

Fire Research Report

A Review of Existing Fire Safety in Homes

CRESA

March 2009

This research aimed to contribute to a reduction in the incidence and consequences of unintended fires in New Zealand households by estimating the prevalence and characteristics of risk factors across a range of dwellings and household types. These findings provided a basis for developing practical risk assessment tools and delivery mechanisms for typical and hard-to-access households.

New Zealand Fire Service Commission Research Report Number 88
ISBN Number 978-1-877349-81-2 (on-line)
ISBN Number 978-1-877349-80-5 (paperback)
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A REVIEW OF FIRE SAFETY IN EXISTING HOMES

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Social Assessment (CRESA)**

March 2009

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ACKNOWLEDGEMENTS

Many people provided us with assistance in this research, especially in the development of the two household fire safety assessment tools. In particular, we would like to thank the following New Zealand Fire Service personnel for their assistance and enthusiasm for the project: Neil Challands, Bruce Cole, Richard Collins, Stuart Law, Simon Quirke and John Sutherland. We would also like to thank Colleen Wade (QStar Solutions Limited and formerly BRANZ) and Amanda Robbins (BRANZ) for their technical input; BRANZ for generously providing access to the HEEP data and the *Ageing in Place* research team, for allowing us to both add fire risk related questions to the national survey and in-depth interviews and access the complete data sets.

EXECUTIVE SUMMARY

1. Introduction

This research aimed to contribute to a reduction in the incidence and consequences of unintended fires in New Zealand households by estimating the prevalence and characteristics of risk factors across a range of dwellings and household types. These findings provided a basis for developing practical risk assessment tools and delivery mechanisms for typical and hard-to-access households.

2. Research Methodology

Quantitative and qualitative data were collected through leveraging off two surveys and a number of case studies funded from other sources. These included: a national telephone survey of 1,600 older people and five community-based cases studies involving 122 households as part of the *Ageing in Place* research programme; and 394 urban and rural dwellings monitored as part of the Household Energy End-Use Project (HEEP). Research tasks included working with research teams carrying out the aligned research to develop and pilot fire risk-related questions; synthesis and analysis of data from these aligned projects; design and development of two domestic fire risk assessment tools; and identification of practical delivery mechanisms for the tools. New data was collected about sources, abundance and type of ignition sources; deferred repairs and maintenance that increase fire risk (e.g., loaded wiring systems, inadequate entry and exit ways); home heating and other systems that pose an elevated fire risk; and typical housekeeping practices that pose a risk of fire.

3. Research findings

Findings from the *Ageing in Place* telephone survey and in-depth interviews remind us that, as people age, they become more vulnerable to fire risk. They become more isolated, often live in dwellings of potentially diminishing physical quality, and anticipate declining ability to do any maintenance work themselves.

Older people are concerned about safety, but that concern is almost entirely focused on access and moving around inside and outside the dwelling. For instance, alterations and renovations are most likely to involve installation of grab rails and other mechanisms to prevent falls and aid movement around the interior and exterior of the dwelling, heating installations or bathroom and kitchen upgrades. Electrical rewiring is rare, as is the installation of smoke alarms and other alarm systems, despite the likelihood that at least one in five of their dwellings do not have working smoke alarms.

The HEEP project suggested a link between age of the dwelling and household composition. Amongst the HEEP households, those including people of retirement age are less likely to live in old dwellings, while households with young children are more likely to live in dwellings that are pre-1970.

Dwellings typically have several heating sources, some not in general use. The most common sources of heating available and in use are electric blankets, portable convection heaters, enclosed wood or coal burners/pot bellies, fan heaters and LPG heaters. Heating sources varied by household type and age of dwelling. Households of *retirement aged* people are less likely to have open fires, enclosed wood or coal burners or pot bellies and LPG heaters and more likely to have heat pumps and distributed heating sources such as central heating. Households with *young children* are slightly more likely to have enclosed wood or coal burners/pot bellies but less likely to have open fires.

The older the dwelling, the more likely there will be an open fire. The newer the dwellings, the more likely there will be a heat pump and the less likely there will be a wood or coal burner or pot belly. More than half the HEEP households have a solid fuel appliance available for their use, most commonly an enclosed wood/coal burner.

The most prevalent sources of cooking in use are microwaves and electric ranges. The prevalence of cooking sources is, to some extent, linked to the life stage of the household. For instance, retirement age households are more likely to have (and use) bench top mini-ovens and less likely to have gas hobs. On the other hand, households with young children are more likely to have gas hobs and unlikely to have bench top mini-ovens. Both households with young children and retirement age households are less likely to have LPG barbeques.

4. Integration and discussion of research findings

The three data sets used in this research, coupled with Census data, showed some general trends relevant to fire risk and fire safety.

- *Experience of fire in the home:* Māori are more than twice as likely as other older householders to have experienced an unintended fire in their home. Cooking is the most common cause of reported fires although people reporting fires are more likely to live in older homes (pre-1970) and more likely to rely on wood as their main fuel source. These findings support the Fire Service's 'don't drink and fry' and 'take care with naked flames' fire safety messages as well as the importance of targeting vulnerable groups such as Māori, older people, and households in older dwellings.
- *Smoke alarms and other equipment:* That few people report installing smoke alarms and other fire safety equipment as part of their dwelling repairs, maintenance or renovations may indicate their high prevalence already. It is more likely, however, that fire safety is not a priority for some households.

These results signal the continuing importance of fire safety interventions that target the installation and regular checking of fire safety equipment.

- *Escape plans:* Although home owners are significantly more likely to have an escape plan than renters, around one in two do not. The Fire Service still needs to provide messages about the importance of escape plans and their practice. Important target audiences include renters and those in apartment blocks. There may be some value in joint fire safety interventions involving the Fire Service and major rental providers such as the Housing New Zealand Corporation and Territorial Authorities.
- *Type, age and condition of dwelling:* While most people in New Zealand live in separate, single-storey houses, the proportion living in ---PDFBREAK--- dwellings joined to another dwelling (e.g., flats, units, townhouses, apartments or houses joined together) is increasing, especially in Auckland and Wellington. New Zealand's housing stock is generally old; one estimate shows 54 percent of all dwellings were built before 1970. The surveys and interviews showed that the older their dwellings, the more people were concerned about their condition and future maintenance. There is some international evidence of a link between fire risk and the physical condition of dwellings, with age of dwellings one, albeit, incomplete, indicator of dwelling condition. Characteristics of older houses that potentially pose fire risk include: the construction materials, physical condition (including electrical wiring) and heating systems.
- *Family formation and household composition:* Trends such as more one-parent families, fewer children in each family, more blended families, healthier and longer old age, and more people choosing to live alone are changing the size and composition of households. Household size is gradually decreasing; the age profile of households is increasing; the number of households is increasing; and dwelling size is increasing. These changes mean a growth in households identified as vulnerable, including older people living alone and one-parent households. Other vulnerable households include those with children and older people, as well as Māori households and those that are renters. Links between age of dwelling and household composition may compound the risk for some of these vulnerable groups. Although there has been little analysis of age of dwelling by household composition, this research provides some insight. It suggests that families with young children are more likely to live in older dwellings. Conversely, the older people are, the more likely they are to live in newer homes. These insights signal the importance of fire messages that target older people living alone; and highlight the fire risk associated with older dwellings and the value of up-grades that improve the physical condition of dwellings (e.g., replacing older wiring and older internal wall linings).

- *Home heating:* Fire risk is linked to some types of domestic heating sources. These, in turn, are linked to the age of dwellings and to household composition. Research results suggest there are more enclosed wood or coal burners/pot bellies and open fires in older homes and heat pumps in newer homes. Older people are more likely to live in newer dwellings and are more likely to be using heat pumps and other distributed heating sources. Households with young children are more likely to be in older dwellings and use enclosed wood or coal burners/pot bellies. These results signal a need for fire safety messages targeted to people living in older dwellings and addressing the particular risks from some heating sources, building materials and condition of the dwelling.
- *Cooking sources:* Many fires originate in the kitchen. The prevalence of different cooking sources is, to some extent, linked to the age and life stage of householders rather than to the age of the dwelling itself. The most prevalent cooking sources in use are microwaves and electric ranges. Particular types of cooking sources are used more (or less) by particular age groups. For instance, retirement age households are more likely to have (and use) bench top mini-ovens but they are less likely to have gas hobs. On the other hand, households with young children are more likely to have gas hobs and unlikely to have bench top mini-ovens. The pattern of cooking source prevalence signals a need for any fire safety messages that relate to types of cooking sources to be targeted to particular age groups rather than to particular dwelling types.

5. Domestic fire safety assessment tools

Research findings informed the development of two risk assessment tools and delivery mechanism for typical and higher risk homes – one for typical households within which people could be assumed to be sufficiently motivated to complete a fire safety assessment of their own dwellings and one for higher risk and hard-to-access households. The latter tool (still at a preliminary design stage) was developed for vulnerable and hard-to-access households that are assumed to be less likely to be motivated to locate and use a self-complete assessment tool. This tool was developed for administration by a range of home assessment specialists already working with higher risk households.

The content of the tools reflects identified fire risk factors for domestic dwellings, including a range of interrelated behavioural, demographic and dwelling factors associated with the occurrence of fires and the appropriateness of people's responses to them. Risk areas that the tools focus on include the following:

- Dwelling details including type, condition (including wiring), tenure, use of other spaces for sleeping, heating sources and use of naked flames
- Household details including the number of people and their ability to respond to fire messages appropriately (e.g., because of any impairments)

- Risk behaviours such as smoking, cooking while drinking, people and items positioned close to heating sources, and care of fire sources and ash disposal
 - Fire precautions such as smoke alarms, escape plans and clear access ways.
- The two fire risk assessment tools were developed in a two-phased, iterative approach. The first phase focused on the development of an assessment tool that reflects the identified fire risks, while the second phase focused on developing a tool for higher risk and hard-to-access households. The second phase was initiated in response to issues raised during the development of the first tool.

A review of a wide range of household safety assessment tools and field experience showed the value of the internet as a delivery mechanism for the assessment tool. The potential advantages a web-based tool included: the reach to a wider range of households; the opportunity to provide targeted advice to respondents; cost effectiveness; and opportunities to provide incentives to respondents, for instance through a rating system embedded in the tool.

Disadvantages of the internet as a delivery mechanism were also identified, and these provided the impetus for developing a second assessment tool for hard-to-access households. The main disadvantage of a web-based assessment tool is that it is likely to be activated and completed only by people already motivated to look for ways to assess and improve their fire safety at home. The research process identified professional groups already carrying out assessments of home safety as potentially useful partners for the Fire Service as it looks for ways to reach more hard-to-access households. Those professionals include occupational therapists, district nurses, social workers, and other health and social service providers. The research confirmed that the clients of these professionals are often concentrated in the higher risk households.

The self-complete household fire safety assessment tool was designed to provide opportunities to trigger advice to householders, usually depending on how they respond to questions. The fire safety checklist for professional assessors could complement the check lists they already use. The fire safety checklist needs further development in further consultation with a range of assessment professionals.

6. Discussion and critical issues

The research findings and review of Fire Service public awareness resources provides a basis for some preliminary evaluation of the relevance of Fire Service interventions. These research processes provide further evidence of the importance and relevance of the following:

- Fire safety messages that address known fire risks, such as 'don't drink and fry'; 'always watch your cooking'; 'take care with naked flames'; 'take care in disposing of smoking debris' and 'dispose of ashes from wood burners and fires safely'.

- Targeting of particular messages to particular *at-risk* groups, for instance targeting 'careful smoking' messages to Māori; 'always watch your cooking' messages to both older people and young men; 'care around open fires and wood burners' messages to people in older houses; and escape planning to people living on their own.
- Fire safety interventions that target the installation and regular checks of smoke alarms, especially to renters and landlords.
- Fire safety messages that promote escape plans, including ensuring that all people living on a property are aware of the escape plan and that they regularly practise the escape procedures, especially to renters, people with outbuildings in which people sleep, older people, and people in multi-dwelling buildings (single and multi-storeyed).
- Developing fire safety messages that address the particular risks associated with living in old dwellings and the value of up-grades to the dwelling that address both comfort and safety – for instance, replacement of wall linings and external cladding, rewiring, and taking care with heating sources based on naked flames.
- Linking policy and programmes relating to home comfort and safety, including home maintenance, with initiatives to reduce domestic fire risk.

1. BACKGROUND

1.1 Introduction

This research aims to contribute to the reduction of the incidence and consequences of unintended fires in New Zealand dwellings by estimating the prevalence and characteristics of risk factors across a range of dwellings and household types, as a basis for developing practical risk assessment tools and delivery mechanisms for both typical and higher risk homes. These tools will complement existing public awareness interventions that are typically not taken up by high risk and hard-to-access households (e.g., those not linked to community services, not identified as high risk, etc).

The research provides a basis for on-going measurement of factors contributing to fire risk, including the number, type and safety of ignition sources, the flammability of building materials, and the fire risk posed by typical housekeeping and maintenance practices in a range of dwellings, including those of older people.

1.2 Research Objectives

This research was designed to enable the New Zealand Fire Service (the Fire Service) to form an evidence-based opinion as to the fire safety aspects of typical New Zealand homes. The research provides the basis for measuring factors contributing to fire risk, especially the abundance and safety of ignition sources, the flammability of building and furnishing materials and the risk of fire posed by typical housekeeping practices. The objectives of this research are:

- to establish a practical, efficient and replicable method and process to review fire safety in existing homes that takes account of diversity in home modifications, heating, and housekeeping practices;
- to establish baseline data from which to develop a robust fire risk assessment tool and delivery mechanisms;
- to assess the actual prevalence and characteristics of fire risk factors in a sample of typical and higher risk dwellings and households.

1.3 Background

The links between factors contributing to domestic fire risk and factors contributing to dwelling comfort and safety (particularly those relating to energy efficiency and sustainability) are not fully understood. However, it is recognised that some energy inefficient building materials and furnishings, heating, lighting and cooking sources, and other factors relating to the physical condition of

dwellings, along with the quality of dwellings, contribute to fire risk (Wade, Duncanson, O'Dea and Duncan, 2003). These include lathe and plaster wall lining, open fires, non-flued gas heating, cooking and lighting using open flames, and faulty and / or overloaded electrical appliances and wiring systems.

In addition, household-related characteristics such as socio-economic status and household composition are implicated in increased vulnerability to fire risk. Many of these characteristics are also indicators of poor home comfort and safety. For instance, older people are particularly vulnerable to both fire risk and poor home comfort and safety. A number of Fire Service Research projects have demonstrated older people's higher risk of being the victim of a domestic fire, with injury or death as a result (Heimdall Consulting, 2007; Duncanson *et al.*, 2001, NIU Development Inc, 2006; International Research Institute for Māori & Indigenous Education, 2001; Thomas *et al.*, 2000; University of Otago, 2000; New Zealand Council for Education Research 2000; CM Research, 2000). Older people are also vulnerable to poor house conditions and inadequate repair and maintenance investments and practices. These factors not only have implications for the health and wellbeing of older people but also potentially compound their heightened fire risk, given factors such as their physical frailty, indecisiveness and lack of awareness of risk.

Households characterised by overcrowding and economic disadvantage are also vulnerable to both fire risk and poor home comfort and safety. For instance, the University of Otago (2000) traced links between social and economic deprivation and fire incidents; Duncanson (2001), Duncanson *et al* (2000, 2001) and Lloyd and Roen (2002) have shown the links between fire risk and variables such as demographic characteristics and behaviours and household composition; and CM Research's study (2000) showed the influence of individuals' understandings and views on fire safety. Research also shows the link between social and demographic characteristics and levels of household energy efficiency, investment in housing maintenance and other factors that contribute to home comfort and safety.

The commonality in risk factors suggests some logic in linking policy and programmes relating to home comfort and safety, including energy efficiencies and sustainability, with initiatives to reduce domestic fire risk. This research provides a basis for building those links in practical ways by developing household fire safety assessment tools and identifying practical delivery mechanisms.

1.4 Methodology

This research is based on the collection of quantitative and qualitative data through leveraging off two surveys and a number of case studies funded from other sources; synthesis and analysis of data from these aligned projects; the

design and development of two domestic fire risk assessment tools; and the identification of practical delivery mechanisms for the tool.

The research process involved integrating data from three research projects including:

- A national telephone survey of 1,600 older people
- Five community-based cases studies involving 122 households of older people; and
- The Household Energy End-Use Project (HEEP).

These household surveys and case studies were expanded to collect data about:

- sources, abundance and type of ignition sources;
- deferred repairs and maintenance that increase fire risk (e.g., loaded wiring systems, inadequate entry and exit ways);
- home heating and other systems that pose an elevated fire risk; and
- typical housekeeping practices that pose a risk of fire.

The Aligned Projects

The **Ageing in Place Project** is motivated by recognition of the need to assess the ability of older people to keep their homes safe and comfortable, given indicators of their vulnerability. Two research tasks, including a survey and in-depth case studies, focus on identifying house condition and repairs and maintenance practices of older people.

