to stay and defend? How can householders recognise: (a) when it is too late to 'leave early'; and (b) when the house is no longer a safe refuge (should defence become untenable)?

The difficulties for agencies in providing timely localised warnings during large and fast onset fires means that residents need to be able to make judgement calls for themselves.

The influence of gender

The gender distribution of the activities undertaken at the time of death highlights the increased vulnerability of women in recent years. Men, with increased knowledge and resources, often take on defensive activities while women and children are often left powerless, sheltering passively or evacuating at the last minute. Although there were no fatalities under the age of 18 and very few deaths associated with late evacuation in vehicles in Hobart, it is increasingly common for women and children to be told to drive to safety.

Social capital and local knowledge

This research has clearly shown that people were aware of elderly or frail people in their community, but, because of a lack of planning and urgency, they had to look after themselves and their immediate family wtih disastrous consequences for their vulnerable neighbours. They therefore had the social capital and local knowledge (factors that are increasingly discussed within the literature as important for reducing bushfire risk[3]), but were waiting to see, and only acting when it was too late. In some cases people tried to persuade neighbours to leave but they refused, either deciding to shelter in place or thinking they could defend their properties. Many severely underestimated the fires and their own lack of preparations.

The current situation

A study was conducted by researchers from the Bushfire CRC after the Hobart fires of October 2006, in order to enable a greater understanding of the influences upon householder's decision-making processes and rationales for behavioural actions. Overall, the fire response was a success, with many residents following advice from the authorities to return home and most choosing to defend them. There were minimal losses and a positive experience of staying and defending for many residents (Lowe et al., in press). The Tasmania Fire Service is a strong supporter of the 'prepare, stay and defend policy'. Their strategy, which proved highly effective in the October 2006 fire, involved the presence of highly mobile fire crews offering advice to residents. Many people commented that the advice was not only useful, but gave them increased confidence in their ability to successfully defend their property.

Policy relevance

Translating the stay or go message into practice is complex, with a great deal of ambiguity in the 'leave early' advice and gaps in peoples' perceptions of the actions they should take. Many people still consider late evacuation as a valid last resort; waiting to see how the fire develops and then fleeing at the last minute. Recent evidence also shows that people frequently retain a 'fall-back plan', with children, valuables or pets being loaded into cars so that they can be evacuated if the situation is deemed too dangerous. In other cases, people expect the emergency services to provide help, information, warning, guidance or assistance.

Those who plan to stay are often not well-prepared; they do not expect to lose electricity or water, have no back-up plan and do not wear adequate protective clothing. Given the speed and erratic nature of bushfires (particularly in urban interface areas), there is a need for communication which prepares people mentally and physically for a situation in which they may have no choice but to stay and defend their homes. Of most importance, however, is the need to recognise and target the vulnerable - women and children who often die fleeing or sheltering in an undefended home.

Acknowledgments

We wish to thank Lucinda Coates (Risk Frontiers) for compiling the original dataset and the Tasmanian Public Records Office, Hobart for the retrieval of coronial reports.

References

Chambers, D. M., and Bettingham-Moore,C. G., 1967. *The Bush Fire Disaster of 7th February 1967: Report and Summary of Evidence.* Tasmanian Attorney-General's Office, Hobart.

Krusel, N., and Petris S.N., 1999. *A study of civilian deaths in the 1983 Ash Wednesday Bushfires Victoria, Australia.* Country Fire Authority Occasional Paper No 1.

Lowe, T., Tibbits, A., Whittaker, J. and Handmer, J. (In Press) *Confidence is key: an assessment of residents' action during the October 2006 bushfires in Hobart.* Australian Journal of Emergency Management.

McArthur, A. G. and Cheney, N. P., 1967. *Report on the Southern Tasmanian Bushfires of 7 February 1967.* Forestry Commission Tasmania, Government Printer, Hobart.

Wettenhall, R. L. 1975. *Bushfire disaster: an Australian community in crisis.* Sydney: Angus & Robertson.

