

## A STEP TOWARDS ZERO: UNDERSTANDING PREVENTABLE RESIDENTIAL FIRE FATALITIES



### ABOUT THIS PROJECT

This research was led by the Metropolitan Fire Brigade on behalf of the AFAC Community Engagement Technical Group, as part of the Tactical Research Fund project, *A strategic analysis of preventable residential fire fatalities*. The research was undertaken by Risk Frontiers, the Metropolitan Fire Brigade and Macquarie University.

### AUTHORS

Lucinda Coates, Jonathan van Leeuwen, Ashley Avci, Jacob Evans, Steven George, Andrew Gissing, Prof Robin van den Honert and Dr Katharine Haynes, Risk Frontiers and Macquarie University; Geoff Kaandorp and Julie Harris, Metropolitan Fire Brigade. For more information contact [lucinda.coates@riskfrontiers.com](mailto:lucinda.coates@riskfrontiers.com)

### SUMMARY

On average, more than one preventable fire-related death occurs in a residential context every week in Australia.

That equates to approximately the same number of deaths as occurred during the Black Saturday bushfires (173), every three years. Since 2003, at least 900 people have died in residential fires – deaths that could have been avoided. Deaths from residential fires have significant social, economic and emotional impacts on individuals, families, communities, and on the firefighters and



▲ Above: THIS RESEARCH WILL ALLOW LIFESAVING INFORMATION TO BE BETTER TARGETED TO THOSE MOST AT RISK FROM HOUSE FIRES. PHOTO: METROPOLITAN FIRE BRIGADE.

other emergency service volunteers and employees who attend these incidents.

This research draws on 14 years of data to provide an update on the evidence around the extent of preventable residential fire fatalities in Australia, those people most at risk of dying in residential fires, and the details of fire incidents and residences where fatal fires have occurred. The research found that deaths from preventable residential fires in Australia averaged 64 fatalities per year between July 2003 and June 2017. This is more than one preventable residential fire fatality per week. Most of these deaths occur in single fatality incidents. In the timeframe studied, there was no clear declining trend in preventable fire fatalities.

The results from this study highlight that reducing residential fire fatality risk is complex. The presence of a single risk factor on its own is unlikely to significantly increase a person's risk of dying in a residential fire. Rather, it is the combination of a range of risk factors surrounding the person – their behaviours, their residential environment, any disability or disadvantage that they are experiencing and other external factors – that is likely to impact their overall level of risk of having a fire that results in their death.

This research provides a set of data that fire services can use to develop evidence-based policy and practice to reduce the occurrence of preventable fatal residential fires.

### CONTEXT

The last published national study into residential fire fatalities in Australia was by AFAC in 2005. This research builds on that report and looks in greater depth at who is most at risk. This new data provides fire services and other stakeholders with an analysis of preventable residential fire

fatalities to inform evidence-based policy and practice to reduce the number of future deaths.

### BACKGROUND

Numerous studies have shown that certain groups of people are more at risk of dying in residential fires. The identification of

risk groups enables fire services to apply a preventative, rather than a reactive, approach to residential fire safety.

The findings from this study enable fire agencies and other stakeholders to improve their knowledge about preventable residential fire fatalities, the nature of the victims and the circumstances surrounding

## DEFINITIONS

**Preventable fires:** Preventable fires are fires where individuals, fire agencies or other stakeholders may have been able to identify the risks (related to a person and/or a physical environment) and take action or develop intervention strategies which, if applied, may have reduced the risk of a fire taking place.

**Fatality:** A fatality is a death where causation, as determined by a coroner, is related primarily to the effects of fire, including causations such as smoke inhalation or burns. The death may have occurred at the time of the fire or any time after, including months after the fire incident.

the fatalities. This information is assisting the design of improved community safety programs to reduce residential fire fatalities in the future.

The 2005 AFAC study found that the most at-risk groups for residential fire fatalities in Australia included males, those aged 65 or over, children under four and adults who had consumed alcohol. This current project aimed to assess the data since 2005 and confirm at a national level findings from Aufiero *et al* (2011), who found that in metropolitan Melbourne, older people and people with a disability were at higher risk and that many residential fire victims were recipients of funded home and community care programs.