- A **national telephone survey** of 1,600 older people is based on a random stratified sample that identifies people who are older (75+ years) and younger (65-74 years). The survey was based around people's perceptions of how their house works for them, and performance such as thermal comfort, energy efficiency and water efficiency. The telephone survey was extended to include questions about ignition sources, fire safety interventions in the home and housekeeping practices.
- **Five case studies** in four locations (Waiheke Island, Sandringham, Kawerau and Marlborough) and amongst Chinese households¹ involved in-depth interviews with a total of 122 households about their: dwellings; social, kin and neighbourhood supports; and repair and maintenance practices. Interviews were face-to-face and combined semi-structured conversational interviewing with structured questionnaires. The interviews were extended to gather data on typical housekeeping practices that pose a risk of fire (e.g., cooking, home heating, smoking, clothes drying, use of electric blankets, etc).

The **Household Energy End-Use Project (HEEP)** is a long-term monitoring project carried out by BRANZ. The data collection started in 1995 and finished in 2005. Each dwelling included in the study was monitored for about 11 months.

¹ This Asian community is one of the fastest growing in New Zealand (the proportion of Asians in Auckland City, which includes Waiheke and Sandringham, is greater than Māori and Pacifica). However, there has been little, if any, research focusing on fire risk in this community despite householders needing to adjust to unfamiliar housing types, cooking and heating technologies, etc).

BRANZ provided access to the data from this study, particularly that relating to household composition and home ignition sources.

Research Tasks

The research tasks involved in collecting, analysing and integrating data from these aligned research projects are described below:

- Gap analysis of the survey and interview instruments for the aligned research projects to identify current fire risk-related questions.
- Identification and design of supplementary questions to identify abundance and safety of ignition sources; electrical faults; flammability of building materials; fire alarms and other fire safety equipment and activities; potential difficulties with entry or exit to the dwelling; and other fire risk factors identified in consultation with BRANZ, the Fire Service and other technical advisers.
- Piloting of new survey and interview questions.
- Training of interviewers in tandem with the teams carrying out the related research activities.
- Data analysis and synthesis, including content analysis of open-ended questions and interview data and coding for any quantitative analysis; bi-variate and multi-variate analysis of fire risk-related data; synthesis of demographic, fire risk and other home comfort and safety data to identify links.
- Conducting a technical workshop to review findings and community input, determine the critical risk factors and identify implications for the design of two domestic assessment tools. Participants included BRANZ technical experts (building materials, flammability, etc) and Fire Service personnel.
- Design of two risk assessment tools and delivery mechanisms options, based on research findings and workshop outputs.
- Trialling the risk assessment tools and delivery mechanisms.

1.5 Report Outline

The rest of the report is structured around the following sections:

- Research findings from the three data sources
- Integration and discussion of these research findings
- The domestic fire risk assessment tools and delivery models, including a description of their development
- A discussion of the findings and implications for Fire Service interventions.

2. AGEING IN PLACE NATIONAL SURVEY AND IN-DEPTH INTERVIEWS

2.1 Introduction

This section of the report summarises findings from two related data collection processes as part of a FRST-funded research programme *Ageing in Place: Empowering Older People to Repair and Maintain Safe and Comfortable Houses in their Communities*. This research programme is designed to establish the extent to which older people's dwellings are repaired and maintained, and the ways in which older people can be assisted to improve the performance of their dwellings. Improving the performance of the dwelling could also reduce fire risk. Dwelling condition is linked to a number of factors identified as fire risks. These include socio-economic status, residential location, tenure, household composition and ethnicity (University of Otago, 2000 and Heimdall Consulting, 2005). Also, some aspects of repairs, maintenance and modifications can contribute to fire safety. For instance, gypsum, paper-faced plasterboard wall linings provide better fire protection than older lining such as lathe and plaster and re-wiring can reduce electrical fire hazards. Research in the United Kingdom suggests that poor housing quality and condition is also an independent fire risk. For instance, the 2002/3 British Crime Survey found a link between poor physical condition of dwellings, a lack of smoke alarms and fire risk.

These data collection processes provide an insight into the condition of New Zealand dwellings within which one vulnerable group, people over 60 years of age, reside and the extent to which this age cohort is making repairs and alterations that could improve their fire safety. The first data collection process is a survey of 1,600 people of 65 years and over living in their own or rental dwellings (i.e. not rest homes). This survey was conducted in July 2008. The sample provides a 95 percent confidence level. The second data collection process includes 122 in-depth interviews that were carried out with householders over the age of 60 years. These were completed in January/February 2009. Together, these data collection processes provide an insight into the following:

- personal and household profile
- type and age of house
- suitability of current dwelling and dwelling conditions
- maintenance, repairs, renovations and modifications made
- perceptions of safety in the home and steps to make improvements, and
- sources of information for decision-making around home maintenance and modifications.

2.2 Research Findings

Personal and Household Profile

Of those participating in the national survey, most (75%) were in the 65-74 years age group; twenty-five percent were 75 years or over (of these, 20% were aged 85 years or over). The age profile of those interviewed is a little older - seven percent are aged 60-65 years; 43 percent are aged 65-74 years and the balance are aged 75 years and over. The difference in age profile of the two groups, to some extent, explains differences in the research findings described in this section of the report.

Most of those surveyed are New Zealand European (91%). The next largest groups are Māori (2%), Pacific Island (>1%) and Asian (>1%). The ethnic composition of those interviewed is a little different as the sample included 20 percent of ethnic Chinese origin (to capture their particular experience). A further 61 percent are of European descent and eight percent are Māori.

In the national survey, virtually all (99%) are superannuants, with sixty percent indicating they (or someone else in the household) have other income sources, most commonly related to investments (30%) or paid work (21%).

For 60 percent of the survey sample, their household composition comprises a couple (without children). Twenty-seven percent live alone. Their household profile reflects one of the trends of an ageing society – the increasing number of people living in one-person households, for instance because partners have died or need professional care in nursing homes and hospitals. In the younger group (65-74 years) 23 percent live in one-person households while, in the older group (75 years and over), 40 percent live in one-person households. Those interviewed included a considerably larger proportion who live alone (more than half), which probably reflects their older age profile. Those of European descent are almost twice as likely to live alone as others.

Type and Age of House

Most (89%) of those surveyed live in single or multi-storied detached houses; 66 percent live in detached, single-storey houses and 22 percent live in detached, multi-storey houses. The older group is slightly more likely to live in a single storey dwelling - 72 percent of the older group resides in single storey detached or semi-detached dwellings compared with 70 percent of the younger group. Of the younger group, four percent live in flats or apartments, compared with six percent of the older group. The rest (12%) live, in order of prevalence, in semi-detached single or multi-storey dwellings, purpose-built flats (e.g., ownership flats) and apartments/flats.

The dwelling types of those interviewed is a little different: 14 percent (including most of the Chinese interviewees) live in purpose-built flats.

As with the New Zealand population as a whole, most of those surveyed and interviewed live in older dwellings: 44 percent of those surveyed live in pre-1970 dwellings with a further 29 percent living in dwellings built between 1970 and 1990. The older the respondents, the less likely they are to live in older dwellings. For instance, of the 65-74 years group, 46 percent live in pre-1970's dwellings. Of those 75 years and over, 43 percent live in these older dwellings. Of those interviewed that knew the age of their homes (60% of the total), 56 percent live in homes built prior to 1970.

Most of those surveyed and interviewed own their own homes. For instance, 70 percent of those interviewed own their homes and 23 percent rent from a mix of private landlords and local and central government. Those of European descent are more likely to own their homes (at 97%) than Māori (at 77%). None of the new immigrant Chinese interviewed owns their homes (most of which are purpose-built flats).

Suitability of Current Dwelling

A number of those surveyed saw their home as unsuitable to their needs in some way. For instance, almost one in five indicated an intention to move from their current dwellings in the next 12 months. Their expected moves reflect a wider propensity amongst New Zealanders as a whole to change dwelling on a fairly regular basis. For instance, the 2006 Census of Dwellings and Households shows that only 37 percent of people lived at the same address as that they were in five years previously (at the time of the 2001 Census). Overall, 18 percent of the respondents in the national survey expect to move. However, results suggest that people's propensity to move reduces slightly with age – 17 percent of the older group expect to move in the next twelve months compared with 20 percent of the younger group.

Survey results show that people's reasons for moving change as people age. Overall, the desire for a smaller property (39% of those intending to move) is the most common motivation to move, followed by ill-health, old age or poor health (22% of those intending to move). Thirty percent of the older group, however, expects to move because of ill-health, old age or poor health, followed by the wish for a smaller property (29%) and a move to a retirement village (11%).

Dwelling Condition and Heating and Lighting

Research suggests a link between the physical condition of dwellings and fire risk both as an independent risk factor (Ford, 2004) and because dwelling condition is related to other fire risk factors such as socio-economic status, the lack of working smoke alarms and tenure. Both the survey and the interviews provide insight into the physical condition of respondents' homes by collecting data about their perceptions of the condition of their homes; and the types of repairs and modifications carried out over the previous twelve months and needed in the future.

In general, the householders surveyed consider their home to be in excellent (46%) or good condition (43%). Similarly those interviewed are positive about the condition of their dwelling although less so than those surveyed. This difference may reflect the data collection process – people in face-to-face interviews (especially those that take place in their homes) may feel less able to avoid reporting the shortcomings. Around one in four judge the condition of their dwellings as excellent, 45 percent as good and 25 percent as average. Only a very small percent judge the condition of their dwelling as poor.

Several factors seem to influence people's views about their dwelling condition and need for repairs and maintenance. Those in newer (that is post-1991) dwellings are more likely to judge them as excellent while, conversely, those in pre-1920 dwellings are more likely to view them as in average or poor condition. Of those surveyed, a larger proportion of the older group anticipate needing some maintenance (albeit most commonly of a minor nature) in the next 12 months. Fifty-seven percent see their homes as needing maintenance, compared with 53 percent of the younger group.

There are also identified links between fire risk and some sources of heating and lighting. The use of naked flames, for instance for cooking, heating, lighting, ambiance (e.g., candles) and smoking, is an identified fire risk. The interview results suggest that older people are more likely to use electricity as their main energy source: 55 percent used electricity. However, gas (at 15% of interviewees) and wood (at 5% of interviewees) are still relatively common. Also, both those surveyed and those interviewed have householders who smoke in the house (7% and 11% respectively). More than one in three Māori interviewees report having someone in the household who smokes inside compared with less than one in eight of those of European descent.

Repairs, Maintenance, Modifications and Renovations

Among those surveyed, the most commonly cited maintenance carried out over the past twelve months was exterior and interior painting. Installing heating, in the form of wood burners, pellet burners or heat pumps (at 2.7%) was also comparatively common, followed by insulation (under-floor, ceiling or wall), which was identified by 1.3 percent, 1.9 percent and 0.9 percent of the sample respectively.

Seventy-one percent also reported having remodeling or retrofitting their homes over the previous twelve months to improve their suitability. Again, the most common changes were the installation of a wood burner, pellet burner or heat pump, especially amongst the older group (11% compared with 9% of the younger group). Data regarding heat sources (discussed later) suggest that older people are installing heat pumps rather than wood or pellet burners. A small percentage of respondents also installed insulation, usually ceiling insulation (3%), followed by under-floor (2%) and wall (1%) insulation. Installing insulation

was slightly more prevalent amongst the younger group, compared with those 75 years and over.

People were also asked about modifications they had done to the inside and outside of their homes to help make them more accessible or, with reference to fire safety, easier to escape from. The most common inside modifications carried out over their time in the home were, in order of prevalence, installing grab or handrails (7%), building a wet-area shower (5%), widening doorways or hallways (4%) and installing automatic or easy-to-open doors or windows (3%). Installing grab or hand rails is slightly more commonly amongst the older group (9% compared with 6%) as is the installation of wet-area showers (6% compared with 5%), audio warning devices (1.5% compared with .5%), and emergency call systems (1.7% compared with .3%). Only eleven people report carrying out full or significant rewiring, despite the fact that many of those surveyed (44%) live in houses built before 1970.

People had also made outside modifications to improve the accessibility of their homes. The most common modifications were to create easy-to-get-at driveways, ramps or street level entrances (8%), installing handrails at steps or doorways (5%) and modifying garages or carport ramps to meet disabled needs. The installation of handrails was more prevalent amongst the older group (8% compared with 4%), while creating easy-to-get-at driveways, ramps or street level entrances were more prevalent amongst the younger group (8% compared with 6% for the older group).

The in-depth interviews provide a basis for collecting more detail about home maintenance and renovations. As with those surveyed, maintenance carried out in the homes of those interviewed usually involves things that make their homes more accessible and easier to negotiate safely. The most common internal changes are installation of grab or handrails (around one in four have installed those), particularly in bathroom areas. Similarly, external maintenance most commonly includes installation of handrails on steps or at the doorway (18%). Twelve percent of those interviewed have also modified or renovated their homes, usually replacing bathroom and kitchen fixtures and fittings. For a very small number, the renovations include rewiring (3 households) or, more frequently, re-plumbing (8 households). All those rewiring their houses feel safe in their homes and have an escape plan.

The different work carried out by the two groups (those surveyed and those interviewed) may be explained by the different age profiles – the older interviewees are more concerned about safety than the slightly younger survey respondents.

Almost one in four of those interviewed still consider they need special modifications to their dwellings to make them suitable and safe. The most

commonly identified future requirements include grab or handrails and wet-area showers.

People surveyed and interviewed are heavily reliant on informal sources of information for their home repairs, maintenance and modifications. Amongst those surveyed, other than trades-people (approached by 46% of respondents) people rely on their own experience (26%) or the advice of friends (30%) and family (27%). Rarely do they go to independent providers of advice such as BRANZ or building inspectors. Seven percent reported using books, magazines and newspapers. Both the older and younger groups of older people rely on similar sources, although the older group is a little more likely to go to family members than the younger group. Similarly, many of those interviewed do not seek advice from independent sources. If they do seek any advice, the sources are likely to be of an informal, non-specialised nature. Of those who have made repairs, maintenance, modifications or renovations, 44 percent have relied on their own experience or knowledge, sometimes in association with advice from family (37%) or friends (42%). Rarely is external advice sought other than from trades-people (28%). When it is, sources include books, magazines and newspapers (13%), building suppliers (10%) and the internet (8%). In three cases people have sought the advice of needs assessors. As people age, it seems, the more likely they will seek advice including sources external to their family and friends.

Those interviewed were asked to comment on any repairs and maintenance they had carried out. The motivation to carry out any work identified was attributed to four broad factors: the need for a general upgrade or tidy-up, the need to address damage, the need to increase security and safety, and the need to improve their means of heating. Some explained that work was at the instigation of their landlord, some raised issues around costs and payment of repairs and maintenance, and some described repairs and maintenance that were still needed. A selection of their comments is included below:

Need for general tidy up and / or upgrade

- *New range hood over stove. Net curtains. A bit of painting in the kitchen*
- *Repainted all outside of house and garage - was in very bad state. Had new garage door installed.*
- *It was time to tidy it up. We needed to recarpet the whole house, because the carpet was old. So we wanted to repaint before recarpeting. The double glazing was prompted by the cold winter months.*
- *Done heaps! Ceiling in bedroom. Washhouse - took out old toilet, repaired hole in floor, repaired ceiling, put in new pipes, painted it. Kitchen - rebuilt, new cupboards. Re-wired. Bathroom - installed toilet. New flooring - cork tiles. Bedroom - painted it.*
- *Replaced front door - it looked awful, unacceptable as suitable front door. New wardrobe doors in bedroom.*

- *Replaced old drapes because they were faded. Replaced carpet in conservatory because it had faded and was patchy.*

Changes made in response to damage

- *Replace ill-fitting windows. Fixed leaks. Tiles on roof replaced. Replace floor in kitchen.*
- *Leak in the roof fixed.*
- *Re-roofed the carport - was damaged in the storm.*
- *Repaired leak in roof. Replaced carpet in the bedrooms and replaced vinyl in the kitchen and bathroom - had a flood (left taps on).*
- *Roof replaced. Ceiling replaced in one bedroom. New wall panel, new wall paper and new carpet. This was done after the last storm. The room had to be dried out with big blowers.*

Need to increase safety and security

- *New door lock in garage. Security door for house.*
- *Really, in the last 12 months since [she] started getting really sick, I haven't been able to do any repairs and maintenance. I had deadlocks fitted in all doors and windows and also alarmed the main gates and made lockable to prevent my wife from escaping due to her condition. So it was for [her] security. Also, I had to repair the gate that [she] had tried to drive our car through to escape - caused by her condition.*

Need to improve means of heating

- *Got the place insulated.*
- *Snug house in May this year through [work done]. Has really improved the house, much easier to heat, using heating less. Snug homes meant no charge to us - I gave them a bottle of wine and chocolates as I was so happy because I would never had been able to afford that.*
- *Insulation done by Energy Options.*
- *Installed heat pump.*
- *Had a pellet fire installed and an oil burner taken out - it wouldn't go.*
- *Heat lamps in bathroom.*
- *Gas put in 10 years ago. Difficulty getting firewood so swapped for gas.*

Repairs and maintenance instigated by landlord

- *Before I moved in, Housing New Zealand changed wall papers.*
- *HNZC did major renovation last year. Mostly good but a few things not well designed.*
- *Our landlord is very nice. We didn't feel comfortable to ask him to do this, to do that. But he did the repairs for us.*
- *We rang the landlord. He came over and fixed it.*
- *We asked our friend to call Housing New Zealand to replace the oven.*

Costs and payment

- *Not worth spending money when you get old.*
- *A lot of expenses I didn't expect.*
- *The part I had to pay, I got that paid from my iwi (North Island). They provide for health needs.*
- *Insurance covered it.*
- *The long term benefits of doing so far out weigh the initial expensive cost of doing this.*
- *I can't afford to do any repairs because I'm only on a benefit.*
- *Paid by City Council.*

Outstanding repairs and maintenance

- *No heating but going to see about it.*
- *Garage needs repairing.*
- *Repair door.*
- *The steps, no parking and washing machine downstairs really are hard for her here. Increase in rates while roads are bad with pot holes and no parking for her makes her mad.*
- *Part of fence blew down in storm.*
- *In process of getting new wood burner and HRV and heat pump.*

Those interviewed were also asked whether the repair and maintenance work had been useful, particularly with respect to running their house, improved access within and around the home, feeling safer, moving around the house and being able to live independently. Generally, they considered the modifications useful although a number made reference to their potential usefulness in the future (as they age) rather than now. Most commonly they talked about improved internal and external access and better protection against falls. Some also felt the changes allowed them to be more independent although they still valued having people around. Some examples of comments are included below:

- *The rail - only way I can get in and out of the house. Marvellous for us both. My sister also uses it. She is handicapped. One of the better things we have done.*
- *The hand rail at the back door is good.*
- *Don't find the grab rail in the shower useful yet. It's handy for putting my flannel on. In the foreseeable future.*
- *Safer going up back steps.*
- *...the electrical re-wiring of the light switches and the floor mats.*
- *The widened doors make it better for [him] when he's using his walker.*
- *[He] avoids the back door because there is a step and uses the front door because it's flat.*
- *Yes. Good to have help though - someone to talk to.*

Safety in the Home

In general, people become more vulnerable to accidents in the home as they age. Contributing factors include their increasing physical frailty coupled with decreasing confidence, and, for some, their loss of cognitive ability. Their vulnerability is potentially increased by their isolation (for instance, because they live alone and have less connection with their communities) and, in some cases, the design and condition of their dwellings. For instance, amongst the surveyed sample, around one in four has injured themselves by slipping or falling inside or outside of their dwelling in the previous twelve months. This percentage is higher for the older group (at 32%). Three percent have burned themselves from hot water directly from taps.

