).

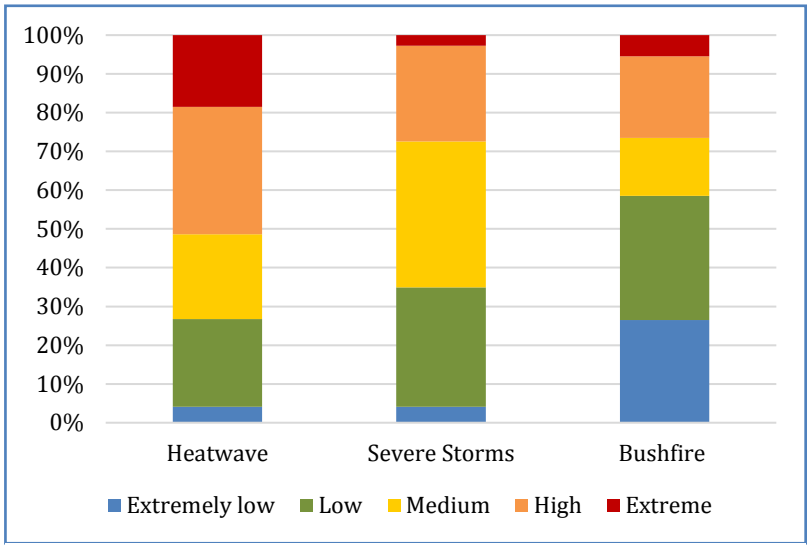

FIGURE 5. RISK PERCEPTION FOR HEATWAVES, SEVERE STORMS AND BUSHFIRES

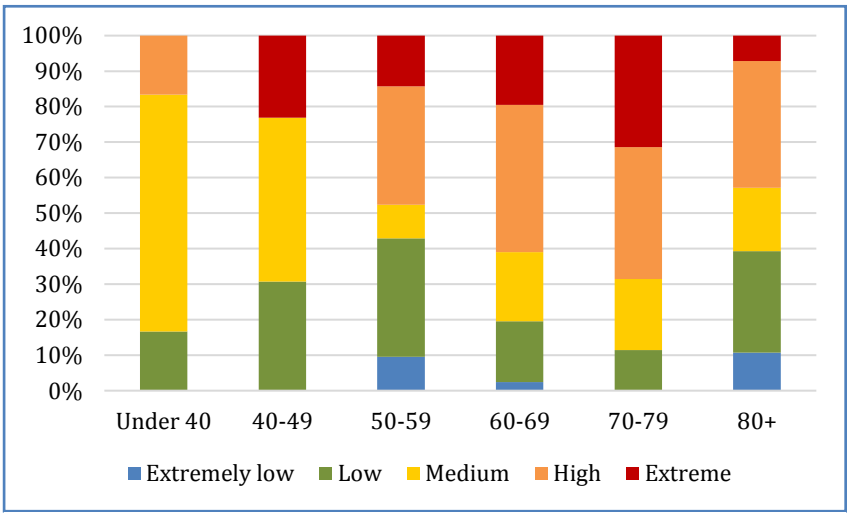

FIGURE 4. RISK PERCEPTION FOR HEATWAVES BY AGE GROUP

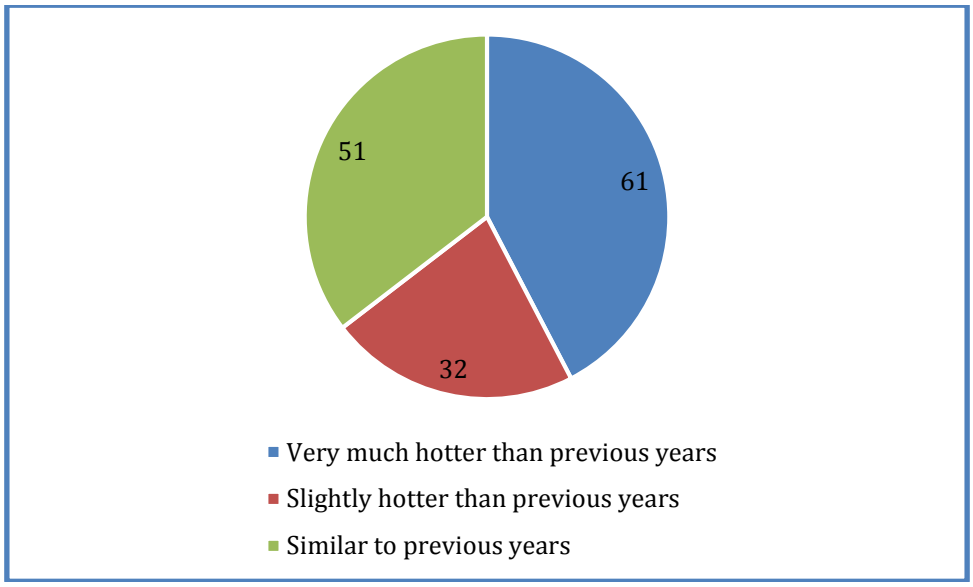

FIGURE 6. PERCEPTION OF TEMPERATURES THIS SUMMER (2016/2017)

During the heatwave event, 42.7% of respondents reported that they were concerned or very concerned about the heatwave, whilst 35% of respondents reported that they were not very concerned. The main issues that people were concerned about were: personal discomfort (29%), impacts on physical health (18%), impacts on vulnerable people (14%), and impacts on pets or animals (10%) (see Figure 7).

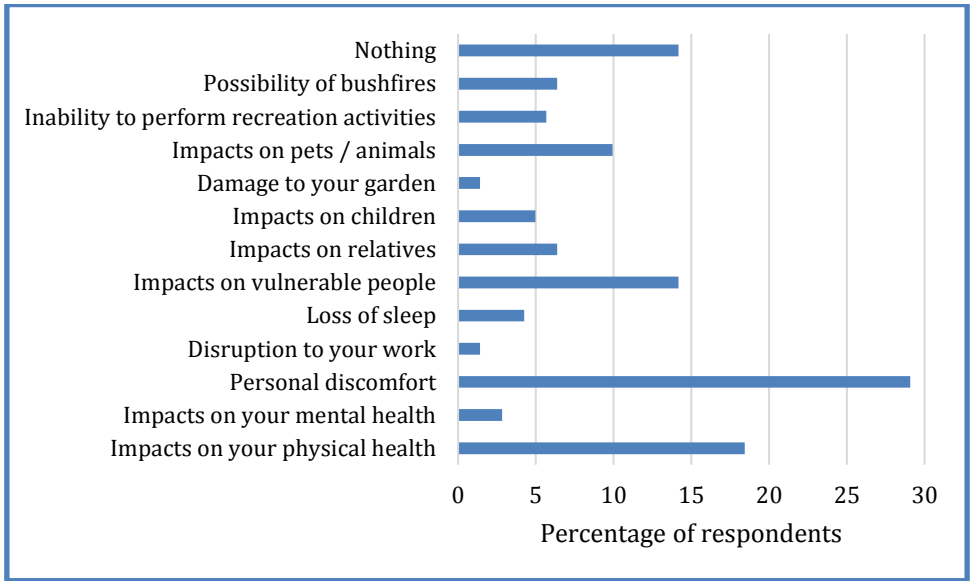

FIGURE 7. CONCERNS RELATED TO THE HEATWAVE

IMPACTS OF THE HEATWAVE AND COPING STRATEGIES

As shown in Figure 8, the main impact reported was feeling hot and uncomfortable (60.5%), followed by being unable to sleep (21.7%), and feeling unwell (15%). Three people reported seeking medical treatment due to the heat. These impacts were experienced by respondents of all ages. Additional comments from respondents described feeling tired, exhausted, or having low energy, being unable to go outside, and being concerned about the cost of using air-conditioning. Only two people reported taking time off work during the heatwave, though this perhaps reflects that 61% of respondents were retired. Some mentioned rescheduling activities to avoid working

outdoors. Notably, 15.6% reported that they were not affected by the heat and, of particular interest, almost 30% of those aged over 80 years reported not being affected by the heatwave. Respondents described feeling lethargic, exhausted and being stuck inside near a fan or air-conditioning.