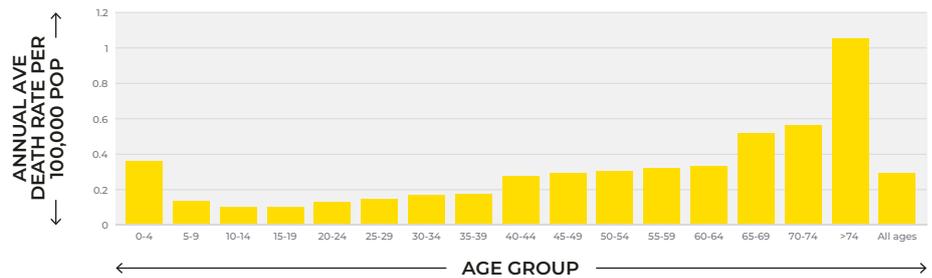
Demographic trends, such as an aging population, aging in place strategies and more people living alone, indicate a potential increase in future risk. The literature commonly identifies that often the variables associated with residential fire deaths appear in combination. These can be factors associated with the person and their behaviour, or a more complex combination of risks incorporating the person, the residential environment and other social and economic factors.

## BUSHFIRE AND NATURAL HAZARDS CRC RESEARCH

The objectives of this study were to:

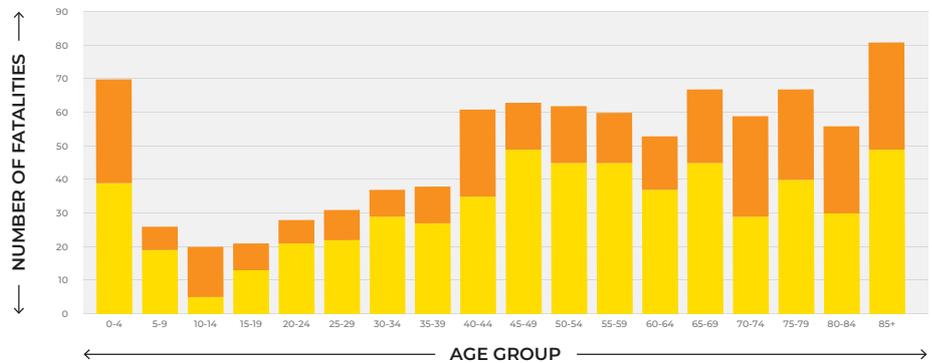
- identify specific socio-demographic characteristics, risk factors and other related information associated with victims of residential fire that are noted in coronial reports
- identify, for the largest cohort of fire victims (those aged 65 or older), how many were recipients of government

## Fatality rates by age group



▲ Figure 1: FATATLITY RATES BY AGE GROUP.

## Fatalities by age and gender



▲ Figure 2: FATATLITIES BY AGE AND GENDER.

funded services prior to their death

- better understand the prevalence of socio-demographic characteristics associated with fire victims in the community-based data from the Australian Bureau of Statistics, including a projection of future risk, where appropriate

The research analysed records from the National Coronial Information System (NCIS) database, supported by the analysis of publicly available Coronial reports. The NCIS database contains records from all states and territories in Australia from July 2000 onwards (except for Queensland, which is from January 2001 onwards).

Australian records from 1 July 2003 to 30 June 2017 were accessed in the NCIS by a variety of searches. After refinement of the applicable dataset, relevant structured and non-structured data from the NCIS (comprising the summary page, police, autopsy and toxicology reports and coroner's findings) were coded for 41 fields and entered into a specially constructed database. Once complete, the data was statistically analysed.

## RESEARCH FINDINGS

This study found that at least 900 people have died in preventable residential fires in Australia from July 2003 to June 2017, averaging approximately 64 deaths per year, or more than one preventable residential fire death every week. Between 2003 and 2017 there was no clear declining trend in fire fatalities.

### THE PEOPLE

Single variable, contingency table and machine learning analyses from the current research found that those most at risk are:

- Older people – people aged over 65 represent 36 per cent of fatalities
- Young children – those aged 0-4 represent 8 per cent of fatalities
- People with a disability – 62 per cent of fatalities
- Aboriginal and Torres Strait Islander people – over-represented by a factor of 2.5
- Smokers – 65 per cent of fatalities
- People on medications (34 per cent) or with alcohol (33 per cent) present in their blood

- Males – 64 per cent of fatalities, particularly those aged over 45
- People who lived alone – 45 per cent of fatalities
- People who live in the most socially and financially disadvantaged locations

The presence of a single risk factor on its own is unlikely to significantly increase a person's risk of dying in a residential fire. Rather, it is the combination of a range of risk factors that increase the risk. Significant risk groups and trends relating to those groups are outlined below.