Despite their ageing, most (60%) of the people interviewed feel safe in their homes. However, 40 percent do not. Sometimes where people live seems to influence their sense of safety, (e.g., whether they feel that the level of crime is high or low). People also spoke about security and fire safety measures they have in place (e.g., security locks, smoke alarms) to improve their security and safety. Typical comments, such as those included below, refer to the safety of their neighbourhood, measures they have taken to improve their safety (including fire safety) and their knowledge and / or experience of crime.

Feelings of safety (including because of the area in which they live)

- *I chose this area because I feel it's safe.*
- *Very very secure. Know neighbours are there.*
- *I don't give it a thought. I've been so long here, I feel at home.*
- *I feel very safe. I always lock the doors. I always ask the LORD to keep me safe too.*
- *... It's a rough area.*
- *Don't feel safe outside even in daytime. NBH not as safe as what it used to be. Got to watch out.*
- *Because it's Waiheke! If I was in town I'd feel like I have to lock everything up, but I don't feel that way here, there is a bit of crime I know but I don't shut the back door.*
- *It's back from the road so it's private. I make sure all doors are locked. I don't know my neighbours on a close basis but I could ring them if I needed to.*
- *This is a court for older people. We don't have many belongings to be stolen....*

Security measures

- *...I feel safe at night since buying the blind for the back door and buying the security door and security lights.*
- *I have got a baseball bat beside my bed to smash the window if there was a fire, or a burglar! The place is locked up like fort Knox when I go out.*
- *...We have a dog, we have smoke alarms, we have safety catches on the windows.*

- *There is a security gate in this building. Anyone who enters this building needs to know someone who lives in this building.*

Fire safety measures

- *... I have a loose escape plan. My exits are out any windows. I have a fire alarm and I check them periodically.*
- *I've thought about what I would do if there was a fire, I'd jump out my bedroom window.*
- *We have got a smoke alarm in every room. Fire brigade put them in free. It would be a bit of a worry upstairs if there was a fire.*
- *The old story, you drop down and crawl out, but haven't really thought about fire.*
- *We put in an extra door coming off our bedroom so we can get outside. It opens outwards and have a safety rail on the landing.*
- *...I have a fire extinguisher...*

Knowledge and / or experience of crime especially burglars or intruders influence feelings of safety

- *We don't walk around neighbourhood after dark. A friend of mine was burgled. His passport and important documents and money were stolen. We don't have much to be stolen. But feel unsafe when we hear about burglaries.*
- *One intruder – [so] put security locks on.*
- *... My family insisted I have a security door because a lady up the road got bashed and robbed in her home in broad daylight.*
- *I don't feel as safe as I used to. There was a 'P' factory that got busted up the road and there's scooters up and down that I feel could take me out on the road. I wouldn't walk down ... at night. In Gulf News always mentioned for crime and problems.*
- *After too many murders in Auckland I felt a bit unsafe at home.*

Other safety concerns/measures

- *As you get older, sometimes you feel not quite so safe. I have to be careful going up and down steps at the back to the clothes line. I am using the clothes horse inside instead of putting clothes on the line.*
- *Both of us have had falls coming into the front of the house...*
- *I have found the water a bit hot and find I have to be careful and control the taps...*

The more isolated older people are, the more vulnerable they are. Most of those interviewed have the potential for neighbourly assistance should they need it. Fifty-seven percent get on very well with their neighbours and 31 percent get on fairly well. However, 10 percent do not really know their neighbours or do not get on with them. Interviewees described what makes for their good and poor neighbour relationships. They often attribute poor relationships to factors like the frequent turnover of neighbours (especially if they are renting) and poor

communication due to language difficulties (for instance, if they are new immigrants). They often attribute good neighbour relationships to their mutual helpfulness. Some also talked about the importance of friendships, for instance made through community organisations such as churches. To older people, however, contacts tend to diminish over time as friends and relations move or die.

Barriers/constraints to good neighbour relationships

- *Although we could not use English to communicate with our neighbours, they are very friendly. We said hello to each other when we come across each other. We did not ask for help from neighbours because we could not speak English.*
- *...Neighbours change a lot.*
- *Our neighbours move in and out frequently. We don't even know who they are.*
- *Hardly ever see them. They do their own thing, I do mine. The distance and age between myself and them gives us no reason to communicate or to visit each other...*
- *Don't know them at all. I'd just like to be able to acknowledge people, but obscured by all the bush and trees in this area so you don't bump into people...*
- *As stated, are relatively new to the area and would like to get to know people better but haven't yet. They think people may be less open due to [her] health and they have foreign accents, "maybe we're a bit different to people."*
- *Two girls on left, renters and not much contact from there. People who rent are less invested in being good neighbours than those who own.*

Mutual helpfulness and / or good relationships between neighbours

- *We visited our neighbours in Christmas. My wife's English is better than mine. She could communicate with our neighbours. When we were in their houses, they turned the Chinese TV programmes on for us. Our neighbours invited us to their houses too. We exchanged ideas how to do gardening.*
- *There are five state houses here. All residents are older people. We help each other and look after each other. We are the youngest. My husband takes up all labour jobs. He trims trees on the driveway. Our neighbours say they are happy to pay for it. But we don't accept any payment because we love to make contribution to this small neighbourhood.*
- *Quite friendly with neighbours but don't pop in. Know neighbours by name and talk a bit. Do things for each other.*
- *Only when there's a need. I always let them know when I'm going to be away and how long for.*
- *Contact with neighbours - talk to one set everyday, over the road - see once a week. Very supportive and concerned about welfare. Help when needed or borrowing/lending. Feel that she could ring them for anything.*

Community organisations provide the means to making friends

- *Have less and less friends. Know neighbours but forget names. Know most of older people around here. Contacts at church mainly.*
- *Friends through St Johns and church.*
- *Never felt part of a family until she moved here and felt accepted by the community.*
- *Daily contact with friends living on the island. Friends live in the streets surrounding [her] house. [Her] engagement in activities brings her into constant contact with her friends also as her music, dancing and walking all involve her friends.*
- *All my friends, my close friends, are in the church....*

Contact with neighbours and friends

- *My friend phones quite often to see how I am. We go to the marae together a lot.*
- *I ring a friend every morning by 8:15. If she doesn't hear from me should be up here to see what was wrong. We help each other. It's a lovely setup.*
- *I feel we see them or meet up with them about the right amount of times.*
- *The older you get the less friends you have - not so much regular contact with others - work, school etc...*
- *I've lost all my old friends, they've all gone. However that's life. I've got an old friend living on the hill, she needs to move on to the flat. There's no nice little rest home for old people in Picton. There's Seaview like a hospital. And Marina Cove is expensive. There used to be a lovely Wesley House for old people there where Marina Cove is now. My son will take me to visit my friends. I have been told I can get taxi tickets, pay - fare - I must do that. I don't want to be ringing up my son all the time to do this and that.*
- *My best friend from school still lives here. The men are dying off and the women are left as widows. Go walking with a friend. The phone always goes. A lot of friends live away from Blenheim.*
- *All long term - just like family. But a lot of friends in Cambridge and a lot of family and friends all over the place like Foxton.*
- *Most friends are in Kawerau and Whakatane. Some have moved from Kawerau to Whakatane.*

Fire Risk and Safety

The proportions of people surveyed or interviewed that reported having had an unintended fire are considerably lower than a 2008 estimate² of 17 percent of households experiencing an unintentional fire in the last 5 years (18% of these were attended by the New Zealand Fire Service). Of those surveyed, five percent reported an unintended fire in their home compared with 11 percent of those interviewed. Of these householders, all were home owners, most judged their home (usually a detached house) as in good condition, and more reported using

² Personal comment based on NZFS annual Fire Knowledge Survey, <http://www.statisphere.govt.nz/StatisticsByAgency/default.htm?mode=ba&aid=39&mid=2971>.

wood as their main fuel source (although the numbers are very small). Almost one in three Māori interviewed report having had a fire, compared with less than one in eight of European descent.

When interviewees further described the fires they had experienced their comments tended to focus on the cause and extent of these fires. Usually the fires were caused by pots and / or pans left on stove tops and damage tended to be smoke-related. In two cases, people referred to neighbours' help in calling the fire service or dealing with the fire.

Comments about causes include the following

- *Fire on stove. Dripping left on hot stove by sister.*
- *Oil in frying pan set alight (flames were hitting the ceiling). Got the fire extinguisher and put it out. Have 2 fire extinguishers.*
- *Earlier this year I left pot on stove and went out. Fortunately I have smoke alarms and I was very lucky....*
- *Electric blanket caught fire. No longer have any electric blankets.*
- *When 15 year old left wood to dry on top of wood stove and it caught light...*

Stories about the damage include the following

- *... Basically was smoke damage - had to repaint and replace the front door because it was broken down by the firemen. So every time I go out now I turn off the stove.*
- *... When I got home, you couldn't see for smoke! We had just completed wallpapering. We had to scrub the house out! Didn't have to call the fire brigade - just caught it in time.*
- *... smoke everywhere. Smoke alarms didn't go off. Fire service check smoke alarms regularly now. Very good service.*

And references to neighbours include the following

- *...The neighbour heard the alarm going and saw smoke coming out the window. The neighbour thought I was at home! So the fire brigade came...*
- *... [she] was next door then and came over when she saw smoke. It was my pot of Kai. She gave me a good telling off too!*

Research participants' recognition of their fire risk varies. Previous research (Warren and Proctor, 2005) found that older people tended to underestimate their risk. One of the identified reasons for their heightened risk was their unquestioning confidence that they could get out of the house easily – because they knew the house layout well. However, very few had explicitly developed an escape plan. Seventy-two percent of those surveyed in the national survey reported having an escape plan (there was little difference between the younger and older groups) compared with only 45 percent of those interviewed. The latter finding, collected through a face-to-face interview process, may be a better indication of prevalence, however, as survey respondents may provide answers they think are more acceptable. Among those interviewed, owners (at 51%) are

more likely to have an escape plan than renters (at 28%), as are those of European descent compared with other ethnicities. Those of Chinese descent (all new immigrants and all in rental accommodation) are considerably less likely to report having an escape plan (at 27%).

Research participants' efforts to improve the fire safety of their homes are patchy. For instance, in a question asking about repairs or maintenance in their homes, only five of the 1,600 surveyed report installing smoke alarms or other fire safety equipment. Their responses may, of course, indicate that smoke alarms are already installed. However, even the positive results of recent research (TNS Conversa, 2006) that shows 88 percent of respondents reported having working smoke alarms would indicate that around 200 of the national survey respondents probably did not have smoke alarms. Other research (Warren and Proctor, 2005) that showed 80 percent prevalence amongst householders visited by Fire Ambassadors (as part of a Fire Service intervention to increase the prevalence of smoke alarms in at-risk households) suggests more than 300 would not have had a smoke alarm. Similarly, only very rarely do those interviewed report installing a smoke alarm or other fire safety equipment as part of their repairs, maintenance, modifications or renovations (although it must be said that most may already have alarms). Those who have installed smoke alarms are slightly more likely to report feeling safe in their homes and have escape plans. None have experienced an unintended fire. Installation of other alarm systems is also rare. Only two have installed visual or flashing alarms (presumably because they have hearing problems) and one has installed an emergency call system. Similarly, of those who still consider they need special modifications to their dwellings, only very small numbers identified a need for visual or flashing alarms (2 people), audio warning devices (3 people) and emergency call systems (3 people).

Summary

Research findings from the *Ageing in Place* telephone survey and in-depth interviews remind us that, as people age, they become more vulnerable to fire risk. They become more isolated: the likelihood of them living alone increases and neighbourhood and community connections diminish. They live in dwellings of potentially diminishing physical quality: like most people in New Zealand, people over 65 years live in older dwellings that require constant maintenance. Although most view their dwellings as currently in satisfactory condition, they also anticipate maintenance needs over the next twelve months and diminishing ability to do any work themselves.

The two data collection processes also show that older people are concerned about safety, but that concern is almost entirely focused on access and moving around inside and outside the dwelling. So hand rails and grab rails are the most common safety addition. Similarly, renovations are more likely to include the installation of heating mechanisms (heat pumps for older people but also wood and pellet burners), internal and external painting and replacing of kitchen and bathroom fixtures and fittings. Electrical rewiring or installation of smoke alarms

and other alarm systems is rare. That so few people have installed smoke alarms as part of their renovations could suggest that they either already had them in the required locations or that any renovations did not require a building consent (as smoke alarms are usually a requirement of the compliance process). Of course, it may also be that respondents do not view smoke alarms as a repair, maintenance or renovation addition (that is, they had installed them but did not report that as part of their repairs or renovation). Most people report having escape plans, but the differently reported prevalence rates between those surveyed and those interviewed suggest that results may reflect data collection methods. Prevalence may be overestimated in data collection processes that are not face-to-face.

3. HOUSEHOLD ENERGY END-USE PROJECT (HEEP)

3.1 Introduction

The Household Energy End-Use Project (HEEP) also provides an insight into the prevalence of critical fire risk factors such as ignition sources and building construction in different dwelling and household types. HEEP is a long-term monitoring project carried out by BRANZ. The data collection started in 1995 and finished in 2005. Each dwelling included in the study was monitored for about 11 months. The final monitoring sample includes 394 dwellings from throughout urban and rural New Zealand.

BRANZ has generously allowed the HEEP data to be used as part of this research.

3.2 Research Findings

Household Composition

The composition of households included in the HEEP project can be characterised in a number of useful ways, including by family and non-family; by life stage; and by size. The HEEP monitoring instrument also allows the household composition data to be compared with Statistics New Zealand's Census data about households.

Households can be described as family and non-family (and family households can include one or more families). A family can be:

- couple-only (with or without other people),
- couple-with-children (with or without other people), or
- one-parent-with-children (with or without other people).

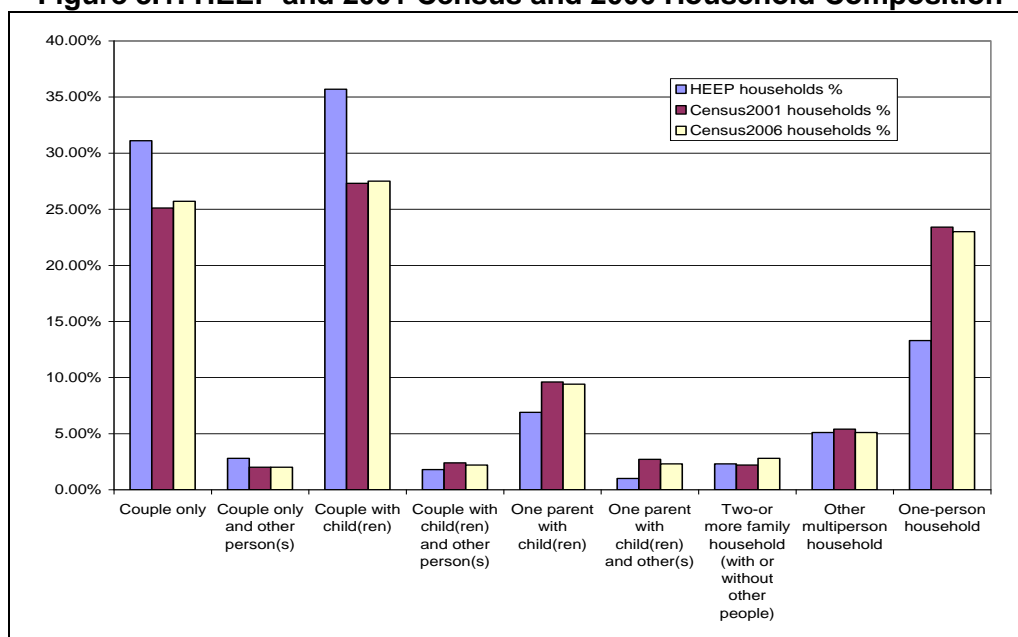
Non-Family households include:

- other multi-person households (groups of related or unrelated people), or
- one-person households.