Impacts on other household members were described similarly, with 39% reporting that household members were hot and uncomfortable and 15.6% noting that household members had difficulty sleeping. Impacts on pets, animals, and gardens, as well as being unable to go outside during periods of extreme heat were also noted. One respondent further explained "One of the biggest impacts was having everyone at home. No one could go outside, kids just got burnt going out into the yard for a few minutes. The heat here is so insufferable that we are now thinking of relocating back to Western Australia."

When asked who was most affected by the recent heatwave, respondents identified the elderly (46%) and children (19.5%). Notably, 26.5% of respondents were unsure of any particular group being more affected by the heatwave.

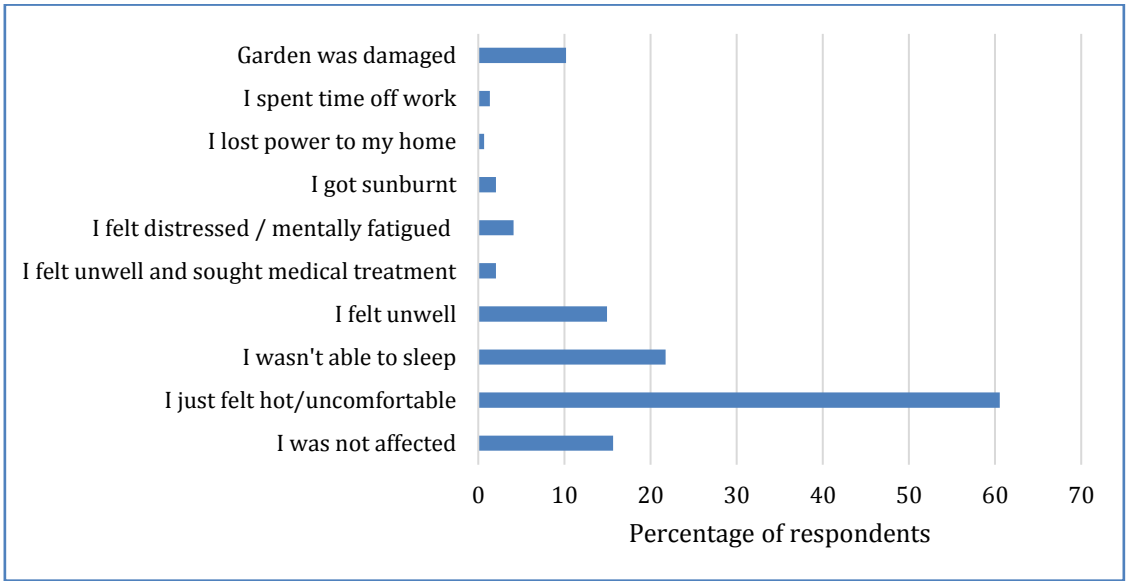

FIGURE 8. PERSONAL IMPACTS EXPERIENCED DURING THE RECENT HEATWAVE

Respondents identified a range of actions taken during the heatwave to cope with the extreme temperatures. Using air-conditioning (76%) and staying in a cool part of the home (64%) were the most common strategies, while many also reported making sure they kept hydrated, using a fan, closing windows, blinds, or shutters, and rescheduling outdoor activities (Figure 9). These findings indicate that residents respond to extreme or severe heat and take protective actions to reduce the impacts on themselves and their household.