**OLDER PEOPLE**

People aged over 65 are the group most at risk of dying in a residential fire, and the fatality rate increases with age. The data indicates that the other factors that increase risk in older people include smoking, having a disability, the presence in their blood of alcohol and/or medications, living alone and requiring support to live at home. Where these factors are present in combination, an older person's risk increased significantly.

**YOUNG CHILDREN**

Children aged under four had the largest number of deaths of any five-year age range. The cause of fire was more often lighters or matches, which may indicate that a significant number of fires were lit by children during fire play. The link to social and financial disadvantage was particularly significant in this cohort, with almost half of deaths in the 0-4 age bracket occurring in locations in the top 10 per cent of greatest socio-economic disadvantage, and 87 per cent of fatalities occurring in the top 40 per cent of locations of greatest disadvantage.

**PEOPLE WITH A DISABILITY**

Within the fire fatality data, 47 per cent of decedents were identified as having at least one disability present (physical disabilities 46 per cent, mental health 28 per cent and neurological disorders 10 per cent). The data suggests that people with a disability more often died between the hours of 8am and midday. This contrasts with the overall data, where fatal fires more often occurred overnight during sleeping hours. This may indicate that for people with a disability, their disability rather than being asleep may have contributed to their inability to safely escape the fire. Similarly, people with a disability more often had a working smoke alarm.

**ABORIGINAL AND TORRES STRAIT ISLANDER PEOPLE**

Over eight per cent of decedents were identified as Aboriginal, Torres Strait Islander, or both. Approximately three per cent of the Australian population identify as Aboriginal or Torres Strait Islander, meaning that this cohort are over-represented in the data by a factor of 2.5. Aboriginal and Torres Strait Islander people comprised 12 per cent of fatalities under 65 years of age and three per cent of people over 65 years, likely reflecting the younger age structure of the Aboriginal and Torres Strait Islander population.

**THE RESIDENCE**

Free-standing houses/villas were the housing type where the majority (67 per cent) of fatal fires occurred. However, these free-standing houses comprise 78 per cent of the housing stock in Australia, so other housing types may be over-represented in the fatality data. Similarly, owner occupiers were the most commonly identified property tenure (53 per cent), but owner occupiers account for approximately 67 per cent of all property tenures in Australia. This indicates that other tenure types, such as private and public rentals, may be over-represented in fire fatalities.

**THE LOCATION**

Geographically, most fatal residential fires occurred in major cities, but there was over-representation of deaths in regional and remote areas. The analysis of the fatality data

in relation to areas of relative socio-economic advantage and disadvantage shows that most fatalities occurred in locations where there is relatively greater socio-economic disadvantage. Fatal preventable residential fires start most commonly in the living room/lounge or bedroom. They are not necessarily large or severe fires, with approximately half of fatal fires burning one room or less of the structure.

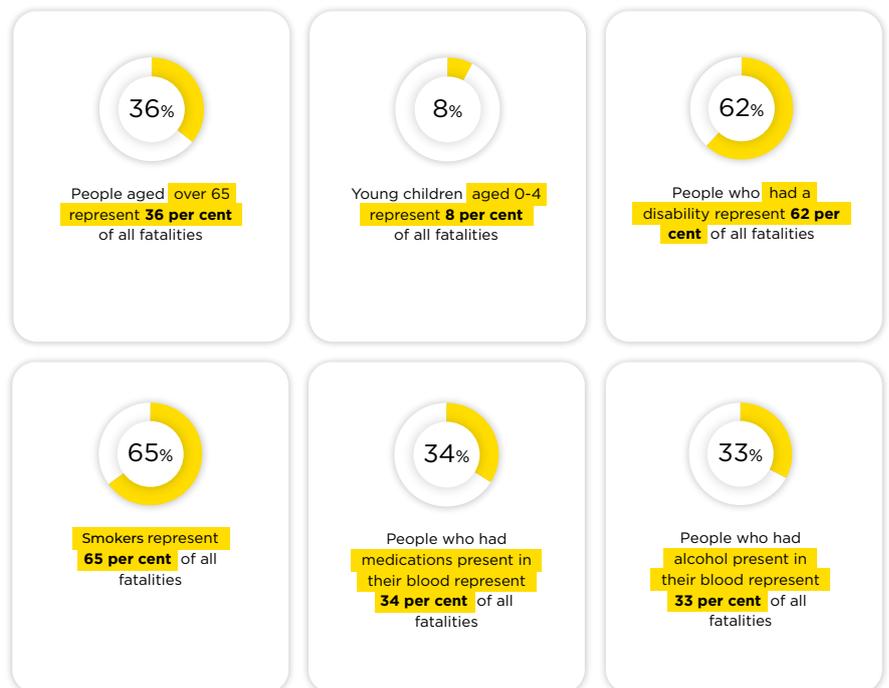
**SEASONALITY**

Most fatal residential fires occur during the winter months. They occur most commonly between the hours of 8pm and 8am, and particularly from midnight to 4am.

