

Fire Research Report

Cooking, alcohol and unintentional fatal fires in New Zealand homes 1991-1997

UNIVERSITY OF OTAGO

May 2001

Twenty-seven New Zealanders died in 22 unintentional domestic fire incidents where the heat source was a stove top or oven in the years 1991-1997 inclusive. These deaths represented 14 per cent of the 187 unintentional fatalities in that time frame. Twenty-five of these fatalities occurred in 20 incidents where food left on the stove top or in the oven ignited; these fatalities form the basis of the following descriptive analysis.

The 25 deceased were in all age groups from children to seniors. Rates for males were over two and a half times the rates for females. Age-standardised rates for Māori were at least four times rates for nonMāori. Māori fatalities occurred disproportionately at younger ages, with seven of the 11 Māori deceased aged under 25 years. Eight of the adult deceased had post-mortem blood alcohol levels in excess of 100mg per 100mls, and a further four had a confirmed history of alcohol consumption immediately prior to the fire incident. Alcohol was known to be a factor in 12 of the 20 fatal incidents, including the three multiple fatality incidents.

Cooking practices were not recorded systematically. However in eight of the twenty incidents cases it was believed that the abandoned cooking had involved cooking with oil or fat. In two cases the abandoned cooking utensil was noted to be an aluminium pot. It is probable that cooking with fat or oil, and using aluminium cooking utensils, pose particular fire risks, especially if household occupants have excess blood alcohol. In 14 of the 20 fatal incidents there was no functioning smoke alarm in the dwelling. The presence or absence of a smoke alarm was unknown in the remaining six incidents.

Mavis Duncanson

New Zealand Fire Service Commission Research Report Number 16

ISBN Number 0-908920-59-8

© Copyright New Zealand Fire Service Commission

Cooking, alcohol and unintentional
fatal fires in New Zealand homes
1991-1997

Mavis Duncanson
May 2001

Introduction

This brief report has been compiled for Crown Public Health to support an alcohol safety injury prevention strategy in the Canterbury region, by describing features of fatal fires resulting from abandoned cooking sources in Aotearoa New Zealand from 1991 to 1997.

This reported analysis uses a subset of data collated for a larger project funded by the New Zealand Fire Service Commission Contestable Research Fund. The overall project is collating data from the New Zealand Fire Service, New Zealand Health Information Service, and coronial files to provide a comprehensive overview of fire fatalities in New Zealand 1991-1997.

Acknowledgements

Shaun Stephenson in the Injury Prevention Research Unit, University of Otago, Elizabeth Grieve of the New Zealand Fire Service, and Craig Leahy at the Coroner's Court provided the basic data for this research and were extremely helpful in answering numerous questions. The study was considered and approved by the Wellington, Auckland and Otago Ethics Committees.

Executive Summary

Twenty-seven New Zealanders died in 22 unintentional domestic fire incidents where the heat source was a stove top or oven in the years 1991-1997 inclusive. These deaths represented 14 per cent of the 187 unintentional fatalities in that time frame. Twenty-five of these fatalities occurred in 20 incidents where food left on the stove top or in the oven ignited; these fatalities form the basis of the following descriptive analysis.

The 25 deceased were in all age groups from children to seniors. Rates for males were over two and a half times the rates for females. The excess male deaths occurred predominantly in the 25-64 age group, and the deceased in this age group were predominantly non-Māori. Age-standardised rates for Māori were at least four times rates for non-Māori. Māori fatalities occurred disproportionately at younger ages, with seven of the 11 Māori deceased aged under 25 years.

The number of fatal fire incidents caused by abandoned cooking materials has been relatively constant over time, with between one and five incidents per year. Incidents occurred predominantly in the night or early morning (10 p.m. to 6 a.m.) towards the end of the week. There was no seasonal pattern apparent. Three of the twenty incidents resulted in multiple fatalities; these three multiple fatality incidents all involved deaths of Māori aged under 25 years.