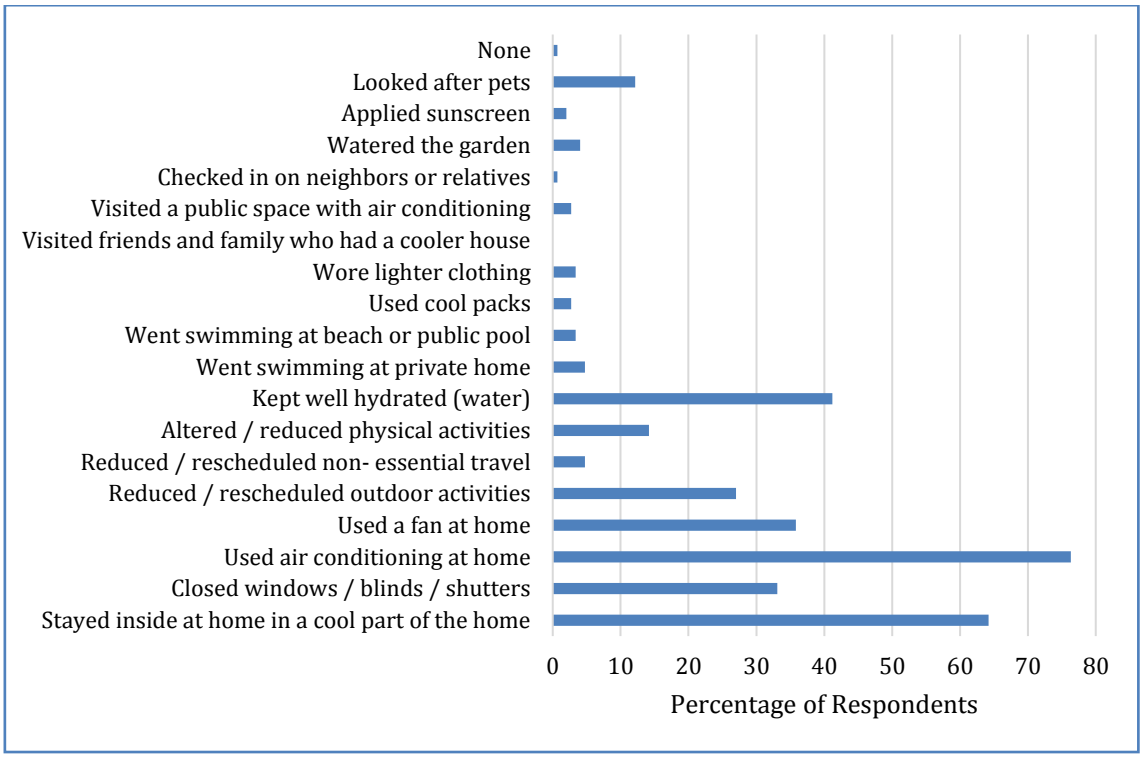

FIGURE 9. PROTECTIVE ACTIONS TAKEN DURING THE HEATWAVE

WARNINGS AND PREPAREDNESS

The majority of respondents (71%) received warning of the heatwave, and most of these monitored heatwave conditions daily (68%). Similar to findings in other studies [11], the media (TV, radio, and newspapers) was the most common source of heatwave warnings. Here, 88% of respondents identified media as the source of the heatwave warning, and 24% identified the BoM. People reported monitoring the heatwave warnings through TV (83.8%), radio (22.8%), and websites (20%), with TV being the most frequent response across all age groups (Figure 10). This highlights the continued importance of traditional media for sharing heatwave warnings. A number of respondents also mentioned using smartphone apps, such as Weatherzone for weather information, and receiving notifications from the SES, RFS, local council and their workplace.

