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At-risk householders' responses to potential and actual bushfire threat: An analysis of findings from seven Australian post-bushfire interview studies 2009–2014

Jim McLennan [a,*], Douglas Paton [b], Lyndsey Wright [c]

[a] School of Psychology and Public Health, La Trobe University, Bundoora, Victoria 3086, Australia
[b] School of Medicine (Psychology) University of Tasmania, Launceston, Tasmania and School of Psychology and Clinical Sciences, Charles Darwin University, Northern Territory, Australia
[c] Bushfire & Natural Hazards Cooperative Research Centre, Level 5, 340 Albert Street, East Melbourne, Victoria 3002, Australia

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ABSTRACT

Many populated areas of Australia are at high risk of bushfire. All state and territory rural fire services have community bushfire safety education programs providing information and advice to residents about bushfire danger, household risk assessment, and planning and preparing to leave safely or to defend a property assessed as being defensible. Following disastrous bushfires in Victoria in February 2009 resulting in the deaths of 172 civilians and destruction of more than 2000 homes, a programme of interviews with affected residents was conducted. This first study revealed generally low levels of both pre-bushfire perceptions of risk, and planning and preparation by householders. Between 2011 and 2014, six further post-bushfire householder interview studies were conducted. Despite fire agencies' community education endeavours subsequent to the 2009 fires: (a) appreciable percentages of residents interviewed in these six post-2010 studies did not believe that they were at-risk prior to the fire and had no plan for what to do if threatened; (b) of those with a plan, a minority were well-prepared to implement their plan – especially if that plan was to leave; (c) very few householders self-evacuated before the fire on the basis of fire danger weather warnings. The findings and implications are discussed.

1. Introduction

Residents of many areas of Australia are at high risk from bushfires (generally called 'wildfires' in North America and 'forest fires' in Europe). Over the period 1900–2011, 260 major bushfires in Australia are known to have claimed 825 lives [1]. Because of the large geographical areas for which they are responsible, and low population densities outside capital cities and major regional centres, Australian rural fire agencies face challenges in responding so as to protect residents when fire threatens. This is especially so for fast moving bushfires under extreme fire danger weather conditions – high temperatures, low relative humidities, and strong winds [2–4].

In 2000, Australian rural fire agencies reviewed their approaches to community bushfire safety as a result of findings from investigations following disastrous multi-fatality bushfires in south-eastern Australia in 1967 and 1983 [5,6]. This review concluded that (a) most civilian fatalities resulted from either the fatal effects of bushfire-generated radiant heat or traumatic injury in a motor vehicle accident, when residents fled at the last moment on foot or in vehicles and (b) suitably prepared homes could be defended against bushfires while providing a safe refuge for occupants during the passage of the main fire front [6,7]. From 2005 to 2009, fire and land management agencies' approaches to community bushfire safety in Australian states and territories were shaped largely by the Australian Fire Authorities Council (AFAC) 2005 position statement which implied that able-bodied householders should be encouraged to remain on their property to actively defend their home when threatened by a bushfire: "…By extinguishing small initial ignitions, people of adequate mental, emotional, and physical fitness, equipped with appropriate skills, and basic resources, can save a building that would otherwise be lost in a fire…People should decide well in advance of a bushfire whether they will stay to defend them or leave if a bushfire threatens" (AFAC 2005, [8, p. 6]). This position became summarised as *Prepare, stay and defend or leave early* [7]. It should be noted that this approach differed from that of most North

* Corresponding author.
E-mail address: j.mclennan@latrobe.edu.au (J. McLennan).

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American wildfire jurisdictions where evacuation of residents threatened by a wildfire was, and remains, the preferred community wildfire safety strategy [9]. Following the disastrous 2009 Victorian 'Black Saturday' bushfires police investigators reported that 113 of the 172 civilian fatalities had perished in or near their homes [10] and the 'prepare, stay and defend or leave early' position came under intense critical scrutiny during the 2009 Victorian Bushfires Royal Commission of inquiry [11]. The AFAC position was reviewed and revised in 2010 to emphasise that leaving before threat is imminent was the safest option for householders: "People usually have two safe options when threatened by bushfire: leaving early or staying and defending adequately prepared properties. Leaving early is always the safest option" [12, p. 1]. In 2012 the position (slogan: *Prepare. Act. Survive.*) was revised further to give even greater emphasis to leaving as the preferred option in the event of bushfire threat:

> 4.2.8 The safest action to protect life Is for people to be away from the bushfire or threat of bushfire as early as possible. *Leaving a high risk bushfire location is the safest action, and leaving before a bushfire threatens is always safer than remaining until a bushfire starts. Leaving becomes increasingly appropriate with higher fire danger ratings. When bushfires are burning on days where circumstances such as weather conditions, topography or fuel loads may create intense fire behaviour, typically when 'Extreme' or 'Catastrophic' fire danger conditions*[1] *are expected, or where circumstances such as weather conditions, topography or fuel loads may create intense fire behaviour, leaving early may be the only safe action, even for people who are prepared to defend well-prepared buildings.* (emphases in the original [13, pp. 5–6])