Twelve of the 20 adult deceased lived alone. These were almost all non-Māori males aged 25-64 years. Adults were present in the households where children under 15 years died in fire incidents that resulted from abandoned cooking materials.

Eight of the adult deceased had post-mortem blood alcohol levels in excess of 100mg per 100mls, and a further four had a confirmed history of alcohol consumption immediately prior to the fire incident. In addition there was a history of alcohol consumption by the caregivers of all five children who died in fires caused by abandoned cooking materials. Alcohol was known to be a factor in 12 of the 20 fatal incidents, including the three multiple fatality incidents.

Cooking practices were not recorded systematically. However in eight of the twenty incidents cases it was believed that the abandoned cooking had involved cooking with oil or fat. In two cases the abandoned cooking utensil was noted to be an aluminium pot. It is probable that cooking with fat or oil, and using aluminium cooking utensils, pose particular fire risks, especially if household occupants have excess blood alcohol.

In 14 of the 20 fatal incidents there was no functioning smoke alarm in the dwelling. The presence or absence of a smoke alarm was unknown in the remaining six incidents. Smoke alarms have the potential to alert household occupants or neighbours to the occurrence of a fire, and allow time for rescue or escape. Promotion of smoke alarm installation is a useful component of any fire safety programme.

Recommendations

That community injury prevention initiatives intentionally include Māori, with a focus on raising awareness of the risks associated with cooking, especially in association with alcohol, and on protecting multi-generational households.

That host responsibility programmes include education about providing savoury food to guests or patrons immediately prior to their return home from the social event or bar facility.

That community injury prevention initiatives explore ways to promote cooking practices which are safer, particularly when household occupants have been consuming alcohol. Such safer practices will include alternatives to cooking with fat or oil, and replacement of aluminium pots with stainless steel pots.

That community injury prevention initiatives and host responsibility programmes include promotion, and if feasible provision, of smoke alarms in private dwellings in conjunction with strategies to reduce incidence of home cooking after consuming alcohol.

Objective

The specific objective of the study was to collate existing information from the New Zealand Health Information Service, The New Zealand Fire Service, and coronial files concerning unintentional domestic cooking related fatal fires in New Zealand 1991-1997, and describe personal, fire related, and environmental factors of these incidents with a view to informing health promotion campaigns.

Methods

Fatal fire incidents were identified from Fire Incident Reporting System and New Zealand Health Information Service. Coronial records of the deceased were obtained using name (where available), date of death, and location of inquest.

Coronial records and Fire Investigation reports were searched to assign a heat source and item ignited to the identified fatal fire incidents. Unintentional fatal incidents where the likely heat source was an oven or stove top in the domestic location were included in this study.

Descriptive analysis of unintentional fire incidents in New Zealand homes where the heat source was an oven or stove top, and the item ignited was abandoned cooking materials, included the following factors:

- Age, gender and ethnicity of the deceased
- Time of incident (year, month, day and hour)
- Role of alcohol in incident
- Household composition and dwelling characteristics

Rates were calculated using 1991 and 1996 New Zealand census data and intercensal estimates. Analysis of ethnicity was restricted to the years 1991-1994 because of changes in numerator and denominator data collection methods in 1995 and 1996.

Results

Causes of fatal fires 1991-1997

Twenty-seven New Zealanders died in 22 unintentional domestic fire incidents where the heat source was a stove top or oven in the years 1991-1997 inclusive. These deaths represented 14 per cent of the 187 unintentional fatalities in the same time frame. Verification of ignition sources for all incidents has not been completed so these data should be regarded as provisional. (see Table 1).

Table 1. Unintentional domestic fatalities from fire and flame in New Zealand 1991 - 1997 by probable source of ignition. Data sources New Zealand Fire Incident Reporting System, New Zealand Health Information Service, Coronial files.