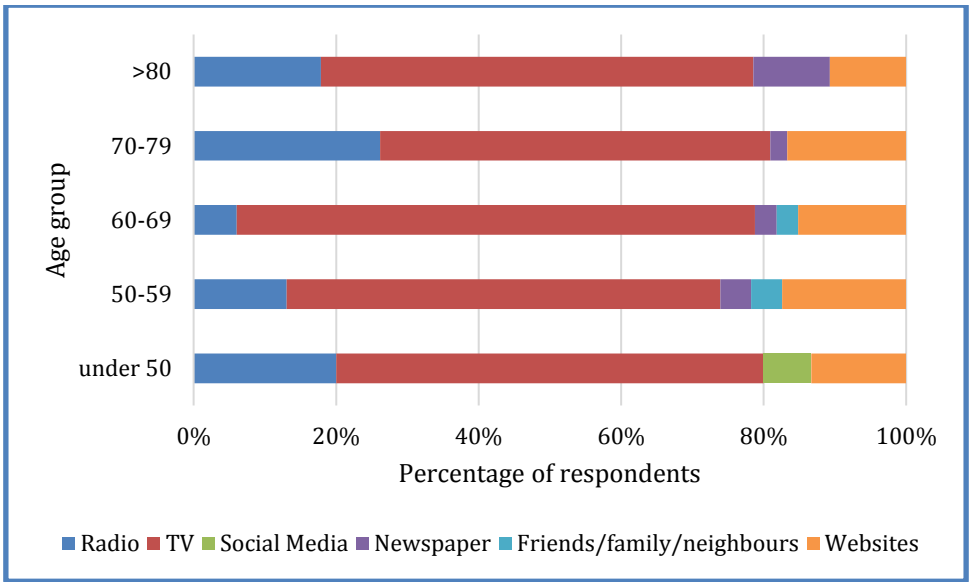

FIGURE 10. MODE OF RECEIVING AND MONITORING WARNINGS BY AGE GROUP

NSW Health has four key messages to support public health and wellbeing during heatwaves. These are: (1) Drink plenty of water, (2) Keep cool, (3) Take care of others, and (4) Have a plan [13]. For this heat event, in its media release and related video clips, the BoM advised the public to "to drink plenty of water and keep your body as cool as possible, and avoid prolonged sun exposure by staying indoors in cool or air-conditioned facilities-either at home or at local shopping centres, libraries and cinemas" [14]. The key messages that respondents recalled from the warnings were: (1) it is going to be hot (77%); (2) stay hydrated (41%); and (3) avoid being in direct sunlight where possible during the hottest parts of the day (21%). Several also reported being advised to seek out cool places (11.6%), check in on family and friends (9.7%), and to care for pets and animals (7.7%). Many respondents were satisfied with the warning services that they currently receive. Suggested information that could improve warnings about heatwaves included: advice about what to do if your home does not have air-conditioning, earlier warnings, promoting awareness of the importance of hydration and symptoms of heat exhaustion, and information on humidity, pollen or other likely allergens.

Of those who received warning of the heatwave, 45% undertook actions to reduce the likelihood or severity of impacts from the heatwave, whilst 53% did not prepare for the heatwave. Figure 11 summarises the preparedness actions taken by residents: among these, rescheduling outdoor or physical activities was the most common. When considering what motivated them to prepare for the heatwave, respondents typically identified the high temperatures (especially over 35-38°C) and that it was 'just common sense.' Among those who received a warning but did not do anything specific to prepare for the heat, many reported that there is nothing that can be done to prepare, that they 'just take it as it comes' and adjust their activity accordingly, and that heatwaves are simply a part of summer.