**END-USER STATEMENT**

“The majority of fatal house fires are preventable, which is concerning. As firefighters, our job is not just to extinguish fires but to stop them from occurring in the first place. Studies like this one provide vital intelligence to assist fire and rescue services better understand why these incidents are happening and who is most at risk. This enables us to develop evidence-based policies and practices to hopefully reduce the number of fatal fires. Even one person dying in a house fire is one too many.”

**– Acting Chief Executive Officer/Chief Officer David Bruce, Metropolitan Fire Brigade**



▲ Figure 3: THE RESEARCH IDENTIFIED KEY STATISTICS FROM AT RISK GROUPS.



▲ Above: FIRE INVESTIGATORS EXAMINING A HOUSE AFTER A FIRE. PHOTO: METROPOLITAN FIRE BRIGADE

### SMOKE ALARMS

In a large majority of cases (66 per cent) it is unknown if a smoke alarm was present, despite smoke alarms being a requirement by law in all residential properties. The extent that the presence of a smoke alarm was noted by coroners is low considering their importance and that the absence of a smoke alarm may have had an impact on the fatality outcome (e.g., by providing an earlier warning to the fire victim).

### SMOKING

People who smoke are over-represented to a large extent in residential fire fatalities. Of cases where the smoking status of the decedent was known, 65 per cent of people were smokers. During the study period, smoking rates in Australia decreased significantly and reduced-fire-risk cigarettes were mandated in Australia in 2010. In the 2004/05 financial year, 23 per cent of Australians were smokers. By 2014/15 this had decreased to 16 per cent. The fatality data does not reflect any decline in the number of smokers who died over the course of the study period. It is unclear why this is the case.

Smoking materials are a major cause of ignition of fatal residential fires. For those cases where the fire cause was known, over a quarter were caused by smoking materials, with just over a third of those relating to smoking in bed. There was a strong link between smoking materials as the cause of fire and the residence being in a relatively disadvantaged area, with 49 per cent of fires caused by smoking materials occurring in the top 25 per cent of the most disadvantaged locations.

### HOW IS THIS RESEARCH BEING USED?

This research is informing fire safety programs nationally, with fire and emergency services across Australia, through AFAC, using the data to develop a national residential fire strategy, 'towards zero', to reduce preventable residential fire fatalities.

The groups identified as most at risk are also the groups that are the most difficult to reach in general fire safety campaigns. Lifesaving information can now be better targeted to the areas it is needed most.

### FURTHER READING

AFAC (2005), *Accidental fire injuries in residential structures: who's at risk*, Australasian Fire and Emergency Service Authorities Council.

Aufiero M, Carlone T, Hawkins W and Murdy S (2011), *Analysis of preventable fire fatalities of older people and people with disabilities: risk reduction advice for the community care sector*, an interactive qualifying project report submitted to the faculty of Worcester Polytechnic Institute in partial fulfilment of the requirements for the Degree of Bachelor of Science, Metropolitan Fire and Emergency Services Board.

Coates L, Kaandorp G, Harris J, van Leeuwen J, Avci A, Evans J, George S, Gissing A, van den Honert R and Haynes K (2019), *Preventable residential fire fatalities: July 2003 to June 2017*, Bushfire and Natural Hazards CRC.

The Bushfire and Natural Hazards CRC is a national research centre funded by the Australian Government Cooperative Research Centre Program. It was formed in 2013 for an eight-year program to undertake end-user focused research for Australia and New Zealand.

*Hazard Notes* are prepared from available research at the time of publication to encourage discussion and debate. The contents of *Hazard Notes* do not necessarily represent the views, policies, practises or positions of any of the individual agencies or organisations who are stakeholders of the Bushfire and Natural Hazards CRC.

All material in this document, except as identified below, is licensed under the Creative Commons Attribution-Non-Commercial 4.0 International Licence.

Material not licensed under the Creative Commons licence:

- Bushfire and Natural Hazards CRC logo
- All photographs/graphics.

All rights are reserved in content not licenced under the Creative Commons licence. Permission must be sought from the copyright owner to use this material.