

## **POSITION STATEMENT on Housing**

This position statement and background paper (appended) has been endorsed by the South Island Public Health Partnership and represents the South Island District Health Boards working together to address the harm caused by poor quality housing.

The Southern District Health Board:

- a) Acknowledges that the housing environment is a key setting with impacts on human health and recognises that the links between housing and health are multifaceted and housing may affect health in multidimensional ways.
- b) Recognises that in common with other social determinants of health, such as access to education and conditions of work, healthy housing (i.e. housing that is supportive of good health) is not distributed equitably through society.
- c) Acknowledges the increasing body of evidence which shows an association between housing quality and morbidity from infectious diseases, chronic illnesses, poor nutrition, and poor mental health.
- d) Recognises that the impacts of cold homes on health include excess mortality from cardiovascular and respiratory disease amongst the elderly, increased respiratory problems in children, increased illnesses such as colds and influenza, mental health problems, and the exacerbation of existing conditions such as arthritis and rheumatism.
- e) Acknowledges that a warm home is vital for comfort and good health whilst recognising that many New Zealand homes tend to be cold, with temperatures regularly falling below the World Health Organization's recommendations.
- f) Recognises that world-leading New Zealand research has been able to show that improved health outcomes can be achieved through housing improvements, particularly those involving insulation retrofits and the provision of improved heating sources.
- g) Considers the human right to housing to be much more than simply a right to shelter, but also the right to have somewhere to live that supports good health outcomes. The Southern District Health Board therefore acknowledges the inextricable link between the right to housing and the need for warm and dry, affordable, culturally appropriate and accessible housing that is part of a wider community with easy access to essential services within a healthy environment.

## **Action on housing improvement for improved health outcomes**

The Southern District Health Board recognises the opportunity to contribute to a reduction in the health impacts of poor quality housing and will do so through supporting and advocating for:

- the provision of quality new housing to increase the availability of affordable homes across all tenures (social housing/private renter, owner-occupier),
- the maintenance and growth of a social housing sector that provides quality homes that are accessible to all who need them,
- improved housing quality through the introduction of minimum standards for all New Zealand dwellings (and particularly social housing and private rental properties) e.g. through the adoption of a Warrant of Fitness/Healthy Housing Index assessments,
- programmes that support appropriate home management practices (ventilation, moisture level management, warmth retention, effective use of heating sources),
- ongoing investment in programmes to provide insulation retrofits and safe heating options (including calling for a ban on the sale and use of unflued gas heaters designed for indoor use, and an end to fuel poverty),
- the opportunity for communities and families to shape the place they live, including access to housing that meets and supports their needs throughout the life course, and
- actions that address health equity, related to housing, for District Health Board populations with a focus on Māori and Pacific peoples and those experiencing greater deprivation.

Working alongside local government and other partner agencies, the Southern District Health Board can advocate for a whole of government approach to addressing housing issues, and in so doing can play a role in facilitating and supporting processes which lead to long term improvements in housing, and ultimately equity of health outcomes for all New Zealanders.

## **Air Quality**

Action on improving air quality needs to be undertaken in parallel with promoting warm homes. Please refer to Southern District Health Board position statement on Air Quality.

# Background Paper of Supporting Evidence to the South Island Alliance

## **POSITION STATEMENT on HOUSING**

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**Prepared by the South Island Analyst Network**

**For the South Island Public Health Partnership Group**

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## Introduction

The housing environment has long been recognised as a key setting with impacts on human health. It is generally agreed that the links between housing and health are multifaceted and as a consequence housing may affect health in multidimensional ways.

The Universal Declaration of Human Rights recognises the right to housing as integral to the right to an adequate standard of living. Article 25 (i) states that:

‘Everyone has the right to a standard of living adequate for the health and wellbeing of himself and of his family, including food, clothing, housing and medical care and necessary social services and the right to security in the event of unemployment, sickness, disability, widowhood, old age and other lack of livelihood in circumstances beyond his control.’

In common with other social determinants of health, such as access to education and conditions of work, healthy housing (i.e. housing that is supportive of good health) is not distributed equitably through society. It has been argued that access to high-quality, affordable housing in neighbourhoods which promote health and wellbeing is one of the most unequally distributed of all the social determinants of health (Tweed, 2017). It has previously been identified, for example, that Māori and Pacific peoples are more likely than non-Māori and non-Pacific to live in rental or temporary accommodation and to experience crowded living conditions (Kearns, Smith, & Abbott, 1991; Koloto & Associates, New Zealand Institute of Economic Research, & Gray Matter Research Ltd, 2007; Robson & Cormack, 2007).

‘...the distribution of health and wellbeing needs to be understood in relation to a range of factors that interact in a complex way. These factors include whether you live in a decent house’ (Marmot, 2010).

This paper offers a brief overview of the New Zealand housing context and highlights the key housing factors associated with poor health outcomes and specific health issues. The paper concludes by offering a summary of the current evidence regarding interventions and approaches to improve housing that have been found to lead to health improvement.