(Footnotes)

[1]For more information on the policy, the historical evidence and an exploration of the legal issues please see chapters Six, Seven and Eight in *Handmer and Haynes (2008) Community Bushfire Safety.* Edited volume. CSIRO Publishing

[2] http://www.ema.gov.au/ema/emaDisasters.nsf

[3] See chapters three and four in *Handmer and Haynes (2008) Community Bushfire Safety.* Edited volume. CSIRO publishing

quarterly newsletter

January 2008, Volume 7, Issue 2

Risk Frontiers

Local knowledge and gender: *re-evaluating the 1967 Hobart bushfire fatalities*

Katharine Haynes, [1&2] , Amalie Tibbits[2] and Thomas Lowe[2]

[1]Risk Frontiers, Macquarie University;
[2]Centre for Risk and Community Safety, RMIT, Melbourne

This Issue

Sponsors

"The heat blast numbed, you couldn't breath the air. I remember thinking atomic war must be like this' Volunteer fireman, The Age, 9th of February 1967.

"Send clothing, send food – we need all you can give us. We have just gone through the most horrible day of our history and we need help. The sky was black as midnight at two o'clock in the afternoon. There were no lights, no power, nothing. We could only grope and hope" Dame Mable Miller, Deputy Lord Mayor of Hobart (Wettenhall, 1975).

Introduction

Australian bushfire policy for community safety is unique. Rather than attempting to evacuate all those that may be in the path of a bushfire, fire authorities in all States allow the public to make a choice: either get out of the area early, or prepare to stay and defend your home and property from the fire. In other countries this strategy is looked upon as being irresponsible and unnecessarily dangerous. However, experience has taught Australians that late evacuation represents a far greater risk than staying, sheltering and defending your home[1].

The 'prepare, stay and defend or leave early' policy is based on evidence from reports into some of Australia's worst bushfire tragedies, including the Hobart bushfires in February1967 in which 64 people were killed and the Ash Wednesday fires in 1983, which killed 75 people across South East Australia. The evidence suggested that people were more likely to be killed while out in the open (the majority fleeing from a building) and that properties defended by their occupants stood a far higher chance of survival. However, apart from this handful of aging post-fire investigations, no detailed research has ever been carried out into the circumstances of all recorded bushfire deaths in Australia – until now.

In this newsletter, we will re-examine the fatalities of the Hobart bushfire of 1967 utilising a bushfire fatality database that Risk Frontiers compiled in collaboration with the Bushfire Cooperative Research Centre (CRC). This database is being used to explore the circumstances and social context of bushfire fatalities over the last 100 years in order to build a more detailed picture of vulnerable groups, and the attributes and behaviours that are likely to lead them towards dangerous decisions. The Australian policy requires modification if it is to fulfil its objective of reducing risk to lives and property and this research will go a long way towards informing its development.

The fatality database

The database of Australian bushfire fatalities has been compiled by Risk Frontiers from information listed in the print media over the last 100 years and from various government reports. Unlike most other fatality data-sets, the names and ages of individuals have been recorded or found through further investigation. This has enabled the use of coronial reports to verify the entries and add important details that may have contributed to each individual death. The relatively high level of detail resulting from this painstaking research provides a unique opportunity to assess the circumstances in each individual fatality, enabling a

thorough analysis of their actions prior to death and also the socio-demographic relationships that were at play. The information pertaining to fire-fighter fatalities has been removed as we wish to concentrate on civilian deaths.

The Hobart bushfire of 1967

Fire conditions across Tasmania in February 1967 were extreme. High rainfall earlier in the year had led to a proliferation of vegetation growth that was followed by the island's driest eight month period since 1855. On the 7th of February, a combination of extremely high temperatures, very low humidity and very strong winds from the north-west created the conditions to drive many existing blazes into the tinder-dry bush. In just 5 hours as many as 110 separate fire fronts burnt through some 264, 270 hectares of land in Southern Tasmania, causing extensive damage to agricultural, forest and public infrastructure and many small towns along the Derwent estuary and east of Hobart.