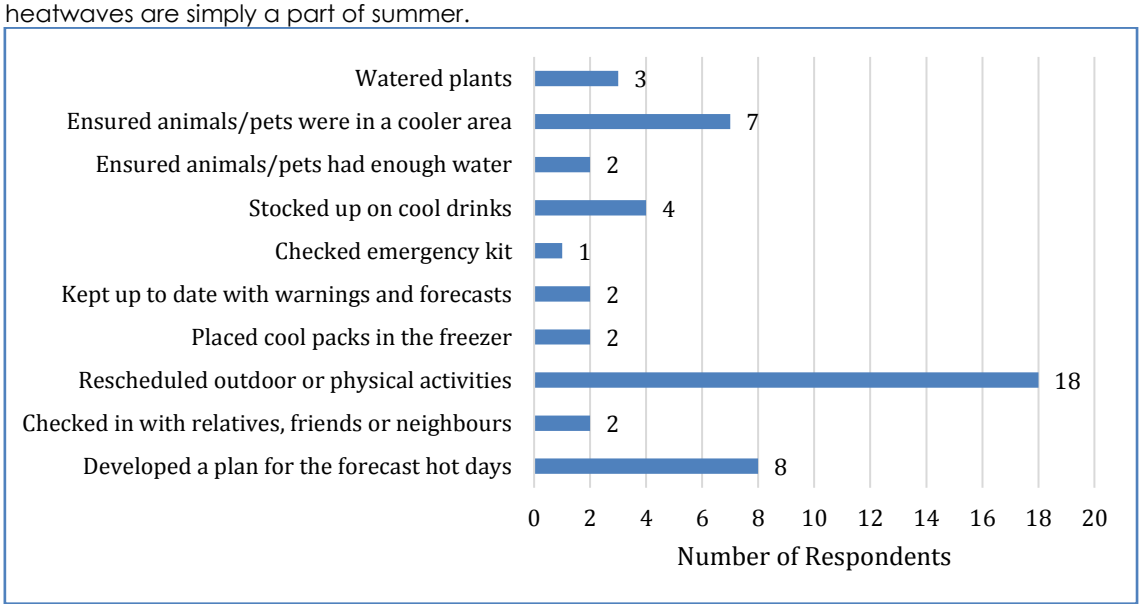

FIGURE 11. ACTIONS TAKEN TO PREPARE FOR THE HEATWAVE

When considering barriers to being better prepared for and reducing the risks from heatwaves, 50% felt that there were no barriers, while 13% thought (further) preparation was not important. Indeed, just over half the respondents felt that they do not need to undertake further actions. Suggestions for ways to reduce risks included improved house design (e.g., insulation, planting trees for shade, installing blinds, solar panels – 17.2%), installing and maintaining air-conditioning (14.4%), building a pool or a bath (7.91%), and moving to a cooler town (7.91%). The main barrier residents identified to being better prepared was affordability (21%).

There were a number of suggestions for ways in which government agencies could better assist communities to reduce the risks of heatwaves. Policies to address concerns about energy costs associated with air-conditioning and fans were mentioned by many respondents: examples include subsidized or lower electricity bills (particularly for vulnerable people), incentives to install solar panels, or subsidies to help vulnerable people install air-conditioning. Ensuring that load shedding is scheduled appropriately (and not during heatwaves) was mentioned by a few respondents. Guidelines and incentives to ensure that houses are designed appropriately – for example, with adequate shade, insulation, and solar panels – were also identified. Many respondents also stated that there was a need for governments to recognize and "take action on"

climate change and global warming. At a local government level, suggestions included planting more trees, keeping public pools open and offering reduced admission prices during heatwaves, and keeping cool places – such as shopping centres – open longer during heatwaves. Notably, many respondents also emphasized the importance of individual responsibility in preparing and responding to days with extreme or severe heat.

CONCLUSION

This survey explores the perspectives of residents in northern NSW who were affected by the first major heat event in 2017. It has found that heatwaves are generally perceived to be a significant risk, and that the primary concerns of residents are personal discomfort and effects on their health and wellbeing. During the heatwave, residents reported feeling tired and uncomfortable, and being unable to go outside. Using air-conditioning, fans, and staying in a cool part of the house were the most frequent coping strategies, alongside keeping hydrated. Notably, few people reported seeking out cooler public places (e.g., libraries, pools), and few reported checking on family and friends that might be particularly vulnerable to or affected by severe heat. The majority of respondents had seen heatwave warnings and, similar to Akompab, Bi [11], most people reported receiving and monitoring warnings through traditional media (e.g., TV, radio, and newspapers). Of those who received warning, 45% prepared for the heatwave, primarily through rescheduling activities. Respondents who did not prepare for the heatwave explained that extreme heat is just a part of summer and that they are able to adjust their activities accordingly during the heatwave. Suggested ways to support better preparedness and reduce the likelihood or severity of impacts tended to focus on making air-conditioning more affordable and accessible, particularly for vulnerable groups, as well as ensuring that cool refuges (e.g., swimming pools) are open and affordable during heatwaves. These suggestions indicate an emphasis on coping strategies during extreme heat events. However, some respondents also identified long term measures to support preparedness: for instance, guidelines and incentives for house design, solar panels and insulation, and 'taking action on' climate change. This study focused on the perspectives of residents in regional and rural NSW, and provides further understanding of the impacts of extreme heat and the ways in which warnings are received and used. Further research could usefully explore how urban communities, businesses and the agricultural sector in NSW perceive heatwave risks, their preparedness and coping strategies, and how they receive and use heatwave warnings.

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