Family households still dominate in New Zealand as a whole, although (as discussed below) family structure is changing. The 2006 Census shows that 73 percent of all New Zealand households were family households. The proportion of Couple-with-Children (at 30%) families was slightly larger than for couple-only families (at 29%) and larger than one-parent-with-children families (at 13%). The proportion of two or more family households was very small. Compared with households overall, more HEEP households are family households (79% compared with 73%). They include Couple-with-Children (at 36% compared with 30%), Couple-Only (at 31% compared with 29%) and One-Parent-with-Children

(at 8% compared with 13%). Conversely, there are fewer One-Person households (at 13% compared with 23%). See Figure 3.1.

Figure 3.1: HEEP and 2001 Census and 2006 Household Composition



Family structure in New Zealand is changing with trends such as an increasing proportion of single-parent families, fewer children in each family and more blended families. These trends are also evident in other Western nations (Keilman, 2008; Demo and Cox, 2000, Hobbs, 2005). The approach to defining families taken by the Families Commission (which is broader than that of Statistics New Zealand) is one reflection of an increasing acceptance of non-traditional family structures. To ensure that it considers the full range of families and their roles and functions, the Commission's inclusive definition³ includes: groups of people who are related by marriage, blood or adoption (including extended families); people living together as a family; and whānau or other culturally recognised groups. The living arrangements of these families may include: single-household nuclear families; extended families and wider kinship groupings (including whānau, customary family structures in Pacific and Asian communities and other ethnic groups and multi-generational groupings); families dispersed across multiple households; joint and shared child custody arrangements, and 'blended' families.

Life-stage Households

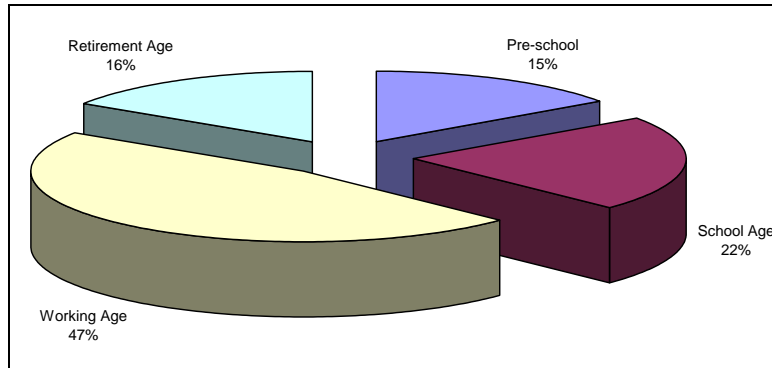
A life-stage approach provides another useful way to describe households and analyse household statistics. Life-stages reflect, at a broad level, how particular age cohorts live their lives (e.g., families with children of different ages, people in their retirement years, people of working age). And life-stage based analysis shows how patterns for particular life-stages stand in relation to those for the

³ See the Commission's website: <http://www.familiescommission.govt.nz/about/index.php>

population as a whole. Figure 3.2 sets out the profile of HEEP households in relation to life-stages associated with the youngest household member. The four life stages are:

- pre-school age (0-4 years)
- school age (5-14 years)
- working age (15-64 years)
- retirement age (65 years and over).

Figure 3.2: Age of youngest HEEP household member



These life-stages are particularly pertinent to fire safety. Households with people over 65 years and those with children are at greater risk of injury or death from fire. Fire fatality statistics show that children and those of retirement age account for over half of all fire fatalities (32% are children/young people aged 0–15 years and 21% are 65 years).

Household Size

In New Zealand, household size is steadily dropping. As Table 3.1 below shows, over a 15 year period (1991-2006), the proportions of one and two-person households have increased while the proportion of multi-person households has decreased. These trends are also evident internationally. In some parts of the United States, one-person households are the most prevalent type (Hobbs, 2005) replacing couple-with-children households. These changes can be attributed to a mix of factors including changes in family structure (including the fragmentation of families into smaller units), fewer children, and the ageing of populations in most developed countries (coupled with increasing longevity). New Zealand statistics bear this out. In 2006, almost a third of those aged 65 years and over lived in one-person households.

As a related trend, the size of households is gradually decreasing. Some reasons for this include marriage breakups (and the formation of new households); smaller families; a healthier more independent retirement-age cohort (including increased longevity); and more people choosing to live alone. There have been slight increases in the proportion of one and two-person households at the same time as households of four or more have either decreased slightly or stayed the

same. One and two-person households comprised 57 percent of all households in 2006 compared with 54 percent a decade earlier.

Table 3.1: Size of households

Number in household	1991 (%)	1996 (%)	2001 (%)	2006 (%)
One-person	21%	21%	23%	23%
Two people	32%	33%	34%	34%
Three people	17%	17%	16%	17%
Four people	16%	16%	15%	15%
Five people	8%	8%	7%	7%
Six people	3%	3%	3%	3%
Seven people	1%	1%	1%	1%
Eight or more people	1%	1%	1%	1%
Total households	99%	100%	100%	100%

Number of Households

Trends that affect the size of households also affect the number of households. As a general trend, in developed countries, the number of households is increasing at a rate that is greater than populations are growing (Menchik, 2002). This is also the case in New Zealand. Census statistics show that, between 1991 and 2006, the total population grew by 19 percent. However, the number of households grew by 23 percent.

Size of Dwellings

Another trend seems counter-intuitive. The size of the dwellings (in room number and floor space) is growing as the size of households shrink and the number of households increases. There are three indicators of this trend: the number of bedrooms, the number of rooms overall, and the overall size of dwellings:

- Census data shows that the number of bedrooms in New Zealand dwellings has steadily increased. In 1996, 77 percent of occupied dwellings had three or fewer bedrooms. By 2006, that proportion had fallen to 72 percent. Conversely, there has been an increase in the proportion of dwellings with four or more bedrooms - from 22 percent in 1996 to 28 percent in 2006.
- There are also increasing proportions of multi-roomed dwellings. The proportion of dwellings in New Zealand with eight or more rooms increased from 15 percent in 1996 to almost 20 percent in 2006. Also, in 2006, 24 percent of one-three member households lived in dwellings with seven or more rooms compared with 18 percent in 1996.
- Houses also appear to be increasing in size. New dwellings have larger floor-plates. The average size of a new house 25 years ago (at just under 110 m²) is just over half the average size of houses in 2007 (at 197 m²).

Two interrelating characteristics of the HEEP dwelling sample mean it does not exactly mirror national trends. As Table 3.2 below shows, one-to-three bedroom houses predominate in the sample and the average floor area is 121 m². Some of these differences can be explained by the older age profile of the HEEP sample (73% were built before 1978, which is a greater proportion than in the total New Zealand housing stock).

Table 3.2: Size of HEEP dwellings

Size of dwelling	Number	%
Fewer than 3 bedrooms	70	17.9
3 bedrooms	198	50.6
More than 3 bedrooms	123	31.5
Total	391	100

^ Three missing cases

Dwellings Profile

There were 1,471,749 occupied private dwellings on Census night in 2006. Most (82%) were separate houses, although the ---PDFBREAK---number of dwellings joined to another dwelling (e.g., flats, units, townhouses, apartments or houses joined together) increased significantly between 2001 and 2006, up 20.1 percent (42,336 dwellings) since 2001. This type of dwelling includes those joined horizontally or vertically. Of the Regional Council areas, Wellington Region had the highest proportion of dwellings joined to other dwellings, at 24.6 percent, closely followed by the Auckland Region at 23.9 percent. The Tasman and Southland Regions had the lowest proportions, both at 8.1 percent.

Of the Territorial Authorities, Auckland City had the highest proportion of dwellings joined to other dwellings, at 37.6 percent, closely followed by Wellington City, at 35.6 percent. Just over three-quarters (76.7%) of separate houses were one-storey and approximately a quarter (23.3 %) were two or more storeys. Approximately one-third (32.9) of joined dwellings were part of buildings that had two or three storeys and 6.5 percent were part of buildings that had four or more storeys.

Across the HEEP sample, most people are living in houses built before the 1991 Building Act. As Table 3.3 shows, 21 percent live in dwellings built in 1949 or before, 29 percent live in dwellings built between 1950 and 1969 and 27 percent live in houses built between 1970 and 1989.

These are some differences, according to life cycle stage, in the age of dwelling people live in. For instance, retirement age households are less likely to live in old dwellings. Households with young children are more likely to live in dwellings that are pre-1970 (57% compared with 50% overall and 48% of older households).

Table 3.3 Age of House

Age	Total	Under 5's	Over 65's
Pre - 1950	20.6%	21.7%	16.3%
1950-1969	29.4%	35 %	31.6%
1970-1989	27.4%	26.6%	33.7%
1990 and newer	13.7%	10%	12.2%

Availability and Use of Ignition Sources

The availability and use of ignition sources (for heating and cooking) are described for the HEEP sample as a whole and as household types. The data provide the basis for both:

- describing the prevalence and use of ignition sources in a sample of New Zealand urban and rural dwellings, and
- comparing the prevalence and use of ignition sources in at-risk households (i.e., those with people over 65 years and those with children) with the whole sample.

Heating sources: The HEEP households were asked to both indicate what sources of heating they had in their dwellings, and which of these sources were in use at the time of the survey. As Table 3.4 shows, on average, each dwelling had 4.4 sources of heating available (including electric blankets). On average, each dwelling had 3.4 heating sources in use. The most common sources of heating available in the dwellings were, in order of prevalence:

- Electric blankets (double)
- Portable convection heaters (e.g. oil column)
- Enclosed wood or coal burners/pot bellies
- Fan heaters
- LPG heaters.

The most common sources of heating in use, in order of prevalence, were:

- Electric blankets
- Enclosed wood or coal burners/pot bellies
- Portable convection heater
- Fan heaters
- LPG heaters.

Comparing heating sources available and heating sources in use in the HEEP sample provides an insight into household heating decision-making. The right-hand column of Table 3.4 below shows what percentage of each heating source available was actually in use across the dwellings. Those most likely to be in use included:

- Solid or liquid fuel fired central heating⁴
- Air conditioners (for heating)
- Gas underfloor heating
- Heat pumps
- In-ceiling/wall insulation
- Reticulated natural gas (unflued) non central
- Enclosed wood or coal burners/pot bellies
- Reticulated natural gas (flued) non central

⁴ However, the numbers of dwellings with solid or liquid fuel fired central heating, air conditioners (for heating), gas under-floor heating, and in-ceiling/wall heating were very small.

- LPG heaters.

Those least likely to be in use included portable kerosene heaters (although the number of dwellings with these was low), followed by:

- Open fires
- Electric blankets: (single)
- Electric radiators (fixed)
- Electric panel heaters.

Table 3.4: Sources of Heating Available and In Use (n=394)

Type of heating	% of dwellings with heating source available	% of dwellings with heating source in use	% of heating source available that is in use
Electric blanket: single	55.6%	36.8%	66.2%
Portable convection heater (e.g. oil column)	55.0%	44.7%	81.1%
Enclosed wood or coal burner/pot belly	53.8%	47.7%	88.7%
Fan heater	48.0%	37.0%	77.2%
Electric blanket: double	41.0%	31.7%	77.6%
LPG	39.3%	33.8%	85.8%
Wall fan heater	25.0%	19.8%	78.8%
Electric radiator (portable)	23.4%	18.0%	77.2%
Open fire	14.5%	9.1%	63.2%
Electric panel heaters	11.7%	7.9%	67.4%
Dehumidifier (used for heating)	11.0%	8.9%	81.4%
Electric radiators (fixed)	9.9%	6.6%	66.7%
Reticulated natural gas (unflued) non central	9.4%	8.4%	89.2%
Electric night store	8.6%	6.9%	79.4%
Electric fan/bar radiator	7.9%	6.3%	80.6%
Reticulated natural gas (flued) non central	6.3%	5.6%	88.0%
Under floor heating (electric)	4.6%	3.5%	77.8%
Heat pump	3.6%	3.6%	100.0%
Gas central heating (multiple rooms)	2.0%	1.5%	75.0%
Air conditioner (for heating)	1.5%	1.5%	100.0%
In-ceiling/wall	1.5%	1.5%	100.0%
Other	1.3%	1.3%	100.0%
Portable kerosene	0.8%	0.3%	33.3%
Solid or liquid fuel fired central heating	0.3%	0.8%	100
Gas underfloor heating	0.3%	0.3%	100%
Total			78.7%

The HEEP data was analysed to identify any differences in the availability and use of heating sources in different types of households and dwellings. The household and dwelling types included: households with young children; households of retirement aged people and dwellings of different ages.

As Table 3.5 below shows, households of *retirement aged* people are less likely to have open fires, enclosed wood or coal burners or pot bellies, and LPG heaters. Conversely, they are more likely to have heat pumps and distributed heating sources such as gas central heating or under-floor heating and solid or fuel fired central heating.

Households with *young children* are slightly more likely to have enclosed wood or coal burners/pot bellies and none surveyed have heat pumps, which are favoured by retirement age households. Like these older households, they are also less likely to have open fires.

Table 3.5: Heating Source

Source	Total households	Households with young children	Households with over 65's
Enclosed wood or coal burner/pot belly	53.8%	55%	42.7%
Open fire	14.5%	8.4%	6.1%
Solid or liquid fuel fired central heating	.25%	0%	1.0%
LPG	39.3%	33.4%	34.6%
Gas central heating (multiple rooms)	2%	0%	3.0%
Gas under-floor heating	.25%	0%	1.0%
Portable kerosene	.8%	1.7%	1.0%
Heat pumps	3.6%	0%	6.1%

Table 3.6 shows differences in heating sources available by dwelling age. Four dwelling age categories were established to match, as much as possible,⁵ the categories that the Fire Service uses in its internal statistical analysis. The Fire Service categorises buildings according to the building legislation applicable at the time of construction (i.e., each break represents a major revision of the Building Act) and construction materials. On the advice of the Fire Service, we have regrouped its six⁶ age categories into four:

- 1945 and earlier (these dwellings have generally been substantially modified)
- 1946 - 1969 (generally have Pinex and hardboard linings)
- 1970 - 1991 (largely gypsum plasterboard linings)
- 1992 onwards (post the 1991 Building Act and gypsum plasterboard linings)

The best match possible from the HEEP data to compare with the Fire service dwelling age categories are:

- Pre-1950
- 1950-1969
- 1970-1989
- 1990 onwards.

⁵ The recoding of the HEEP data to match the categories used by the Fire Service is limited by the way the data was collected, which was in decades.

⁶ The six age categories are: pre 1900; 1900-1945; 1946-1969; 1970-1991; 1992-2004; and 2005 onwards

Most of the dwellings in the HEEP sample fall into the two middle age categories, 1950-1969 and 1970-1989. The HEEP data suggests some general trends:

- The older the dwelling, the more likely there will be an open fire (although overall numbers are small)
- Installation of heat pumps is more prevalent in newer dwellings (in fact, none of the pre-1950 dwellings have heat pumps)
- Fixed electric heaters are less common in newer dwellings, while portable ones are less common in older dwellings
- Enclosed wood or coal burners and pot bellies are less prevalent in newer dwellings.

Table 3.6: Sources of Heating Available by Age of House

Heating Source	Pre-1950 (n=80)	1950-1969 (n=115)	1970-1989 (n=105)	1990 onwards (n=51)	All Dwellings (n=394)
Electric blanket: single	9.6%	10.2%	12.9%	15.2%	55.6%
Portable convection heater (e.g. Oil column)	13.9%	10.2%	10.9%	11.7%	55.0%
Enclosed wood or coal burner/pot belly	12.0%	14.1%	11.3%	9.9%	53.8%
Fan heater	11.5%	9.4%	8.8%	12.1%	48.0%
Electric blanket: double	7.8%	8.3%	7.0%	8.5%	41.0%
LPG	5.6%	10.8%	9.5%	9.0%	39.3%
Wall fan heater	4.5%	3.1%	7.7%	8.5%	25.0%
Electric radiator (portable)	3.5%	6.5%	5.4%	5.4%	23.4%
Open fire	4.9%	4.3%	1.4%	0.4%	14.5%
Electric panel heaters	4.2%	5.5%	4.5%	2.2%	11.7%
Dehumidifier (used for heating)	1.9%	2.6%	1.8%	2.2%	11.0%
Electric radiators (fixed)	2.8%	2.2%	2.5%	0.4%	9.9%
Heat pumps	0	0.2%	0.9%	3.6%	3.6%

Use of solid fuel for heating: The HEEP data also provides detail about the use of solid fuel (wood, coal and coke) in dwellings for heating. Historically, New Zealand households have relied heavily on solid fuels to heat their homes and a substantial proportion still do. However, Census figures show a gradual reduction in the reliance on solid fuels, especially coal. The reduction, in part at least, reflects various regional and national programmes that aim to shift users from solid fuel to other forms of heating to reduce pollution.