Probable source of ignition	Number of fatalities (%)
Heater (electric, gas or other)	35 (19)
Cigarette	31 (17)
Stove top or oven	27 (14)
Smoking materials or candle	25 (13)
Open fire/Solid Fuel burner	14 (7)
Candle	10 (5)
Other electric appliance	8 (4)
Other	5 (3)
Undetermined	32 (17)
Total	187 (100)

Fatalities from abandoned cooking

Two unintentional domestic fire related fatalities in incidents where the heat source was a stove top or oven occurred when the cooking appliance was being used as a heat source. The remaining 25 people died in 20 incidents, described in detail below, where food left on a stove top or in an oven ignited.

Demographic features

The deceased were in all age groups from children to seniors (see Table 2). Over two-thirds (72 per cent) of the deceased were male. The excess male deaths occurred predominantly in the 25-64 age group (see Figure 1). Two fifths of the deceased (44 per cent) were identified as Māori from health data or coronial records. Māori deceased were significantly younger than non-Māori, with seven of the eleven Māori deceased (64 per cent) aged under 25 years. In contrast 86 per cent of nonMāori deaths were of adults aged 25 years or older (see Figure 2), with a predominance of males. Rates were calculated using denominators derived from the 1991 and 1996 New Zealand censuses and intercensal estimates. Māori rates 1991-1994 were calculated using the sole Māori denominator. Comparisons of rates age standardised to Segi's world population showed that rates for males were over two and a half times rates for females (age standardised rate ratio male:female = 2.65 (95%CI 1.11-6.35). Māori rates were significantly higher than nonMāori rates. Although there is uncertainty about the magnitude

of this increased risk for Māori, it is likely to be at least fourfold (age standardised rate ratio Māori:nonMāori = 11.02 (95%CI 4.25-28.56).

Table 2. Demographic characteristics of New Zealanders who died as a result of fire incidents caused by abandoned cooking materials 1991-1997 inclusive. Data sources New Zealand Fire Incident Recording System, New Zealand Health Information Service, Coronial files.

	Number of fatalities (%) n=25	Rate per 100,000 person years
Age group		
0-14	5 (20)	0.09
15-24	4 (16)	0.10
25-34	5 (20)	0.12
35-44	4 (16)	0.11
45-64	4 (16)	0.08
65+	3 (12)	0.10
Gender		
Female	7 (28)	0.05*
Male	18 (72)	0.14*
Ethnicity		
Māori	11 (44)	0.72* [#]
nonMāori	13 (52)	0.06* [#]
Not stated	1 (4)	

* Age standardised rates [#]1991-1994 data only

Figure 2. Age and gender of New Zealanders who died as a result of unintentional fire incidents in New Zealand homes caused by abandoned cooking materials 1991-1997 inclusive. Data sources: New Zealand Fire Incident Recording System, New Zealand Health Information Service, Coronial files.

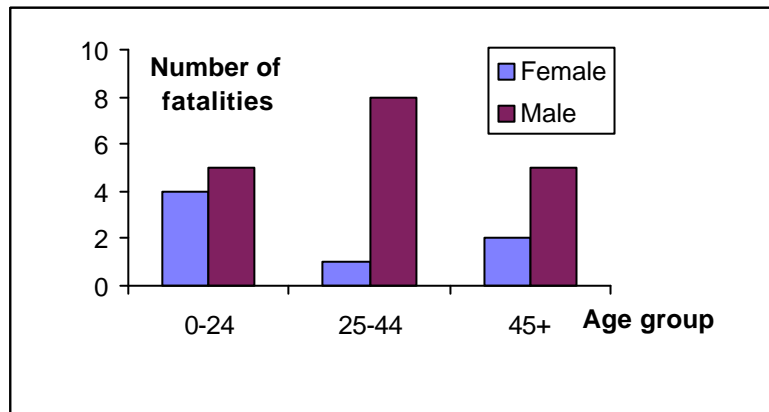
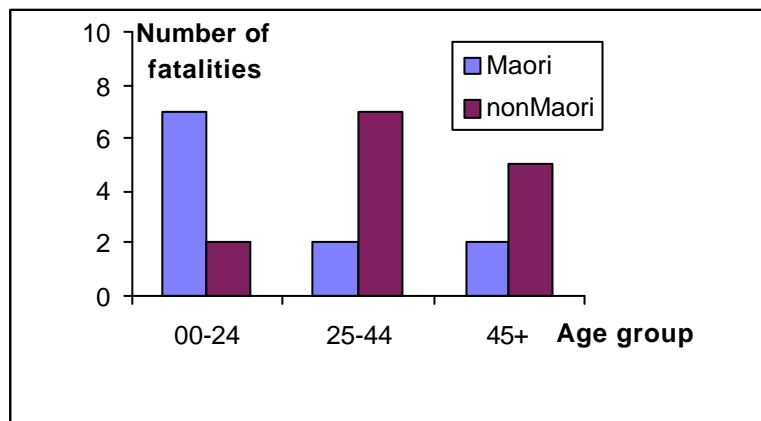