## Overview of housing in New Zealand

According to 2015 estimates prepared by Statistics New Zealand the country’s private dwelling stock is 1.8 million of which about 1.7 million dwellings are usually occupied (the balance includes private dwellings not normally occupied such as second homes, holiday homes and vacant dwellings). The majority of these households (64 percent) are owner-occupied (i.e. the people own the dwelling with or without a mortgage) and 32 percent of householders rent the dwelling in which they reside (Statistics New Zealand, 2015a). Statistics New Zealand (2015a) has reported that the proportion of households renting has increased over time with only 23 percent of households reporting that they rented their dwelling in 1991. The proportion of those reporting that they own their dwelling (with or without a mortgage) has correspondingly reduced from 74 percent in 1991.

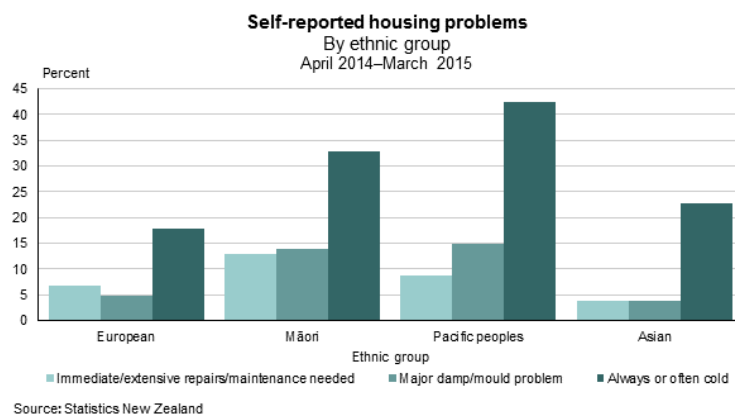
The decline in the proportion of people living in an owner-occupied dwelling has occurred at a faster rate for Māori and Pacific people than for the total population (this proportion includes all people living in households, including children). The proportion of the total population living in an owner-occupied dwelling fell 15.3 percent between 1986 and 2013 but in the same time period the proportion for Pacific people fell by 34.8 percent and by 20 percent for Māori (Statistics New Zealand, 2016).

The BRANZ Housing Condition Survey (HCS), undertaken five-yearly since 1994, offers a snapshot of the state of New Zealand housing. The findings of the 2015 HCS (560 homes were surveyed across the country, including an on-site assessment; comprising 411 owner-occupied and 149 rental properties) indicate that rental housing is generally in poorer condition than owner-occupied houses with assessors twice as likely to rate rental properties as ‘poorly maintained’ compared with owner-occupied homes (White, Jones, Cowan, & Chun, 2017).

Eighteen percent of the rental properties surveyed were judged by the assessor as ‘feels a little damp’, a further 10 percent were judged ‘damp in places’ and 3 percent as ‘quite damp’ or ‘damp throughout’. Consequently some 31 percent of rental houses felt damp to some extent compared with 11 percent of owner-occupied houses (White et al., 2017). Although mould was visible (to at least some extent) in around half (49%) of all houses surveyed the proportion was somewhat higher in rental properties (56%) compared with owner-occupied properties (44%) (White et al., 2017).

The 2014 New Zealand General Social Survey asked over 9000 participants (aged >15 years) about housing quality. Participants were asked questions about dampness, cold and the general condition of the dwelling in which they resided. Nearly half of respondents reported living in a cold house and 21 percent of those surveyed indicated that their homes were often or always cold (Statistics New Zealand, 2015c). Māori and Pacific people were more likely to report that their home was cold or damp (see Figure 1. below (Statistics New Zealand, 2015c)).

Figure 1. Self-reported housing problems



New Zealand houses tend to be older, of lighter construction and more poorly insulated than countries with similar climates (Wilton, 2004) and consequently are under-heated by international standards (Philippa Howden-Chapman et al., 2009). For example, the Household Energy End-use project monitored room temperatures and found that the average temperature achieved in South Island living rooms was only 17°C and nearly one third of households were identified as having an average winter temperature in the living area below 16°C. Bedrooms were found to be mainly unheated with only 20 percent of households heating this area of the house (Wilton, 2004).

The World Health Organization has recommended a minimum indoor temperature of 18°C and a 2-3°C warmer minimal temperature for the very young and the very old. Temperatures below 16°C, particularly in the presence of high humidity, are associated with adverse health consequences and temperatures below 12°C are a health risk for vulnerable groups (Ormandy & Ezratty, 2012).

## Housing and Health

### Defining healthy housing

'Healthy Housing' is a complex construct which encompasses much more than the physical structure of the home. The World Health Organization has conceptualised housing as a four-dimensional model, encompassing the physical structure of the dwelling, the meaning of home to individuals and families, the community, and the immediate external housing environment (see Figure 2. below).

Figure 2. The four dimensions of housing



The four dimensions of housing incorporate:

- The home – the social and psychological aspects of the house, including safety and privacy.
- The dwelling – includes the physical structure and condition of the dwelling, its design and characteristics; the level of occupancy for size, indoor air quality, indoor temperature and humidity, affordability and tenure.
- The community – the social characteristics of the community, for example the level of social cohesion, trust and collective efficacy promoted by public places and social facilities.
- The immediate environment – includes the quality of urban design, such as access to green space and public services as well as general environmental conditions within neighbourhoods.