The most damaging fire struck deep into Hobart's outer suburbs. The speed and ferocity of its advance left many people confused and panic-stricken as they tried to return to defend their homes or escape from the catastrophe that was rapidly unfolding around them. The Tasmanian fires ultimately claimed 64 lives.

The findings of Alan McArthur and Phil Cheney from the CSIRO's Forest Research Institute were published in a preliminary report (McArthur and Cheney, 1967) and later reproduced in the report of the official government inquiry (Chambers and Brettingham-Moore, 1967). Their investigations highlighted the inability of many victims to remove themselves from the area or to defend their homes from the flames. They included the following observations:

> *'Most of the people who died in their homes or within a short distance thereof were either very old and infirm or suffered from some physical disability. In the case of about half of the people who died whilst escaping from their homes, such homes did not catch fire. In a few cases it may be said that if they had stayed inside they would have had a reasonable chance of survival'* (Chambers and Brettingham-Moore, 1967).

The findings of McArthur and Cheney were among the first to explicitly suggest staying and defending property as being preferable to last-minute evacuation and they form a fundamental basis to the current 'prepare, stay and defend or leave early' policy. However, their observations lacked the kind of detail and understanding of human decision-making that is necessary to 'fine-tune' the policy for successful implementation.

Results of data analysis

Our data-set lists 64 fatalities due to the fires on the 7th of February. On the first day 54 died; ten died over subsequent days in hospital. Eight of these deaths were attributed to natural causes, heart attacks brought on due to the exertions of fire-fighting or the stress of the situation. There were 53 deaths due to the direct effects of the fire: 51 to burns and asphyxiation; one due to drowning while evacuating (victim was trying to move livestock when they were overcome by the flames and tried to cross a watercourse), and one due to falling debris (victim had been protecting his home when the chimney from the burning building next door fell upon him). The circumstances of a further three deaths are unknown. The fatality numbers quoted in other sources, typically originating from the EMA database[2], state that there were 62 fatalities with nine of these being attributed to natural causes. Our data set contains the details of two additional deaths.

The collection and verification of the data through coronial records has not been simple.

Access to the coronial records in some states is a very complicated bureaucratic procedure. There are many inconsistencies with names, ages and dates; some deaths did not have inquests as they died much later in hospital or the inquests are now missing. Often the boxes and files are not in order and, when found, the information can be disappointing due to a lack of detail, or witnesses not disclosing a full account of the events.

Demographics

There are 32 men and 32 women listed. This equal number is unusual, as all previous fires in the 20th century had been dominated by male fatalities. (This trend of increasing female vulnerability has continued in recent decades.) The age distribution shows that over half of the fatalities (59%) were 60 years of age or more, with 28% aged 30 – 59 years and only 5% aged 18-29 years. There were no fatalities under the age of 18.

Decision making

Deciding whether people had sufficient warning or not and then judging the rationality of their survival decisions is a difficult task. Although the available information is limited, we have tried where possible to categorise people based on a coding scheme devised by Krusel and Petris (1999) for their analysis of the Victorian Ash Wednesday deaths in 1983. This includes:

- Victims who recognised the real threat to their safety with enough time to save their lives, but chose an ineffective survival strategy;
- Victims who did not recognise the real threat to their safety in time to implement an effective survival strategy;
- Victims who were physically incapable of implementing an effective survival strategy.

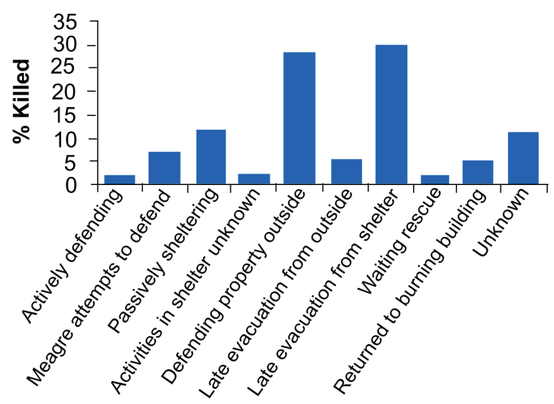
We also added a further two categories to include those for whom we did not have enough information to make a judgment and also for those who made the correct decision but were just unlucky, i.e. debris falling on them as they defended their home or succumbing to a heart-attack when they had previously been fit and well.