The following trends show a significant shift in fuel use in New Zealand households:

- An increase from 10 percent in 1961 to 42 percent in 1971 of dwellings relying primarily on electricity
- A fall from 83 percent in 1961 to 50 percent in 1971 of dwellings relying primarily on solid fuel.

Table 3.7: Main Heating Fuel – 1981, 1991 and 2001 Census & HEEP

Size of household	Census 1981	Census 1991	Census 2001	HEEP Sample
Electricity	10%	38%	42%	43%
Gas	2%	1%	1%	16%
LPG*	2%	3%	6%	31%
Solid fuel^	83%	49%	50%	10%
Other	2%	6%	0%	
Not specified or no heating	1%	3%	1%	

*Assuming 'kerosene' in 1961, 1966 and 1971 Censuses is functionally equivalent to an LPG heater.

^ Assuming 'space heater' in 1961 and 1966 Censuses is an enclosed solid fuel burner.

Of the 188 HEEP households using solid fuel, only 15 percent rely solely on it to heat their home. Most use a combination of electricity/gas and solid fuel; 17 percent combine solid fuel with LPG. Almost all solid fuel users report its use for multi-space/room heating (e.g., living, lounge and dining areas).

As the table below shows, about 59 percent of the HEEP households have a solid fuel appliance available for their use.

Table 3.8: Availability of Solid Fuel Appliances In HEEP Households

Solid fuel appliance available	Self-reported data*		Monitored data	
	n	%	n	%
Yes	226	58	231	59
No	167	42	163	41
Total	393	100	394	100

* 1 missing case

The most commonly available solid fuel appliance is an enclosed wood/coal burner. About one-quarter of those households with the facility to use solid fuel have an open fire, but a significant number of those households with an open fire also have an enclosed wood burner. Open fires are much more likely to be available but not used, compared with enclosed wood/coal burners, which are more likely to be used. Most HEEP households with only an open fire did not use it for heating.

Sources of cooking: The most prevalent sources of cooking available in the HEEP dwellings are microwaves, followed by electric ranges (oven and hobs) and electric frying pans, and then by LPG barbeques. The most prevalent cooking sources in use, as distinct from in the dwelling, are microwaves and electric ranges. See Table 3.9.

Table 3.9: Sources of Cooking (n=394)

Source of Cooking	% of dwellings with cooking source available	% of dwellings with cooking source in use	% of cooking source available that is in use
Microwave	86.8%	76.4%	88.0%
Electric range (oven + hobs)	68%	62.7%	92.2%
Electric frying pan	59.7%	39.8%	66.8%
LPG BBQ	55.2%	34.8%	77.0%

Crock-pot	36.0%	24.9%	69.0%
Electric oven	25.9%	24.1%	93.1%
Electric hobs	16.8%	15.5%	92.4%
Bench-top mini oven	13.4%	10.2%	75.5%
Gas hobs	9.9%	9.1%	92.3%
Separate electric grill	7.4%	6.1%	82.7%
Rice cooker	6.3%	2.5%	40.0%
Gas range (oven + hobs)	5.8%	5.6%	95.7%
Wood/coal range	4.9%	3.3%	68.4%
Coal/wood BBQ	3.9%	3.0%	80.0%
Induction cooking ⁷	0.8%	0.8%	100.0%
Separate gas grill	0.8%	0.8%	100.0%
Electric BBQ	0.8%	0.5%	66.7%
Gas oven	0.3%	0.3%	100%

As well as showing the proportion of dwellings that have, and use, particular cooking sources, the HEEP data also provides an insight into the percentage of sources available that are in use (shown in the right hand column of Table 3.9 above). For instance, although 60 percent of dwellings have electric frying pans, only two-thirds of these frying pans are actually in use. Conversely, ninety-three percent of electric ranges in dwellings are in use. This use data gives a better indication of ignition sources used than availability alone. The most sources to be used if they are available are:

- gas ovens⁸
- induction cooking
- separate gas grills
- gas ranges (oven + hobs)
- electric ovens
- electric hobs
- gas hobs
- electric ranges.

The least likely to be used are rice cookers, electric barbeques, electric frying pans (despite them being one of the most prevalent sources), wood/coal ranges and crock-pots.

The prevalence of cooking sources in HEEP dwellings is, to some extent, linked to the life stage of the household. For instance, retirement age households are more likely to have (and use) bench top mini-ovens and less likely to have gas hobs (at 2%). On the other hand, households with young children are more likely to have gas hobs (at 13%) and unlikely to have bench top mini-ovens. Both households with young children (at 32%) and retirement age households (at 39%) are less likely to have LPG barbeques than the sample as a whole (at 55%). Rice cookers are reasonably prevalent in households with young children

⁷ An induction cooker uses induction heating, which results from a magnetic field hysteresis loss.

⁸ The numbers of dwellings with a gas oven, induction cooking or a separate gas grill were very small.

compared with retirement age households (at 3%) and the sample overall (at 6%). However, as shown in Table 3.9 above, only 40 percent are in use.

Table 3.10: Cooking Source

Source	Total	Under 5's	Over 65's
Gas range (oven + hobs)	5.8%	10.0%	6.1%
Gas oven	0.3%	0%	0%
Gas hobs	9.9%	13.3%	2.0%
Rice cooker	6.3%	11.7%	3.1%
Bench top mini oven	13.4%	5.0%	28.6%
Microwave	86.8%	80.0%	83.7%
LPG BBQ	55.2%	31.7%	38.8%

Summary

Most of the dwellings included in the HEEP sample were built before the 1991 Building Act. Retirement age households are less likely to live in old dwellings and households with young children were more likely to live in dwellings that are pre-1970.

On average, each dwelling had 4.4 sources of heating available but, on average, 3.4 heating sources in use. The most common sources of heating *available* and in *use* were electric blankets (double), portable convection heaters (e.g. oil column), enclosed wood or coal burners/pot bellies, fan heaters and LPG heaters.

Heating sources varied by household type and age of dwelling. Households of *retirement aged* people are less likely to have open fires, enclosed wood or coal burners or pot bellies, and LPG heaters. Conversely, they are more likely to have heat pumps and distributed heating sources such as gas central heating or under-floor heating and solid or liquid fuel-fired central heating. Households with *young children* are slightly more likely to have enclosed wood or coal burners/pot bellies. None of those surveyed have heat pumps, which are favoured by retirement age households. Like these older households, they are also less likely to have open fires.

The older the dwelling, the more likely there will be an open fire while, in newer dwellings, installation of a heat pump is more prevalent, as are portable electric heaters. Enclosed wood or coal burners and pot bellies are less prevalent. More than half the HEEP households have a solid fuel appliance available for their use, most commonly an enclosed wood/coal burner.

The most prevalent sources of cooking in use are microwaves and electric ranges. The prevalence of cooking sources is, to some extent, linked to the life stage of the household. For instance, retirement age households are more likely to have (and use) bench top mini-ovens and less likely to have gas hobs. On the other hand, households with young children are more likely to have gas hobs and unlikely to have bench top mini-ovens. Both households with young children and retirement age households are less likely to have LPG barbeques.

4. SUMMARY OF RESEARCH FINDINGS AND DISCUSSION

The three data sets relating to home comfort and safety (the HEEP data, the national survey of 1,600 households and in-depth interviews with 122 people from five different communities), coupled with Census data, suggest some general trends relevant to fire risk and fire safety. These are described below along with their implications for fire safety interventions, including the domestic fire safety assessment tools presented in the next section of this report (Section 5).

Experience of fire in the home: Although it is hard to pinpoint its exact size, a small proportion of people (the national survey and in-depth interviews suggest somewhere between 5% and 11%) have experienced an unintended fire in their home. These research results, which show Māori respondents more likely to have experienced fires in their homes, are consistent with fire death and injury statistics that show a disproportionate number of Māori victims.

That most of the fires described in the in-depth interviews, which involved people over 60 years, were cooking-related is not surprising given the findings of previous research. As noted in the following section (Section 5), unattended or abandoned cooking is implicated in a high proportion of unintentional fires. This risk is exacerbated by drinking and impaired cognitive capacity, including that associated with old age.

That the research findings also show a link between people's experience of fire and their reliance on wood as their main fuel source is also not surprising. Unattended naked flames are also an identified fire risk (see Section 5).

In the national survey, people in pre-1970 dwellings were more than twice as likely as those in newer dwellings to have experienced a fire (the use of wood as a heating fuel may also be implicated in some of these fires). It may be that older houses are in poorer physical condition than newer houses. These findings are consistent with other research that suggests a link between house condition and fire risk (see Section 5), both because of the condition of the dwelling itself and because other risk factors such as socio-economic status and tenure are linked to dwelling condition.

These findings provide further evidence of the importance of the Fire Service's 'don't drink and fry' and 'take care with naked flames' fire safety messages (included in the domestic fire safety assessment tool found in Section 5). They also show that target audiences need to variously include Māori, older people, households in older dwellings and dwellings of poorer physical condition, and households reliant on wood for their main fuel source.

Smoke alarms and other equipment: Research results do not provide a clear picture of the prevalence of working smoke alarms in households. The national survey and in-depth interviews record few people putting in smoke alarms and other fire safety equipment as part of their dwelling repairs and maintenance, modifications or renovations. However, research quantifying the prevalence of working fire alarms in New Zealand dwellings suggests that at least 200 of those surveyed would not have had smoke alarms. Given the numbers of people carrying out kitchen and bathroom renovations, we could have expected a greater percentage reporting their installation as the requirement to install smoke alarms is embedded in the compliance processes of most, if not all, Territorial Authorities.

Previous research (see Section 5) shows the importance of functioning smoke alarms in homes as they lower the risk of death in the event of an unintentional fire. The two *Ageing in Place* data collection processes show low rates of smoke alarm installation. While it may be that households already have smoke alarms the research nevertheless suggests that smoke alarms are not a priority for some households. Thus, the research signals the continuing importance of fire safety interventions that target their installation in dwellings and their regular checks.

Escape plans: In-depth interviews showed that around one in two households have an escape plan although home owners are almost twice as likely to have escape plans as renters. Around one in two home owners and at least two-thirds of renters may not have escape plans in the event of a fire. Previous research (Warren and Proctor, 2005) showed that some groups considered intimate knowledge of their homes as a sufficient precaution to respond to a fire appropriately.

These findings show the need to still provide messages about the importance of escape plans, including ensuring that all people living on a property are aware of it and that they regularly practise the escape procedures. To target renters, whose propensity to develop escape plans appears to be considerably lower, there may be some value in joint fire safety interventions involving the Fire Service and major rental providers such as the Housing New Zealand Corporation and Territorial Authorities.

Age and condition of dwelling: Most people in New Zealand live in separate, single-storey houses. Profiling of New Zealand's dwellings on Census night 2006 showed that 82 percent were separate houses, more than three-quarters of which were single-storey. However, the ---PDFBREAK---number of dwellings joined to another dwelling (e.g., flats, units, townhouses, apartments or houses joined together) increased significantly in the previous five years, especially in Wellington and Auckland.

New Zealand's housing stock is generally old. Recent analysis of this housing stock carried out by BRANZ estimates that 54 percent of dwelling units were built

prior to 1970. BRANZ also estimates that 23 percent were built from the 1990s. Some United Kingdom based research shows a link between fire risk and the physical condition of dwellings (see Section 5). Age of dwellings provides one, albeit, incomplete, indicator of dwelling condition. The national survey and in-depth interviews suggest that the older their dwellings, the more people tend to be concerned about their condition and about future maintenance needs. Despite their concerns, however, it seems that people do not always carry out repairs and maintenance, often because of the cost and, for older people, their increasing inability to do the work themselves.

The construction materials, electrical wiring and heating systems of older dwellings, along with any degradation in physical condition, also potentially increase their fire risk. The national survey and in-depth interview data suggests a link between fire occurrence and age of dwelling: higher proportions of those living in older dwellings had experienced a fire. Older dwellings are typically constructed of more flammable materials (e.g., internal wall linings and external cladding), have older (and potentially unsafe) electric wiring,⁹ have open fires, enclosed wood or coal burners and pot bellies, and lack fixed heaters (that is, portable electric and gas heaters are more likely to be in use). However, when householders carry out maintenance, modifications or renovations, this is considerably more likely to include painting, replacing bathroom and kitchen fixtures and fittings, and re-plumbing than rewiring or replacing wall linings.

There has been little analysis of age of dwelling by household composition. The HEEP research and the national survey provide some insight, however.¹⁰ For instance, amongst HEEP respondents living in older dwellings, there is a larger proportion of families with young children (an identified vulnerable group). And in the national survey, the older people are, the more likely they are to live in newer homes.

Together, these insights, although incomplete, signal the importance of fire messages that focus on the fire risk associated with older houses and the value of up-grades to improve the physical condition of dwellings such as replacing older wiring and replacing older internal wall linings.

Home heating: Households rely on a range of heating sources. Historically, New Zealand households have relied heavily on solid fuels to heat their homes. A substantial proportion of households still do, especially through the use of enclosed wood or coal burners or pot bellies. The proportion is gradually reducing, however, as more households rely primarily on electricity.

⁹ Overseas research raises concern about the safety of electrical wiring in older dwellings. However, recent New Zealand research (Patel, 2005) found that domestic fire risk from older electrical wiring systems (particularly that installed in the early 1940s and 1950s) is low compared to other types of electrical fire risks such as heat-initiated fire from electrical equipment.

¹⁰ Further insight could be gained using Census data at a meshblock level, with meshblocks selected on the basis of the predominant age of the dwellings.

Research suggests a link between heating sources available and / or used and the age of dwellings and householders. The older the dwelling, the more likely there will be an open fire; in newer dwellings heat pumps are more prevalent, while fixed electric heaters and enclosed wood or coal burners and pot bellies are less prevalent. Older people are more likely to live in newer dwellings and, therefore, the heating sources they use are less likely to include open fires and enclosed wood or coal burns or pot bellies and more likely to include heat pumps and other distributed heating sources. Households with young children are more likely to be located in older dwellings and, therefore, more likely to use enclosed wood or coal burners/pot bellies. However, they are less likely to use open fires.

These results further signal a need for fire safety messages that are targeted to people living in older dwellings. Dwellings built before 1970 make up more than half New Zealand's total housing stock. These messages also need to address the particular risks that some heating sources pose, especially if coupled with risks arising from the material composition and condition of the dwelling.

Cooking sources: The prevalence (in terms of availability and / or use) of different cooking sources is, to some extent, linked to the age and life stage of householders rather than to the age of the dwelling itself. Most dwellings have several cooking sources available, but householders do not use all the cooking sources they have available. The most prevalent sources in use are microwaves and electric ranges. Particular types of cooking sources are used more (or less) by particular age groups. For instance, retirement age households are more likely to have (and use) bench top mini-ovens but they are less likely to have gas hobs. On the other hand, households with young children are more likely to have gas hobs and unlikely to have bench top mini-ovens.

The pattern of cooking source prevalence signals a need for any fire safety messages that relate to types of cooking sources to be targeted to particular age groups rather than to particular dwelling types.

Family formation and household composition: Trends such as more one-parent families, fewer children in each family, more blended families, healthier and longer old age, and more people choosing to live alone are changing the size and composition of households. The size of households is gradually decreasing, yet dwellings are getting larger, and the number of households is increasing. The increase in household numbers is occurring at a rate that is greater than the population is growing.

These changes have implications for fire safety. One change is growth in the number of ageing one-person households. Research identifies older people as a group vulnerable to fire injury and death, given physical, sensory and cognitive disabilities. Their vulnerability increases when they live alone, given that there is no-one to help them respond appropriately in the event of a fire. Unfortunately, as people age (with increased likelihood of disabilities) the likelihood that they will

live alone (especially for woman) also increases. The need for targeted interventions to reduce the fire risk of older people living alone will increase as the prevalence of older one-person households increases.

5. DOMESTIC FIRE SAFETY ASSESSMENT TOOLS

5.1 Introduction

This research sought to establish the prevalence and characteristics of risk factors across a range of dwelling and household types, as a basis for developing a practical risk assessment tool and delivery mechanism for typical and higher risk homes. This tool was intended to complement existing public awareness fire safety campaigns and practical interventions. Findings from an iterative research approach pointed to the need to develop two household fire risk assessment tools rather than the originally conceived single tool – one for typical households within which people could be assumed to be sufficiently motivated to complete a fire safety assessment of their own dwellings and households and one for higher risk and hard-to-access households. However, the latter assessment tool has been developed for a different delivery mechanism that reflects the reduced likelihood that householders would locate and use a self-complete survey. Instead, the tool has been developed for administration by a range of home assessment specialists already working with higher risk households.

This section of the report does four things. First, it summarises identified fire risk factors for domestic homes, mainly based on research that analyses fire injury and fatality statistics. These concentrate around dwelling, household and personal characteristics as well as behavioural factors. Second, it describes the iterative research process taken to develop two assessment tools that reflect these fire risk factors. This description including the rationale for developing two tools rather than the initially intended single tool and for the two different delivery mechanisms recommended. Third, it discusses factors the Fire Service might need to consider for any future development and implementation of these tools. And fourth, it includes the two fire risk assessment tools and the associated advice either embedded in the tool (for the self-complete tool) or provided through existing Fire Service material.