Figure 1. Age and ethnicity of New Zealanders who died as a result of unintentional fire incidents in New Zealand homes caused by abandoned cooking materials 1991-1997 inclusive. Data sources: New Zealand Fire Incident Recording System, New Zealand Health Information Service, Coronial files.



Fatal fire incidents resulting from abandoned cooking

In four incidents the burn injury that led to death occurred in the kitchen after the deceased had temporarily left the room and returned to find ignition had occurred, or was in the room at the time ignition occurred. Such burn injuries were sustained as a result of inappropriate action in dealing with the discovered fire, or to disability limiting capability of containing the fire. In the remaining 15 incidents the deceased were thought to have been asleep at the time of the fire. In 13 incidents the alarm was raised by a neighbour or passer by when the fire was sufficiently established to be obvious from the outside. Three incidents resulted in multiple fatalities. These three multiple fatality incidents accounted for the deaths of eight people, seven of whom were Māori aged under 25 years.

Patterns over time

The number of fatal fire incidents caused by abandoned cooking materials has been relatively constant over time, with between one and five incidents per year (negative test for trend, $p > 0.5$). Thirteen unintentional domestic fatal fires due to abandoned cooking occurred in the spring and summer months (September – February) and seven in the autumn and winter months (March to August). This difference was not, however, statistically significant (RR 1.86: 95%CI 0.94-3.60). Incidents occurred predominantly in the night or early morning, with almost two thirds (65 per cent) of the incidents occurring between the hours of 10 p.m. and 6 a.m. (see Figure 3). In the seven-year time period there were no incidents on a Monday or Tuesday, and between one and six incidents on each day of the week from Wednesday to Sunday inclusive.

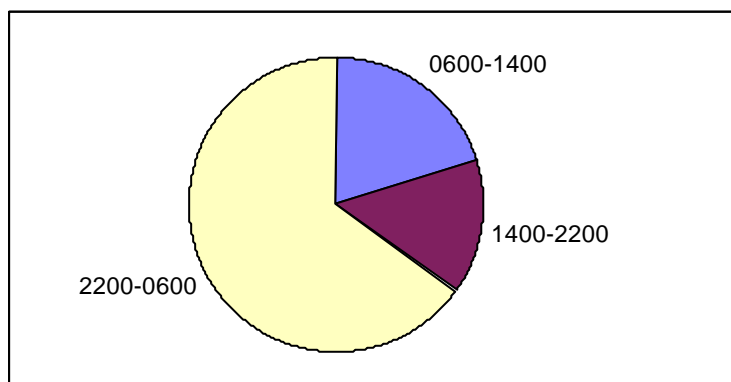


Figure 4 Time of day of unintentional fire incidents in New Zealand homes caused by abandoned cooking materials 1991-1997 inclusive. Data sources Fire Incident Recording System, Coronal files.