This identified that the majority (48%, n=31) chose an ineffective survival strategy, 13% (n=8) did not recognise the real threat to their safety; 11% (n=7) were physically incapable; 11% (n=7) were unlucky; and 17% (n=11) are unknown.

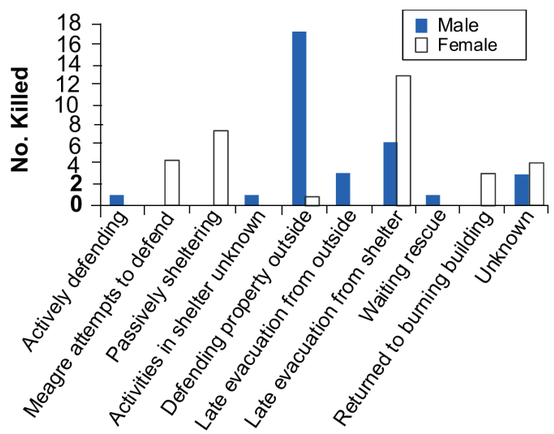
Activities at the time of death

An examination of the activities that the victims were engaged in at the time of death shows that the majority (58%) were caught just outside their homes, neighbours' homes or their place of employment. 30% (n=19) were making a late evacuation from shelter and 28% (n=18) were actively defending wider property and livestock. 21% of deaths (n=13) occurred inside the home. However, only one victim died whilst actively defending his property and his death was due to natural causes brought on from the exertion of fire-fighting. 17% of victims (n=11) were passively sheltering in the home with 6% of these (n=4) known to be making very modest and unsuccessful attempts to defend their property. The activities of one victim are unknown.

Activity prior to death



Activities prior to death and gender



An examination of activities in relation to gender shows that of the 32 female fatalities, 13 died while making a last-minute flee from shelter, 11 while passively sheltering or making meagre and unsuccessful attempts to defend their property and three who re-entered their burning home. Of the latter, two returned for possessions and one tried to save her mentally handicapped son. In comparison, men were dominantly engaged in defensive activities outside of the home when they were overcome by the fire.

The majority of victims who died whilst defending property and livestock outside (17 men and 1 woman, 28%), died from the direct effects of the fire. However, this category also contains four of the eight natural deaths (heart-attacks).

Of those caught outside, 30 were on foot and only four men were found associated with vehicles. This included two separate incidents involving workers in the area who tried to evacuate on foot when the fire front approached. The first incident involved two men who were timber felling in a heavily wooded area and were completely unaware of the fire risk. The coroner concluded that it was highly likely the two men had been caught out, with late evacuation their only option as they had tried to flee in their vehicle and then on foot.

The second incident also involved two men and it is clear from the survivor's witness statement that they both would have survived if they had stayed in the vehicle. They were warned that they would not get through the area and were in the process of turning the truck around when flames engulfed it, the motor stalled and as they fled on foot "there seemed to be a fire ball coming up the road". The survivor tore ferns from the verge and sheltered while the fire front passed. When he returned to the truck he found it had not caught fire. The victim also returned to the truck very badly burned and both then walked for help. The victim was taken to hospital and died the next day. As the truck was unburnt it would have provided a safe shelter and could well have saved the victim's life.

Discussion

If we had looked directly at the statistics or the locations of death of the deceased we may have simply concluded that the majority of the fatalities occurred due to age and infirmity. This tells only half the story. A re-evaluation of the detailed coronial reports and witness statements, presents a more complete narrative and demonstrates that the fatalities are related to the roles that people take on in fire-prone environments and the resources (including warnings and preparations) that are at hand.

Warnings and preparations

Many of these victims underestimated the severity of the fires and, thus, were not mentally or physically prepared to stay and defend their properties. Fire agencies are attempting to address these issues through education programmes. However, this case study identifies a number of important issues for the 'prepare, stay and defend' position. For example; what level of preparation is required