5.2 Household Fire Risk Factors

Research identifies a range of interrelated behavioural, demographic and dwelling factors associated with fire risk, including the occurrence of fires and the appropriateness of people's responses to them. For instance, fire risk can be attributed to behavioural factors such as unattended/abandoned cooking, careless smoking, and unattended burning candles and other naked flames. Often these behaviours are linked to alcohol consumption. The lack of functioning smoke alarms also increases the likelihood of injury and death from fire. These risk behaviours are linked to personal and household socio-economic status, which is also related to other risk factors such as household composition and the

condition of the dwelling. Other demographic factors implicated in fire risk include age and ethnicity, the latter probably as much to do with socio-economic factors as any cultural differences. These interrelated factors are described in more detail below:

An alcohol impaired person is the strongest independent risk factor for death in the case of a fire. When alcohol is involved, people are more likely to take more risks or respond inappropriately to a fire. When associated with other risk behaviours such as cooking late in the evening (discussed below), smoking and use of naked flames, the risks are significant. The risks for alcoholics are further exacerbated by the physiological effects of their condition (e.g., impaired cognition and lower resistance to the effects of fire) and their increased risk-taking behaviours (Heimdall Consulting, 2005).

Unattended/abandoned cooking, which is implicated in a high proportion of unintentional fires, is exacerbated by drinking and impaired cognitive capacity, including that associated with old age. For instance, when alcohol is involved people are more likely to abandon their cooking because they have fallen asleep while, in the case of cognitive impairment, people are more likely to abandon their cooking because they have forgotten that is what they are doing. Fires associated with alcohol and careless cooking usually occur between 10pm and 6am (University of Otago, 2000 and Heimdall Consulting, 2005).

Careless smoking also increases fire risk, especially if a number of people in a household smoke, and / or they smoke a lot, and / or they smoke in a number of rooms (including the bedroom), and there is inappropriate disposal of smoking materials (e.g., in contact with flammable materials). For instance, Smith *et al.* (2009), in research to establish the links between smoker characteristics and risk of fires and burns, found 6.8 percent of respondents had experienced one or more fires caused by cigarettes. Their research shows increased risk of cigarette-caused fires for both males and Māori. Often the risk is compounded by alcohol use and disabilities (University of Otago, 2000 and Heimdall Consulting, 2005).

Unattended burning candles and other naked flames (e.g., from bottled gas) are also a fire risk, particularly when they are used for lighting and heating in sleeping and living areas (e.g., in sheds, caravans) separate from main dwellings (Heimdall Consulting, 2005 and Warren and Proctor, 2005). Candles used for ambiance reasons also pose a fire risk.

The lack of functioning smoke alarms is another risk factor. Indeed, the presence of smoke alarms demonstratively lowers the risk of death in the event of an unintentional fire, even when the occupant is living with a disability (Marshall *et al.*, 1998, Duncanson, 2001 and University of Otago, 2000).

Socio-economic status and deprivation is a strong determinant of fire risk. The contribution of socio-economic factors to fire risk is complex and also associated

with other risk factors such as smoking, alcohol/drug use, gender (young and older males predominate in fire death and injury statistics), education levels, beneficiary/employment status, residential location, housing tenure, and ethnicity (risk for Māori is three times that of the total population) (Heimdall Consulting, 2005 and University of Otago, 2000). Fire risk is compounded by dwelling quality and condition. Many low income households live in substandard buildings, many of which are rentals. Some identified associations between these risk factors include the following:

- Smoking rates are higher amongst people and households with lower household socio-economic status
- The installation and functionality of smoke alarms is less prevalent in households with lower socio-economic status
- People's inability to understand and respond appropriately to fire safety messages is linked to educational underachievement (University of Otago, 2000).
- Rental accommodation is associated with higher rates of residential fire deaths and injuries (University of Otago, 2000 and Robbins, Wade, Bengtsson, Howard, and Soia, E, 2008).
- Housing quality is a key factor in fire risk – especially temporary homes, poor housing conditions, poorly maintained older dwellings and cheaply constructed new homes (University of Otago, 2000).

Household composition is also a key determinant of fire risk with fire incidence higher amongst single-parent and crowded households and in those with older people, children and people with disabilities (Warren and Proctor, 2005). Household composition is also linked to socio-economic status and deprivation. For instance, sole parents are often associated with poverty, poor housing, and increased smoking rates (University of Otago, 2000), all of which are independent fire risk factors. There is also an increased injury risk related to fire for children of sole parents because of their possibly diminished capacity to provide supervision to their children.

Some population groups are at higher risk. The increased risk for young people (including infants, children and adolescents) is associated with their high dependence on adults to ensure safety and their development-related physical and intellectual immaturity and incapacity to understand and respond to fire risk. The increased risk for the aged is linked to their physical infirmity, declining cognitive and sensory capacities (compounded by the effects of medication), risk behaviours (heaters too close to flammable surfaces, unattended cooking, unsafe use of electric-blankets), tendencies to live alone, and limited resources. Māori death and injury (particularly for *tamariki*) from fire is three times that of the total population, the disparity primarily explained by socio-economic and education factors (Thomas, Rayner, Moroney, 2000 and Heimdall Consulting, 2005).

Dwelling condition may be a fire risk in itself. In the United Kingdom, households in poor physical condition were identified as at risk of experiencing a

domestic fire, with condition of the house amongst the twelve characteristics of households with the greatest risk of experiencing a domestic fire. The research concluded that the fire risk of dwellings in poor physical condition is further compounded by their likely lack of smoke alarms (more than half those dwellings in poor physical condition did not have a smoke alarm in a context of 80% installation overall). These dwellings appear to be doubly vulnerable to fire risk.

Furnishing materials can be a fire risk. Upholstered furniture with polyurethane foam padding is also a known fire risk and implicated in a significant number of fatal fires. Polyurethane foam is often compared to a block of solid petrol in terms of the amount of energy it can release when burned in fire. It is difficult for householders and the Fire Service to identify the risk as there is often a lack of information about the construction of furniture. There are no flammability controls on furniture sold in New Zealand. (Robbins, *et al.*, 2008 and Wade *et al.*, 2003).

Summary: These fire risk factors have informed the development of the two household risk assessment tools. Risk areas that the tools focus on include the following:

- Dwelling details including type, condition (including wiring), tenure, use of other spaces for sleeping, heating sources and use of naked flames
- Household details including the number of people and their ability to respond to fire messages appropriately (e.g., because of any impairments)
- Risk behaviours such as smoking, cooking while drinking, people and items positioned close to heating sources, and care of fire sources and ash disposal
- Fire precautions such as smoke alarms, escape plans and clear access ways.

5.3 Development of Fire Risk Tools

The two fire risk assessment tools were developed in a two-phased, iterative approach. The first phase focused on the development of an assessment tool that both reflected the identified fire risks (from previous research and further verified in related research, the main findings of which are summarised in Section 4). The second phase, which focused on developing a tool for higher risk and hard-to-access households, was initiated in response to issues raised during the development of the first tool. These two phases are described below.

Phase 1: The first phase, carried out over a five-month period, involved developing an assessment tool for individual households that addressed all the identified fire risk factors for households. These included characteristics and conditions of the dwellings themselves (including outbuildings); demographic characteristics of householders; the prevalence of risk behaviours amongst householders; and the prevalence of fire safety interventions. This assessment tool was initially developed for the collection of data about households and

householders as a basis for building baseline data about the prevalence of fire risk factors at a community level. Potential delivery mechanisms considered for collecting the data included administration by neighbourhood or community groups or service providers.

The initial research process for identifying the content of the assessment tool included analysis of several sets of data (HEEP data, a national survey, case studies in six communities and house condition surveying); a review of literature related to household fire risk; interviews with fire safety specialists in the New Zealand Fire Service and BRANZ; and a search and review of household safety assessment tools. This search included, but was not limited to, fire safety assessment tools.

The review of a wide range of household safety assessment tools showed the relative value of the internet as a delivery mechanism for the assessment tool. The potential advantages a web-based tool included:

- Reach a wider range of households
- The opportunity to combine data collection with the provision of targeted advice to respondents (with that advice consistent with Fire Service messages)
- Cost effectiveness
- Opportunities to provide incentives to respondents, for instance through a rating system embedded in the tool.

The team's view that a self-complete, web-based tool provided the best delivery mechanism was supported by both field based experience (e.g., householders involved in case studies and house condition surveys expressed some reluctance at further surveying to assess their fire risk) and by those interviewed as part of the tool's development. The potential advantages of using the internet as a delivery mechanism was also generally supported in a subsequent workshop and follow-up consultation process with fire safety specialists.

Disadvantages of the internet as a delivery mechanism were also identified, and these provided the impetus for developing a second assessment tool (described below). The main disadvantage of a web-based assessment tool is that it is likely to be activated and completed only by people already motivated to assess and improve their fire safety at home. To find the tool, potential respondents would have to be searching on the web for such a tool or told about it by equally motivated people. However, research suggests that those most at risk are least likely to access a tool through the internet. Fire risk is higher among households in areas of higher deprivation and among the elderly. These are also the households with lower access rates to the internet and, often, less willingness to recognise their elevated fire risk. It is therefore reasonable to assume that many of the more vulnerable households may be unable to, or lack sufficient motivation to, find and complete a web-based fire risk assessment tool.

The content of the assessment tool was further refined through a workshop and interviews with fire safety specialists within and outside of the Fire Service, and follow-up reviews of the assessment tool via e-mail. The content includes both questions relating to a range of risk factors and the advice that is triggered depending on how people respond to particular questions. The final assessment tool is included at the end of the section following discussion of some factors to consider should the Fire Service decide to further develop the tool for wider distribution. The attached advice is sourced from Fire Service brochures and pamphlets and from the website. Other advice was developed at the workshop by fire safety specialists. There are still advice gaps, however, that would need to be filled should the Fire Service decide to further develop the tools. Further work is also needed on the tool to prepare it for a web-based distribution. This is outside the scope of this research. However, we have tested an interactive web-based format for the self-complete assessment tool.

Phase 2: The team, in discussion with researchers conducting interviews and house condition surveys with householders in the *Ageing in Place* research, explored other options for accessing more hard-to-reach households. The preferred option explored was the development of an assessment tool that could complement those used by a number of professional groups already carrying out assessments of home safety. These professional groups include occupational therapists, district nurses, social workers, and other health and social service providers. Initial interviews with a range of these professionals confirmed that their clients are often concentrated in the higher risk households. Client bases include the elderly, those with disabilities (e.g., physical, cognitive, sensory), those recovering from mental illness, and those in low income households. These professionals also talked about their existing interest in, and concern about, fire risk amongst their client base and their openness to expanding their checklists to include fire safety-related items. Thus, they confirmed the real potential for accessing many of the hard-to-access households through health and social service providers already involved in home assessments.

The development of a fire safety checklist, included later in this section, is the culmination of consultation with this group of home safety assessment professionals who agreed to contribute to this research. They are located in different organisations across the country. The checklist of items was formed out of a subset of the questions included in the web-based, self-complete assessment tool for householders and has been developed as a preliminary list only. Further work may be needed to target this list to the particular assessment practices of different professional associations and provider groups. Some factors to consider should the Fire Service decide to progress the adoption of this checklist are discussed below.

5.4 Considerations for Future Implementation of the Tools

Factors that may need to be considered in any further development and implementation of each of the two assessment tools are summarised below.

Self-complete household fire safety assessment tool

- The assessment tool has been designed to provide opportunities to trigger advice to householders, usually depending on how they respond to questions. That is, it is designed for advice is embedded in the assessment tool in an electronic format. The hardcopy version, included below, has the advice attached in the right-hand column of the questionnaire alongside the question response that it relates to. The advice attached to the question itself would appear no matter how the users respond to the questions. And the questions have been designed to be as non-judgemental as possible to avoid householders becoming disenchanted with the assessment tool and not completing it. The drinking and cooking item in the assessment tool is a good example of our attempt to keep questions fairly neutral - people are not asked whether anyone drinks heavily and cooks (they are unlikely to answer in the affirmative anyway) but simply whether they drink and cook. After all, barbequing with a beer in-hand is almost ubiquitous in New Zealand. Regardless of how people respond, they will receive the same advice. That a late-night cook-up, especially with oil, after heavy drinking is a fire risk.
- In any further development of the assessment tool and attached advice, the advice provided needs to be consistent with other messages provided by the Fire Service and needs to be clear and precise. Notable shortcomings of some of the tools reviewed in the development of this assessment tool included advice that was too long, and questions and answers that were too complex.
- If the Fire Service decides to use the tool for any sort of data collection, the consent of respondents may be needed. This could be in the form of a filter question at the start or finish of the assessment tool.
- If the assessment tool is used for any sort of data collection, this may have implications for Fire Service resources as it may require the organisation to respond to identified need at an individual dwelling level (e.g., to ensure smoke alarms are installed, etc).
- Ideally the assessment tool would be accessible from a number of sites that potential users might be regularly accessing in addition to the Fire Service site (e.g., those of Regional Councils and Territorial Authorities, health and social service providers, Accident Compensation Corporation, and similar).
- Some form of rating system for the assessment tool could provide an incentive for people to improve their fire safety status. Social marketing experience shows that people seem to respond with positive action when they are able to compare themselves with others – and see where they could improve to increase their comparative status.

Fire safety checklist for professional assessors

- This research has identified the potential for the Fire Service to gain the support of a wide range of assessment professionals and organisations as a basis for collectively working towards improving the overall safety of vulnerable and hard-to-access households. The research process itself has provided a basis for the Fire Service further building that support and establishing formal working partnerships. We see value in the Fire Service putting immediate effort into further developing these partnerships so that the momentum gained through the research process is not lost. These professionals and organisations have demonstrated a willingness to include some fire safety considerations in their assessments.
- As with the self-complete assessment tool for householders, the Fire Service may want to consider whether the primary purpose of the assessors' tool is to collect data (that is, identify at-risk dwellings) or as a trigger for providing advice. If the former purpose is the case, then there may be resource issues for the Fire Service and for those collecting the data. If the latter is the case, then the assessors would need easy access to advice (that is, in the form of brochures, etc) or may need to improve their own knowledge.

5.5 The Assessment Tools

Web-based self-complete, household fire safety assessment tool: Delivery of this tool could be web-based with responses to particular questions triggering particular advice. The hardcopy version of this assessment tool, in the form of a questionnaire, follows. Following that, is another hardcopy version that has the advice attached in the right-hand column, alongside the response that it relates to. The advice attached to the question itself needs to appear no matter how the users respond to the questions.

SELF COMPLETE RISK ASSESSMENT TOOL FOR INTERNET DELIVERY

Your Dwelling

1. What sort of dwelling do you live in?
 - ₁ A single-storey dwelling
 - ₂ A multi-storey dwelling
 - ₃ A flat or apartment in a single-storey multiple dwelling building
 - ₄ A flat or apartment in a multi-storey multiple dwelling building
 - ₅ Other (please specify) _____
2. When was your dwelling first built?
 - ₁ Pre-1990
 - ₂ After-1990
3. Is your dwelling rented or owner-occupied?
 - ₁ Rented
 - ₂ Owner-occupied
 - ₃ Other (please specify) _____
4. Do you have dwelling (home owners) insurance?
 - ₁ Yes
 - ₂ No
5. Do you have contents insurance?
 - ₁ Yes
 - ₂ No
6. How would you describe the current condition of your dwelling?
 - ₁ Excellent – no immediate repair and maintenance needed
 - ₂ OK – minor or some maintenance needed
 - ₃ Poor– Immediate and / or extensive repairs/maintenance needed
7. Has your dwelling had any significant renovations?
 - ₁ Yes
 - ₂ No

8. If so, what would best describe the status of that renovation?
- ₁ Completed
 - ₂ Still underway
9. Do you have any outbuildings that are used for sleeping?
- ₁ Yes
 - ₂ No
10. If yes, which of these statements best describes this outbuilding?
- ₁ Garage separate from the dwelling
 - ₂ Garage attached to the dwelling
 - ₃ Sleep out
 - ₄ Caravan
 - ₅ Other
11. The colour of the covering on your electric wiring indicates the age of the wiring. What colour is most of the electric wire covering in your dwelling?
- ₁ Black
 - ₂ White
12. How would you describe your meter box?
- ₁ Old-type fuse fittings (that is, with fuse wire)
 - ₂ Modern with circuit breakers
13. Are all your large electrical appliances (refrigerator, microwave, television, heaters) plugged into separate sockets?
- ₁ Yes
 - ₂ No
14. Which of these best describes the inside of your dwelling?
- ₁ Spacious with little clutter
 - ₂ Cramped with clutter
 - ₃ Spacious with clutter
 - ₄ Cramped with little clutter
15. Which of these things are near to or against the wall of your dwelling?
- ₁ Trees
 - ₂ Vegetation (long grass, etc)
 - ₃ Rubbish (papers, discarded Christmas trees, etc)
 - ₄ Firewood
 - ₅ Abandoned cars
 - ₆ There is nothing against or close to the wall of the dwelling

Your Household

16. How many people live in your household (including on your property overall)?
- _____
17. Would anyone in your household (including on your property) not hear a smoke alarm if there was a fire?
- ₁ Yes
 - ₂ No