Australian fire agencies revised their approaches to community bushfire safety education in light of the changes to the AFAC position in 2010 and 2012 [14]. All Australian state and territory rural fire agencies have well-developed information-based community bushfire safety education programs in place [15–22]. While these have evolved with changes to AFAC's several position statements 2001–2012, since 2010 the overall message to at-risk householders has maintained a core of eight key elements:

(i) The agency has available detailed written bushfire safety information for residents of at-risk locations, and householders are urged to read and act upon this information.
(ii) Residents of at-risk areas face a real danger of injury or death from bushfires.
(iii) A household bushfire safety or survival plan is essential, and this plan should be in written form.
(iv) Leaving should be the plan of choice.
(v) On days of predicted *Extreme* or worse fire danger weather, at-risk residents should leave their homes proactively for a safer location well before a bushfire threatens.
(vi) Residents should prepare adequately to implement their bushfire plan to either leave or stay and defend well in advance of a possible bushfire threat.
(vii) Residents who do not intend to stay and defend their property should leave well before a bushfire presents an imminent threat: they should not 'wait and see'.
(viii) Residents should not stay and defend their homes on a day of maximum fire danger weather (*Catastrophic* or *Code Red*).

At face value, all the above seem uncontroversial as desirable actions for residents facing potential or actual bushfire threat. However, up to this point in time there has been no reported large-scale assessment of the extent to which Australian residents who experienced a significant bushfire threat had acted in accordance with these eight bushfire safety recommendations since the 2010 and 2012 changes to the AFAC position [12,13]. We seek to remedy this apparent lack by analysing findings from seven post-bushfire householder interview studies conducted by the Bushfire Cooperative Research Centre (BCRC) and the Bushfire and Natural Hazards Cooperative Research Centre (BNHCRC) over the period 2009–2014. Findings from six studies conducted post-2010 are compared with the findings from the study conducted immediately following the 2009 Victorian bushfires.

2. Methods

Following the 7 February 2009 Victorian bushfires, the BCRC established a bushfires research task force to investigate aspects of the fires. An important component of the task force's work was to conduct interviews with householders impacted by fires in eight locations identified by authorities as the worst-affected fire areas in terms of fatalities and house losses. Researchers visited properties and interviewed residents about their pre-bushfire risk perceptions, plans and preparations; warnings received on the day of the fire; and actions on the day. Details of the study and findings are in McLennan et al. [23].

Following this initial study, the BCRC undertook five further post-bushfire interview studies (twice in Western Australia – WA – in 2011, and twice in New South Wales – NSW – in 2013; and once in Tasmania in 2013), while the BNHCRC undertook a study in WA in 2014. Each study was carried out by a university school or department which obtained ethics committee approval for the research. The locations and fire events covered by each of the seven studies are summarised in Table 1. Across all the studies most participants were interviewed at their properties, following publicity in local media about the study. Because of the damage to local infrastructure and the numbers of displaced residents it was not possible to recruit random samples of households. However, those interviewed represented a range of property locations and types, household compositions, and fire outcomes – where homes had survived intact, been damaged, or in some instances destroyed. Interviews were conducted at properties in or adjacent to the more severely-burned areas, where people were present on those days on which interview teams were in the local area. Leaflets were left at properties where residents were absent inviting them to contact the research administrator and arrange for an interview – either by telephone or in person at an agreed location. Almost all those approached agreed to be interviewed, there were very few refusals and these were due mostly to residents not being available to be interviewed at that time.

Each study used a semi-structured interview methodology. The interview guides used in each instance were similar in overall format and content, although they differed in matters of detail according to (a) the specific natures of the fires and the affected communities and (b) the community safety issues identified by the fire agency as priorities for inquiry. Interviews were audio-recorded. For the 2009 study and the first study in WA (Lake Clifton – see Table 1), all interviews were transcribed and content-analysed using the *NVivo* (QSR International, Melbourne, Australia) text management software tool. In the remaining five studies, interview content summary checklists were completed by members of two-person interview teams during the course of each interview (and checked for completeness and agreement by the team following each interview), and a sample of interviews was transcribed and content-analysed. This change was made to save time

[1] Since 2010 Australian fire agencies have used a six-level fire danger weather rating system: Low-Moderate; High; Very High, Severe; Extreme; Code Red/Catastrophic – some agencies use 'Code Red' others use 'Catastrophic' as the descriptor of the highest level of fire danger.