Alcohol

Eight of the adult deceased had post-mortem blood alcohol levels in excess of 100mg per 100mls, and a further four had a confirmed history of alcohol consumption immediately prior to the fire incident. Ten of the deceased, including the five children, had no alcohol detected at post-mortem. There was no information about alcohol consumption in the remaining three cases. In addition there was a history of alcohol consumption by caregivers of all five children who died in fires caused by abandoned cooking materials. In total alcohol was directly or indirectly associated with 17 of the 25 fatalities (68 per cent).

Alcohol was known to be a factor in 12 of the 20 fatal incidents. Eleven of these twelve incidents known to be associated with alcohol occurred between 10 p.m. and 6 a.m. Five of

the incidents where alcohol was a factor involved people who lived alone, a further three resulted in multiple fatalities. A common scenario was a person putting food on to cook after returning home late in the evening, and then falling asleep.

Cooking practices

Information about cooking practices was not recorded systematically. However in eight of the twenty incidents overall, and in six of the twelve incidents where alcohol was involved, reports indicated that the cooking material which led to the fire included oil or fat. In two cases the abandoned cooking utensil was noted to be an aluminium pot.

Household composition

Ten of the 20 adult deceased lived alone. Almost all of these were nonMāori males aged over 20 years. Alcohol was known to be involved in five of these cases, and there was no information about alcohol in three cases. Adults were present in all the households where children under 15 years died in cooking related fire incidents.

Dwelling characteristics

Fourteen incidents occurred in single private dwellings, and six in flats or apartments with between two and 40 units. In 14 of the 20 fatal incidents there was no functioning smoke alarm in the dwelling. The presence of a smoke alarm was unknown in the remaining six incidents.

Discussion

Limitations

The numbers are small in this study – with a total of 25 fatalities in 20 incidents over a seven-year period. The study did not control for factors that may be associated with gender or ethnicity, and independently associated with risk of a cooking related fire in the home. One such factor is socio-economic status, which is known to be associated with fatal fire incidence (Duncanson, Woodward, & Reid, 1999). Future analysis will seek to clarify the relative roles of ethnicity and socio-economic status. Caution must therefore be used in interpreting the figures in this report. Nevertheless trends can be observed and can inform prevention strategy.

Key observations

Ethnicity

Previous studies have shown that overall Māori death rates from fire and flame are between two and five times the rate for nonMāori (Duncanson, Woodward, Reid, & Langley, 2000). Although numbers were small in the present series the excess mortality risk for Māori appears to be higher for cooking related fires than for household fires generally, suggesting that cooking related fires are a particular issue for Māori. A survey in the Bay-Waikato fire region (Thomas, Rayner, & Moroney, 2000) indicated that Māori were less likely than the general population to appreciate the likelihood of fires starting in the kitchen. Over one quarter (27 per cent) of the 300 Māori participants in the survey had experienced a kitchen fire, usually when frying food or having a “boil-up”. Thus fire safety campaigns for Māori need to include dangers associated with cooking, particularly in association with alcohol. Because a high proportion of the Māori deceased were aged under 25 years, a household rather than simply individual focus is appropriate.

Recommendation

That community injury prevention initiatives intentionally include Māori, with a focus on raising awareness of the risks associated with cooking, especially in association with alcohol, and on protecting multi-generational households.

Alcohol

The strong association between cooking related fatalities and use of alcohol is indicated by direct or indirect involvement of alcohol in 68 per cent of the deaths, and in 60 per cent of the incidents. The use of oil or fat in incidents where alcohol was associated with an unintentional fire death is consistent with the observation that savoury food is craved after alcohol consumption. Including “food for the road” in host responsibility programmes is therefore an appropriate strategy to reduce household fire injury.

Recommendation

That host responsibility programmes include education about providing savoury food to guests or patrons immediately prior to their return home from the social event or bar facility.