18. Would anyone in your household (including on your property) not sense a fire (maybe because they don't have a good sense of smell, or have a hearing or seeing impairment)?
- ₁ Yes
₂ No
19. Would anyone in your household (including on your property) need help to get out if there was a fire (maybe because they have a disability or an illness or would not know what to do)?
- ₁ Yes
₂ No
20. Does anyone in your household smoke?
- ₁ Yes
₂ No
21. If yes, have you noticed any burns marks or holes in any furnishings or clothes?
- ₁ Yes
₂ No
22. Does anyone in your household cook after (or while) drinking alcohol?
- ₁ Yes
₂ No
23. Does anyone in your household (including in sleep-outs, etc) use naked flames (e.g. candles, gas cookers, gas heaters)
- ₁ Yes
₂ No
24. Do any children in your household show an unusual interest in fire?
- ₁ Yes
₂ No
25. Which of these do you use for heating?
- ₁ Electric fan heater
₂ Electric radiator (e.g. bar heater)
₃ Portable gas heater (e.g. LPG)
₄ Fixed gas heater (e.g. gas fan heater)
₅ Oil column
₆ Open fire
₇ Log or pellet burner
₈ Heat pump or central heating
₉ Electric blanket
26. If you use an open fire/log burner, do you dispose of the ashes using a metal container and take them to a safe place away from the dwelling?
- ₁ Yes
₂ No

27. If you have a log or pellet burner, is it in good working order?
₁ Yes
₂ No
28. If you use an open fire or log or pellet burner, do you check and clean the chimney regularly?
₁ Yes
₂ No
29. Are there things (like furniture, curtains) closer than a meter to your heater, open fire or log or pellet burner?
₁ Yes
₂ No
30. Does anyone in your household sit closer than a metre from the heater, open fire or log or pellet burner?
₁ Yes
₂ No
31. Does anyone in your household dry clothes in front of the open fire, log or pellet burner or heater?
₁ Yes
₂ No

Fire safety

32. Do you have smoke alarms installed in your dwelling?
₁ Yes
₂ No
33. Do you test your smoke alarms regularly (that is, to ensure they are in working order or need there batteries changed)?
₁ Yes
₂ No
34. What additional fire protection equipment do you have?
₁ Sprinkler system
₁ Fire extinguisher
₂ Fire blanket
₃ Garden hose
₄ Other _____
₅ None
35. Do you have an escape plan in case of a fire in your dwelling?
₁ Yes
₂ No

36. Have you practised the escape plan?
₁ Yes
₂ No
37. Do you have more than one way to get out of the dwelling in case of a fire?
₁ Yes
₂ No
38. Are all the ways out of your dwelling clear of furniture, toys and clutter?
₁ Yes
₂ No

SELF COMPLETE RISK ASSESSMENT TOOL WITH ADVICE ADDED

Your Dwelling

No.	Question	Advice
1.	<i>What sort of dwelling do you live in?</i>	You don't know where a fire will start so you should have smoke alarms in every hallway, bedroom, living area and every level of your home.
	A single-storey dwelling	
	A multi-storey dwelling	
	A flat or apartment in a single-storey multiple dwelling building	
	A flat or apartment in a multi-storey multiple dwelling building	So you live in a multi-storey apartment building? That means special fire safety things for you to think about. Living above ground level is one, and there's the fact that you may have only one way of getting out of the apartment and, in some cases, even the building. Make sure you are familiar with the evacuation plan for your building and know what actions to take. Evacuation plans should be clearly on display throughout your building. Get to know the fire protection measures in your building and what you will need to do if you have to evacuate in an emergency. Practice using your fire exits occasionally to ensure that they work well.
	Other (please specify)	
2.	<i>What is most of your wall lining made of?</i>	House fires burn very quickly sometimes, because of building and furnishing materials.
	Gibraltar board (e.g. such as GIB-board)	Did you know that Gibraltar board (e.g. such as GIB-board) provides better fire protection than most other wall linings?
	Lathe and plaster	This wall lining typically burns very quickly and fuels house fires.
	Soft board	This wall lining typically burns very quickly and fuels house fires.
	Timber	This wall lining typically burns very quickly and fuels house fires.
	Other	
3.	<i>Is your dwelling rented or owner-occupied?</i>	
	Rented	If you have any concerns about fire safety contact your landlord.
	Owner-occupied	
	Other (please specify)	
4.	<i>Do you have dwelling (home owners) insurance?</i>	
	Yes	
	No	Have you thought about what would happen if you had a fire in your home – could you afford to repair or rebuild? Where would you live in the meantime?

5.	<i>Do you have contents insurance?</i>	
	Yes	
	No	Have you thought about what would happen if you lost your belongings in a fire – could you afford to replace them?
6.	<i>How would you describe the <u>current</u> condition of your dwelling?</i>	Research shows, there is a demonstrated link between fire risk and dwelling quality, age of dwellings provides one indicator of quality. Houses in poor condition are shown to pose fire risk.
	Excellent – no immediate repair and maintenance needed	
	OK – minor or some maintenance needed	
	Poor– Immediate and/or extensive repairs and maintenance needed	
7.	<i>Has your dwelling had any significant renovations?</i>	Did you know that scrim walls, large amounts of interior timber, pinex ceilings and other linings that are more common in older homes impose greater fire risk because they burn very quickly and fuel fires.
	Yes	
	No	
8.	<i>If so, what would best describe the status of that renovation?</i>	
	Completed	
	Still underway	Is the area under renovation fire safe? Are there exposed walls or wires. Would building materials block your exit in the case of a fire? Does your insurance policy require you to inform your insurance company that renovations are underway?
9.	<i>Do you have any outbuildings that are used for sleeping?</i>	Outbuildings such as garages need smoke alarms or sprinklers if they are attached to the house or used as sleeping quarters.
	Yes	In many cases councils require permits/consents when you change the use of an outbuilding to a bedroom or living area. Check with your council about what you might need to do to bring the outbuilding up to a safe standard.
	No	
10.	<i>If yes, which of these statements best describes this outbuilding?</i>	Make sure you don't store flammable materials, like petrol, in areas where people sleep.
	Garage separate from the dwelling	
	Garage attached to the dwelling	
	Sleep out	
	Caravan	
	Other	

11.	<i>The colour of the covering on your electric wiring indicates the age of the wiring. What colour is most of the electric wire covering in your dwelling?</i>	
	Black	If the covering is black, that indicates your wiring is old. The black covering is probably deteriorating, exposing you to fire risk from faulty wiring.
	White	
12.	<i>How would you describe your meter box?</i>	
	Old-type fuse fittings (that is, with fuse wire)	Older fuse fitting do not provide you with the protection that newer circuit breakers do if you overload the system. You may be exposing your household to greater fire risk.
	Modern with circuit breakers	
13.	<i>Are all your high wattage electrical appliances (e.g., microwave, heater, electric jug, toaster, hairdryer) each plugged into a separate wall socket?</i>	Ensure all electric appliances are in safe working order – replace frayed cords and broken plugs and keep appliances free of dust. Overloaded power points or multi-boxes are dangerous. One appliance per socket. Consider multi-boxes with circuit breakers.
	Yes	
	No	
14.	<i>Which of these best describes the inside of your dwelling?</i>	Household clutter could increase your fire risk. The clutter provides more fuel to feed a fire, if one should start, and it will take hold and spread further and faster. And clutter might block your way when you try to escape a fire. Do not clutter your cooking area. For example, keep tea towels and cloths away from the stove.
	Spacious with little clutter	
	Cramped with clutter	
	Spacious with clutter	
	Cramped with little clutter	
15.	<i>Which of these things are near to or against the wall of your dwelling?</i>	Regularly clear away household rubbish and keep it well away from your house. Ensure you dispose of your Christmas tree appropriately. Don't leave it beside the house or garage.
	Trees	
	Vegetation (long grass, etc)	
	Rubbish (papers, discarded Christmas trees, etc)	Ensure you dispose of your Christmas tree appropriately. Don't leave it beside the house or garage.
	Firewood	
	Abandoned cars	
	There is nothing against or close to the wall of the dwelling	
	Your Household	

16.	<i>How many people live in your household (including on your property overall)?</i>	Do you know where everyone sleeps? Most fires happen at night time. Would you know how many to check for, and where they all are, if a fire should occur?
17.	<i>Would you or anyone in your household (including on your property) not hear a smoke alarm if there was a fire?</i>	Be aware of people's hearing ability. They may not hear an alarm if they are hard-of-hearing, naturally sleep deeply or do so because they are on medication or have been drinking. Check that all people are aware of a fire if an alarm sounds.
	Yes	There are special smoke alarms available to assist those with hearing disabilities: ultra-loud sound, strobe light, vibrating pager or vibrating pad for under your pillow
	No	
18.	<i>Would you or anyone in your household (including on your property) not sense a fire (maybe because they don't have a good sense of smell, or have a hearing or seeing impairment)?</i>	If you are asleep you are unlikely to smell smoke and detect a fire.
	Yes	Fires start quickly and grow quickly.
	No	Don't assume that all people will sense a fire – as part of your evacuation procedure check that all people know a fire has happened need to escape.
19.	<i>Would you or anyone in your household (including on your property) need help to get out if there was a fire (maybe because they have a disability or an illness or would not know what to do)?</i>	Work out an escape plan to suit your home and talk about it with everybody in the house When a fire strikes, it spreads quickly giving you and your family less than four minutes to get out of the house safely. Tragically, children often perish in house fires because they hide in cupboards and under beds.
	Yes	People with physical, mental and other disabilities usually need help to respond to a fire appropriately. Make sure your escape plan includes working out who will provide help to whom.
	No	If you are older or have a disability here are some safety precautions: Sleep near an exit, if you live in a multi-storey building or have difficulty getting about, sleep on the ground floor. Keep a telephone (a whistle or alert bracelet) and torch by the bed.
20.	<i>Do you or anyone in your household smoke?</i>	
	Yes	Ensure ashtrays are emptied into a metal bin outside. Remember that smoking in bed is dangerous and bedclothes ignite easily. Use a solid ashtray to stub out cigarette butts – soak butts in water before throwing them out.
	No	
21.	<i>If yes, have you noticed any burns marks or holes in any furnishings or clothes?</i>	Check behind cushions for butts and ashes before going to bed
	Yes	
	No	

22.	<i>Does anyone in your household cook after (or while) drinking alcohol?</i>	Cooking is the number one fire danger in your home. One-third of all fire deaths in NZ are caused by unattended cooking. Alcohol is involved in 50 percent of all fatal house fires.
	Yes	Don't drink and fry – get takeaways delivered instead. Never leave cooking unattended, always watch the pan or pot when cooking with oil or fat, if oil or fat is smoking, turn off the heat, and snuff out a fat fire with a pot lid or oven tray. Never carry it outside. Don't cook when you've been drinking. Alcohol and cooking don't mix.
	No	Never use water to put out an oil or fat fire. Instead smother the flames. If oil or fat is smoking, turn off heat Have a drink once you've sat down to eat.
23.	<i>Does anyone in your household (including in sleep-outs, etc) use naked flames (e.g. candles, gas cookers, gas heaters)?</i>	Use candles with care. Use candles in a secure candle holder with a wide flat base. Keep candles away from paper, curtains, bedclothes and anything else that will burn easily. Put candles out before you go to sleep or leave a room. Don't allow children to play with candles or be unsupervised in a room with a lit candle.
	Yes	
	No	
24.	<i>Do any children in your household show an interest in fire?</i>	Children are most at risk of dying or being badly burned in a fire. This is often because of fire-play caused through access to matches and lighters. Because young children do not know how to escape safely, in the event of a fire they face considerable risks. If you and your family could benefit from the Fire Awareness and Intervention Programme (which is aimed at children, parents and caregivers) contact your local fire stations or visit http://www3.fire.org.nz/cms.php?page=18280
	Yes	Matches and lighters are tools not toys. Keep all matches and lighters up high, out of reach of children. Teach children to take matches or lighters to an adult straight away. Only use child restraint lighters and safety matches. Remember, child resistant lighters are NOT child proof!
	No	
Heating your dwelling		
25.	<i>Which of these do you use for heating?</i>	Remember to turn heaters off and keep furniture and clothes at least one metre from the heater or fire place.
	Electric fan heater	
	Electric radiator (e.g. bar heater)	
	Portable gas heater (e.g. LPG)	You need to ensure your gas heater and gas bottle are serviced annually.
	Fixed gas heater (e.g. gas fan heater)	
	Oil column	
	Open fire	Ensure you dispose of your ashes appropriately.
	Log or pellet burner	Ensure you dispose of your ashes appropriately.
	Heat pump or central heating	
Electric blanket	Always turn off your electric blanket at the wall before getting into bed. Have blankets checked annually by a competent service person.	

26.	<i>If you use an open fire or a log or pellet burner, do you dispose of your ashes using a metal container and/or remove the ashes to a safe place away from the dwelling?</i>	Ashes can take up to five days to cool. So when it's time to clean out the hearth or wood burner, place the ashes in a metal container, well clear of your home and pour water over them. Never place them in plastic, paper or wooden containers or with other rubbish if still warm.
	Yes	
	No	
27.	<i>If you have a log or pellet burner, is it in good working order?</i>	Free standing wood burners and pellet burners may be durable for five years or less and in-built burners may be durable for 15 years or less (check the New Zealand Building Code). You need to get your burner checked for safety on a regular basis.
	Yes	
	No	
28.	<i>If you use an open fire or log or pellet burner, do you check and clean the chimney regularly?</i>	If you have an open or solid fuel fire, you need to have the chimney cleaned once a year.
	Yes	
	No	
29.	<i>Are there things (like furniture, curtains) closer than a meter to your heater, open fire or log or pellet burner?</i>	
	Yes	Remember the Heater-Metre rule. Keep children, furniture, clothing and anything else that could catch fire at least one metre from heaters and fire-places. Ensure you use a spark guard or fire screen with an open fire.
	No	
30.	<i>Does anyone in your household sit closer than a metre from the heater, open fire or log or pellet burner?</i>	Remember the Heater-Metre rule. Keep children, furniture, clothing and anything else that could catch fire at least one metre from heaters and fire-places. Ensure you use a spark guard or fire screen with an open fire.
	Yes	
	No	
31.	<i>Does anyone in your household dry clothes in front of the open fire, log or pellet burner or heater?</i>	
	Yes	Remember the Heater-Metre rule. Keep children, furniture, clothing and anything else that could catch fire at least one metre from heaters and fire-places. Ensure you use a spark guard or fire screen with an open fire.
	No	

	Fire safety	
32.	<i>Do you have smoke alarms installed in your dwelling?</i>	<p>Fires start quietly and grow quickly. Far more New Zealander's die from being overcome from smoke than from flames. When you're asleep, you can't smell smoke so a smoke alarm is a priceless early warning system.</p> <p>You don't know where a fire will start so you should have smoke alarms in every hallway, bedroom, living area and every level of your home.</p> <p>Install them on the ceiling as close to the centre of the room as possible. For more information about where to place smoke alarms check out http://www3.fire.org.nz/cms.php?page=776</p>
	Yes	You're four times more likely to survive a fire if you have working smoke alarms in your home
	No	
33.	<i>Do you test your smoke alarms regularly (that is, to ensure they are in working order or need there batteries changed)?</i>	<p>Are your smoke alarms working? Dust in the smoke alarm can stop it from working and cause nuisance false alarms. Gently dust the alarm with a vacuum cleaner brush every 6 months. Replace any smoke alarms that are not working or are over 10 years old.</p> <p>Seniors are at far greater risk of having fire in their home than any other emergency (such as an intruder). Working smoke alarms could save their life.</p>
	Yes	
	No	Test smoke alarms each month by pushing the test button to ensure it beeps (you may need to use a broom handle to reach it). Change the battery when the unit starts 'cheeping'. A good practice is to change you smoke alarm batteries when you change your clocks for daylight saving.
34.	<i>What additional fire protection equipment do you have?</i>	
	Sprinkler system	Sprinklers, like smoke alarms, save lives. They are also the most cost effective means of protecting a house fire from a serious fire. Sprinklers can be installed in a number of ways. However, most homeowners are likely to choose the combined system which combines the house plumbing system and the fire sprinkler into one. Fire is fast – home sprinklers and hardwired interconnected smoke alarms are effective.
	Fire extinguisher	If you have a fire extinguisher, do you know how to use it? There are many fire extinguisher training courses available. Or see http://www3.fire.org.nz/cms.php?page=785 for more information.
	Fire blanket	
	Garden hose	Keep your garden hose connected
	Other	
	None	

35.	<i>Do you have an escape plan in case of a fire in your dwelling?</i>	Work out an escape plan to suit your home and talk about it with everybody in the house. Have a safe meeting place outside, such as a letter box or special tree.
	Yes	Get down, get low, get out – smoke is poisonous get underneath it by crawling along the floor to get out. Shut the doors behind you to stop the spread of fire. Get out and star out – never go back inside. Shout Fire! Fire! Fire! To warn others. Gather at your planned meeting place – such as your letterbox. Phone 111 from a safe place – tell the operator your: house number, street, nearest intersection, suburb and city, rural ID number if you have one. Wait for the Fire Service to arrive and tell them where the fire is and if anyone is still inside.
	No	If you live in an apartment building it's a good idea to carry out a fire safety survey of your apartment and the building to find out – what type of fire alarms the building has, the number of exits from your own apartment, the number of exits from your floor to the outside of the building, is there emergency lighting? If you live in a high rise apartment always call 111 in an emergency – you might be the first person to have done so. Keep an emergency kit ready – torch, paper mask, bottle of water, spare front door key to hang around your neck. Know the fire alarm signals, know where the exits are if you are going to have to walk the stairs, be decisive – after all it's your life, if you are going to evacuate, do it quickly, take the door key with you in case you can't use the exit stairs due to smoke and have to go back to your apartment, if you are going to stay know how to protect yourself for as long as possible if you do get trapped and before walking out to the final exit at street level check nothing or no one is going to land on you.
36.	<i>Have you practised the escape plan?</i>	
	Yes	All your family needs to understand the escape plan and practise escaping from each room in the house by the two exits every three to six months.
	No	Children easily get lost or disorientated in smoke. So can adults. A regularly practised escape plan can save lives. If a child has planned and practised an escape plan they are more likely to get out alive in a house fire.
37.	<i>Do you have more than one way to get out of the dwelling in case of a fire?</i>	You need to know two ways out of every room (to escape from fire), always keep keys in deadlocks when you are at home (so that you can get out easily in a fire)
	Yes	
	No	
38.	<i>Are all the ways out of your dwelling clear of furniture, toys and clutter?</i>	Are the passageways clear for a quick escape? You need to make sure your exit doors and windows are easy to open and get through. Also, you need to make sure that there is a safe way to reach ground from any upper floors.
	Yes	
	No	

39.	<i>Do you do a fire check every night before you turn out the light e.g. turning off electrical appliances and clearing clutter from exit?</i>	More than half of all fire deaths occur in homes, mainly while people are sleeping. A quick safety check (using the following questions) before you go to sleep can save you and your children's lives.
	Yes	Are kitchen appliances turned off? Are heaters turned off and furniture and clothes one metre from the heater or fire place? Has the ashtray been emptied into a metal bin outside? Have you disposed of your fire ashes appropriately? Have you switched the television off at the power switch on the set – and not on the remote control's 'standby'? Are all candles out before going to bed? Have you closed the kitchen and living room doors to slow a fire from spreading to bedrooms? Is the house secure with keys in deadlocks? Are the passageways clear for a quick escape? Have you turned off all electric blankets before getting into bed?
	No	

If you need any further information surrounding fire risk and safety please refer to the New Zealand Fire Service website www.fire.org.nz

Fire safety assessment tool for professional assessors: This draft tool includes a list of items that could supplement those already used in a range of assessment tools used by professional assessors in a range of circumstances.

FIRE SAFETY ASSESSMENT TOOL FOR PROFESSIONAL ASSESSORS **Dwelling**

Is the dwelling rented or owner-occupied?

- ₁ Rented
- ₂ Owner-occupied
- ₃ Other

Does the occupant/s have home contents insurance?

- ₁ Yes
- ₂ No

Are there renovations underway that affect movement around the home?

- ₁ Yes
- ₂ No

Are any outbuildings used for sleeping?

- ₁ Yes
- ₂ No

Are all large electrical appliances (refrigerator, microwave, television, heaters) plugged into separate sockets?

- ₁ Yes
- ₂ No

How accessible is the home for moving around?

- ₁ Spacious with little clutter
- ₂ Cramped with little clutter
- ₃ Cramped with clutter
- ₄ Spacious with clutter

Are any of these things near to or against the wall of the dwelling?

- ₁ Trees
- ₂ Vegetation (long grass, etc)
- ₃ Rubbish (papers, discarded Christmas trees, etc)
- ₄ Firewood
- ₅ Abandoned cars

Which of these are used regularly for heating?

- ₁ Radiator heater
- ₂ Portable gas heater
- ₃ Open fire
- ₄ Log or pellet burner
- ₅ Electric blanket

If an open fire or log/pellet burner is in use, is there a safe way to dispose of ashes?

- ₁ Yes
₂ No

If an open fire or log/pellet burner is in use, is the chimney regularly checked/cleaned?

- ₁ Yes
₂ No

Are furniture, curtains or clutter very close to the heater, open fire or log/pellet burner?

- ₁ Yes
₂ No

Does anyone sit very close to the heater, open fire or log/pellet burner?

- ₁ Yes
₂ No

Does anyone dry clothes very close to the open fire, log/pellet burner or heater?

- ₁ Yes
₂ No

Household

Would anyone in the household (on the property) not hear a smoke alarm?

- ₁ Yes
₂ No

Would anyone in the household (on the property) not sense a fire - because they don't have a good sense of smell, or have a hearing or seeing impairment?

- ₁ Yes
₂ No

Would anyone in the household (on the property) need help to get out if there was a fire (e.g., have a disability or an illness or would not know what to do)?

- ₁ Yes
₂ No

If yes to any of the above, is there someone else in the household who could help?

- ₁ Yes
₂ No

Does anyone in the household smoke?

- ₁ Yes
₂ No

If yes, are there any burns marks or holes in any furnishings or clothes?

- ₁ Yes
₂ No

Does anyone in the household cook after (or while) drinking alcohol?

- ₁ Yes
₂ No

Does anyone in the household (including in sleep-outs, etc) use naked flames (e.g. candles, gas cookers, gas heaters)

- ₁ Yes
₂ No

Do any children in the household show an unusual interest in fire?

- ₁ Yes
₂ No

Fire safety

Are smoke alarms installed in the dwelling?

- ₁ Yes
₂ No

Are smoke alarms installed in any outbuildings where people sleep?

- ₁ Yes
₂ No

Are smoke alarms regularly checked for working order and batteries?

- ₁ Yes
₂ No

Is there an escape plan in case of a fire?

- ₁ Yes
₂ No

Has anyone practised the escape plan?

- ₁ Yes
₂ No

Is there more than one way to get out of the dwelling in case of a fire?

- ₁ Yes
₂ No

Are all the ways out of the dwelling clear of furniture, toys and clutter?

- ₁ Yes
₂ No

6. DISCUSSION AND CRITICAL ISSUES

The household risk assessment tools and delivery mechanisms developed as part of this research process reflect research findings about the prevalence and characteristics of risk factors across a range of dwellings and household types. These findings were generated from three data collection processes as well as from Census data. The three data collection processes were: the Household Energy End-Use Project (HEEP); in-depth interviews with 122 householders; and a national survey of 1,600 households. The latter two processes are part of the *Ageing in Place* research programme¹¹ and included people over the age of 60 years. These assessment tools were developed to complement existing fire safety interventions, for instance by ensuring the content is consistent with the messages included in the Fire Service's range of brochures, pamphlets and other fire safety information sources.

Previous research has identified a range of interrelated behavioural, demographic and dwelling factors associated with fire risk, including the occurrence of fires and the appropriateness of people's responses to them. These risk factors include behavioural factors such as unattended or abandoned cooking, careless smoking, unattended burning candles and other naked flames and a reluctance to adopt fire safety measures (e.g., smoke alarms) in the home. These risk behaviours, some of which are linked to or exacerbated by alcohol consumption, are, in turn, linked to personal and household socio-economic status, household composition and dwelling condition. Other demographic factors implicated in fire risk include ethnicity, age and disability, including disability associated with ageing.

The research findings both provide an insight into the prevalence of domestic fires and further substantiate some of the household fire risk factors identified in previous research:

- By far the most commonly identified cause of fires people described in the in-depth interviews was unattended or abandoned cooking, which is implicated in as many as one in three domestic fires. People did not elaborate on the reason for the inattention (e.g., whether it was alcohol related or not) other than attributing the incidents to forgetfulness.
- More than one in ten of the households surveyed and interviewed have householders who smoke inside, with Māori respondents considerably more likely to report having someone in the household who smokes inside. Recent New Zealand research reinforced the link between smoking and fire incidence, especially for males and for Māori.
- Unattended naked flames are identified as a fire risk, for instance when used as lighting or heating in outbuildings used for sleeping or living. The use of naked flames for heating is still relatively prevalent, especially in older homes.

¹¹ This six-year programme is funded by the Foundation for Research Science and Technology

For instance, amongst the HEEP households, 48 percent were regularly using enclosed wood or coal burners or pot belly burners, 34 percent were using LPG heaters and nine percent were using open fires. The cause of one of the fires described by an interviewee was attributed to a wood burner.

- The lack of functioning smoke alarms is an identified risk factor. However, this research gives an unclear signal about the prevalence of working smoke alarms in New Zealand dwellings. Only very rarely had those interviewed or surveyed as part of the *Ageing in Place* installed smoke alarms as part of their dwelling repairs, maintenance or alterations. While this could indicate that most already had smoke alarms, other research would suggest that somewhere between an eighth and a half¹² would not. The results of the *Ageing in Place* research could, therefore, indicate that people still do not know about or value the safety benefits of installing alarms. Both interpretations probably have some validity.
- Similarly, the results relating to fire escape plans may be misleading. While more than one in three people interviewed in the *Ageing in Place* research reported having an escape plan, previous research results suggest that people often think they have an escape plan because they know their way around the house and have thought about how they would get out in the event of a fire. Those with documented escape plans are probably a minority, for instance families that have completed a plan through a school-based initiative.
- While this research does not directly provide further insight into links between fire risk and socio-economic status, it does so indirectly. For instance, the research shows higher prevalence of unwanted fires amongst Māori who were interviewed and surveyed, with that higher prevalence probably as much to do with their socio-economic status as their ethnicity. Other indications of deprivation, including tenure and dwelling condition, are also risk factors and were implicated in fire prevalence. Those research participants who had experienced unwanted fires were more likely to be renters and live in older dwellings.
- Household composition is also a key determinant of fire risk: for instance, fire incidence is higher amongst single-parent and crowded households and in those with older people, children and people with disabilities. As the research documents, household composition is changing in tandem with changes in family formation and increasing longevity. And dwellings themselves are changing. As a general trend, the number of households is increasing and they are getting smaller (including an increase in the proportion of one-person households), but dwellings are increasing in size. Two changes that have implications for the Fire Service are the increasing proportions of single-parent households and older, one-person households (which, in turn, could be

¹² A 2003 *Smoke Alarm Validation Survey* prepared for the Fire Service by NFO New Zealand showed 51 percent households had a working smoke alarm while the latest Fire Knowledge Survey showed 88 percent.

expected to have higher rates of disability). Both these household types are identified as vulnerable to fire risk.

- This research also suggests links between dwelling age and fire risk as well as dwelling condition and fire risk. For instance, those who had experienced an unwanted fire in their homes were more likely to live in an older dwelling (that is, pre-1970) and seldom lived in a new dwelling (that is, post 1991). More than one in two of New Zealand's dwelling stock was built before 1970. The fire risk for people in older houses may be compounded if they fall into the identified vulnerable groups. There is a lack of data to profile housing stock by age and household type and householders. However, the HEEP data and the *Ageing in Place* research together provide some insights. The HEEP data suggested that families with young children might be more likely to live in older dwellings and the *Ageing in Place* data shows that, as people get older, they are more likely to live in newer dwellings. Further research is needed, however, to examine any links between dwelling age, dwelling condition, household composition and householder demographics.

The development of the assessment tools was an iterative process, as described earlier in this report, with feedback loops between the key tasks. During the tool development process it became clear that an interactive tool would be most effective because it would provide the opportunity to inform and educate a wide range of New Zealand households. The key tasks were to:

- Identify the main risk factors to address in tools intended for the assessment of domestic dwellings.
- Identify the best information and advice available to address specific risk factors to ensure people using the tool could prevent fire in their home and respond appropriately if a fire should occur. As described in the previous section (Section 5) the advice embedded in the assessment tools was sourced from existing Fire Service material intended for raising public awareness. This is to ensure than any messages included in the new tools is consistent with other Fire Service interventions. Fire safety specialists were also given the opportunity to review the advice identified and make any changes to improve the content or accessibility of the message and address any ambiguities.
- Conduct a gap-analysis of the information and advice contained in Fire Service resource material to identify gaps in information and advice available to address identified risk factors.

The research findings and review of Fire Service public awareness resources provides a basis for some preliminary evaluation of the relevance of Fire Service interventions. These research processes provide further evidence of the importance and relevance of the following:

- Fire safety messages that address known fire risks, such as 'don't drink and fry'; 'always watch your cooking'; 'take care with naked flames'; 'take care in disposing of smoking debris' and 'dispose of ashes from wood burners and fires safely';

- Targeting of particular messages to particular *at-risk* groups, for instance targeting ‘careful smoking’ messages to Māori; ‘always watch your cooking’ messages to both older people and young men; ‘care around open fires and wood burners’ messages to people in older houses; and escape planning to people living on their own;
- Functioning smoke alarms and, therefore, the continuing importance of fire safety interventions that target their installation and regular checks, especially to renters and landlords;
- Escape plans, including ensuring that all people living on a property are aware of the escape plan and that they regularly practise the escape procedures, especially to renters, people with outbuildings in which people sleep, older people, and people in multi-dwelling buildings (single and multi-storeyed);
- Developing fire safety messages that address the particular risks associated with living in old dwellings and the value of up-grades to the dwelling – for instance, wall linings, external cladding, rewiring, heating sources, and insulation.

The commonality in risk factors suggests some logic in linking policy and programmes relating to home comfort and safety, including energy efficiencies and sustainability, with initiatives to reduce domestic fire risk. This research provides a basis for building those links in practical ways by developing household fire safety assessment tools and identifying practical delivery mechanisms.

7. BIBLIOGRAPHY

- Collier, P and Baker, G. 2004. *Improving the Fire Performance of Polystyrene Insulated Panel in NZ*. New Zealand Fire Service Commission Research Report Number 45.
- CM Research. 2000. *A strategy for developing greater responsibility for fire safety and prevention*. New Zealand Fire Service Commission Research Report Number 3.
- Demo, D. H., and M. J. Cox. 2000. Families with young children: A review of research in the 1990s, *Journal of Marriage and the Family* 62(4): 876-95.
- Duncanson, M, Woodward, A and Reid, P. 2000. *Social & economic deprivation and fatal unintentional domestic fire incidents in New Zealand 1988-1998*. New Zealand Fire Service Commission Research Report Number 5.
- Duncanson, M. 2001. *Cooking, alcohol and unintentional fatal fires in New Zealand homes 1991-1997*. New Zealand Fire Service Commission Research Report Number 16.
- Duncanson, M., Reid, P., Langley, J. and Woodward, A. 2001. *Overview of fire-related mortality data for New Zealand 1991-1997*. New Zealand Fire Service Commission Research Report Number 29.
- Heimdall Consulting. 2005. *Human Behaviour Contributing to Unintentional Residential Fire Deaths 1997-2003*. New Zealand Fire Service Commission Research Report Number 47.
- Heimdall Consulting. 2007. *Risks, Perceptions & Experiences of Fire Amongst Older People*. New Zealand Fire Service Commission Research Report Number 71.
- Hobbs, F. 2005. U.S. Census Bureau, Census 2000 Special Reports, CENSR-24, *Examining American Household Composition: 1990 and 2000*, U.S. Government Printing Office, Washington, DC.
- International Research Institute for Māori & Indigenous Education. 2001. *Interventions in Māori House Fire Mortality Rates through Innovations in Healthy Māori Housing Solutions*. New Zealand Fire Service Commission Research Report Number 14.
- Keilman, N. 2008 European demographic forecasts have not become more accurate during the past 25 years. *Population and Development Review*, 34(1).
- Menchik, P. 2002. *Demographic Change and Fiscal Stress on States: The Case of Michigan*. Department of Economics: Michigan State University.
- New Zealand Council Educational Research. 2000. *Improving the Fire Safety Knowledge & Practices of Vulnerable Groups*. New Zealand Fire Service Commission Research Report Number 8.
- NFO New Zealand. 2003. *Smoke Alarm Validation Survey*. New Zealand Fire Service.
- NIU Development Inc. 2006. *Effective Fire Safety Strategies for Pacific Peoples*. New Zealand Fire Service Commission Research Report Number 60.

- Patel, V. 2003/2004. *Electrical Wiring Systems and Fire Risk in Residential Dwellings*. Ministry of Consumer Affairs.
- Robbins, A, Wade, C, Bengtsson, M, Howard, N and Soia, E. 2008. *Revision of the Cost Effectiveness Analysis of Home Sprinkler Systems including Sustainability*. New Zealand Fire Service Commission Research Report Number 82.
- Roen, K. and Lloyd, M. 2002. *Domestic Fire Prevention: vulnerability and the translation of safety knowledge*. New Zealand Fire Service Commission Research Report Number 25.
- Smith, J., Bullen, C., Laugesen, M and Glover, M. 2008. *Cigarette fires and burns in a population of New Zealand smokers*. Tobacco Control: British Medical Journal Publishing Group Ltd.
- Thomas, P., Rayner, K., and Moroney, M. 2000. *Determining Effective Fire Safety Strategies for Māori. Bay-Waikato Fire Region*. New Zealand Fire Service Commission Research Report Number 2.
- TNS Conversa. 2007. *2007 Fire Knowledge Survey*. New Zealand Fire Service.
- UMR Research. 2007. *NZFS Research Among People with Physical and Sensory Disabilities*. New Zealand Fire Service Commission Research Report Number 68.
- University of Otago. 2000. *Social & economic deprivation & fatal unintentional domestic fire incidents in NZ 1988-1998*. New Zealand Fire Service Commission Research Report Number 5.
- University of Otago. 2001. *Cooking, alcohol and unintentional fatal fires in NZ homes 1991-1999*. New Zealand Fire Service Commission Research Report Number 16.
- Wade, C, Duncanson, M, O'Dea, D and Duncan, C. 2003. *Costs and benefits of regulating Fire Safety performance of upholstered furniture in NZ*. New Zealand Fire Service Commission Research Report Number 35.
- Warren, J, and Proctor, L. 2005. *Developing Indicators of Household Risk & Targeting Interventions*. New Zealand Fire Service Commission Research Report Number 51.