Food preparation patterns

The cooking utensils in two incidents were noted to be aluminium pots. Public awareness of the propensity of aluminium to melt and fuel household fires is low. Outdated aluminium pots may also be given to young people who are leaving parental homes to establish independent living arrangements. Despite missing information, oil or fat was being used in at least half of the incidents where alcohol was associated with an unintentional fatal fire as a result of abandoned cooking. Community consultation to develop alternative cooking patterns after alcohol consumption may therefore be of value. For example preparation of food prior to going out and reheating in a microwave oven could be promoted (personal communication, Rau Hoskins, IRI, Auckland University, November 2000). Similarly it may be possible to encourage replacement of aluminium pots with safer stainless steel products through hotel-based product promotion initiatives.

Recommendation

That community injury prevention initiatives explore ways to promote cooking practices which are safer, particularly when household occupants have been consuming alcohol. Such safer practices will include alternatives to cooking with fat or oil, and replacement of aluminium pots with stainless steel pots.

Smoke alarms

The absence of smoke alarms was noteworthy in this small series. A 1998 survey found that 65 per cent of New Zealand households reported having at least one smoke alarm (CM Research, 1998). Although the data for the reported study was from an earlier time the affected households appear to represent a less well protected group in society. Even if the prevalence of smoke alarms was 40 per cent it would have been expected to find functioning smoke alarms in eight of the homes in this study. New Zealand surveys and overseas studies have shown that socio-economically deprived households, and ethnic minorities are less likely to have smoke alarms installed (CM Research, 1998; Duncanson, Lawrence, & Simpson, 2000; Duncanson, Lawrence, Simpson, & Woodward, 2000; Roberts, 1996). In the event of an unintentional fire the presence of a smoke alarm is associated with a lower risk of death, even when the occupant is living with disability (Marshall et al., 1998). Even if the occupant is not roused by a smoke alarm signal, perhaps because of disability or recent alcohol consumption, the signal may alert a passer by to the occurrence of a fire. In a follow-up survey, after the Auahi Whakatūpatō fire safety intervention programme in Eastern Bay of Plenty, seven of the 437 respondent households reported a potential fire incident which was avoided because of a presence of a functioning smoke alarm. In two of these cases the alarm signal was heard by a neighbour who rescued the occupant or alerted the Fire Service (Duncanson, Lawrence, Simpson, & Woodward, 2000).

Recommendation

That community injury prevention initiatives and host responsibility programmes include promotion, and if feasible provision, of smoke alarms in private dwellings in conjunction with strategies to reduce incidence of home cooking after consuming alcohol.

References

- CM Research. (1998). *Fire safety survey* (Confidential). Wellington: New Zealand Fire Service.
- Duncanson, M., Lawrence, K., & Simpson, J. (2000). *Process and outcome evaluation of Auahi Whakatūpato smoke alarm installation project in the Eastern Bay of Plenty 1997-1999*. Wellington: New Zealand Fire Service Commission.
- Duncanson, M., Lawrence, K., Simpson, J., & Woodward, A. (2000). *Follow-up survey of Auahi Whakatūpato smoke alarm installation project in the Eastern Bay of Plenty* (Research Report number 7). Wellington: New Zealand Fire Service Commission.
- Duncanson, M., Woodward, A., & Reid, P. (1999). *Social and economic deprivation and fatal unintentional fire incidents in New Zealand* (Research Report number 5). Wellington: New Zealand Fire Service Commission.
- Duncanson, M., Woodward, A., Reid, P., & Langley, J. (2000). Unintentional house fire deaths in New Zealand 1991-1998. *New Zealand Public Health Report*, 7, 31-33.
- Marshall, S. W., Runyan, C. W., Bangdiwala, S. I., Linzer, M. A., Sacks, J. J., & Butts, J. D. (1998). Fatal residential fires: Who dies and who survives? *Journal of the American Medical Association*, 279, 1633-1637.
- Roberts, I. (1996). Smoke alarm use: prevalence and household predictors. *Injury Prevention*, 2, 263-265.
- Thomas, P., Rayner, K., & Moroney, M. (2000). *Determining effective fire safety strategies for Māori* (Research Report 2). Wellington: New Zealand Fire Service Commission.