Aspects of these four dimensions can affect health through physical, psychological and social mechanisms and each element can interact with others, reflecting the complex relationship between housing and health. For example, matters such as affordability, suitability (i.e. adequate space and privacy), security of tenure, relationships with neighbours, accessible location for work and other basic facilities (e.g. access

to food, schooling etc.) are all encompassed by the four dimensions and as such may have a protective or negative impact on health (Archer, Murie, Turkington, & Watson, 2016; Bonnefoy et al., 2004).

It is generally accepted that housing which is supportive of good health will be dry (a damp house provides an ideal environment for moulds and mites), clean (e.g. sanitation, personal and domestic hygiene, and food safety are addressed), pest-free, safe (e.g. trip/falls hazards reduced, smoke alarms installed), contaminant-free (e.g. free of secondhand smoke, lead paint), appropriately ventilated/thermally controlled, and generally well-maintained (E. Baker, Lester, Beer, Mason, & Bentley, 2013; National Centre for Healthy Housing, 2018; Ranson, 1988).

### Housing factors contributing to poor health outcomes

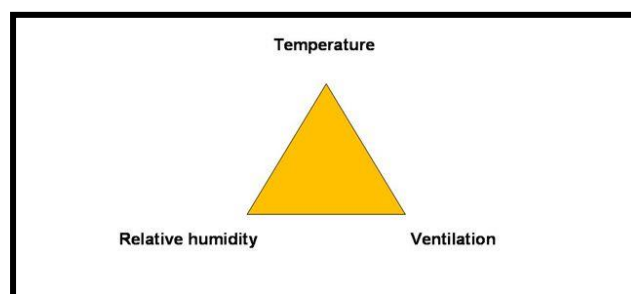
Although clearly there are multiple housing variables associated with human health and safety, the following are recognised as key contributors to poor health outcomes:

- Temperature, humidity and ventilation
- Overcrowding
- Fuel poverty
- Affordability

### Temperature, humidity and ventilation

A healthy indoor environment is achieved through balancing temperature, moisture levels (relative humidity) and ventilation (see Figure 3.<sup>1</sup>). An imbalance of one factor alone can impact on the indoor environment to the detriment of the occupants.

Figure 3. A healthy indoor environment requires a balance of factors Source: Beacon Pathway



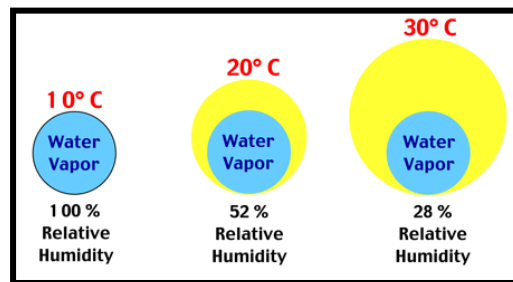
A healthy home will be warm in winter and cool in summer. Insulation enables even temperatures to be maintained by providing a barrier that slows the movement of heat to the exterior of the house. Good insulation ensures that the energy used within the home can warm the home rather than the outdoors. Without insulation, approximately 42 percent of heat escapes through the roof, 10 percent through the floor and 24 percent through the walls. Insulation also helps to reduce overheating in summer months – ceiling insulation contributes to this process particularly by acting as a buffer, to the ceiling cavity, and reducing the amount of radiant heat absorbed into the home through the roof.

<sup>1</sup> [http://www.beaconpathway.co.nz/new-homes/article/balancing\\_temperature\\_moisture\\_and\\_ventilation](http://www.beaconpathway.co.nz/new-homes/article/balancing_temperature_moisture_and_ventilation)



The term humidity describes the fact that the atmosphere can contain water vapour. The amount of humidity found in the atmosphere varies because of a number of factors. Two important factors are evaporation and condensation. Relative humidity can be simply defined as the amount of water in the air relative to the saturation amount the air can hold at a given temperature multiplied by 100. Figure 4. (below) shows how relative humidity changes in a parcel of air with an increase in temperature. Increasing the temperature of a parcel of air, without adding or removing water, increases its ability to hold water vapour.

Figure 4. The concept of relative humidity (Pidwirny, 2006)



Mould thrives in conditions where humidity is greater than 70 percent and where there are cold surfaces on which condensation can form, such as uninsulated walls, ceilings and windows. Relative humidity for housing should be between 40 and 50 percent and in addition to preventing condensation (through both insulation and the use of extractor fans in kitchens and bathrooms, vented clothes dryers etc.) the opportunity for moisture to enter the home needs to be reduced by utilising appropriate ventilation techniques to ensure an environment where mould cannot flourish (Collins, K. as cited in P. Howden-Chapman, Signal, & Crane, 1999).

Ideally modern ventilation methods ensure fresh air is provided to a household ensuring that, in spite of the increased airtightness of modern builds, moisture and other airborne pollutants do not build up within the house.

### Overcrowding

Statistics New Zealand use the Canadian National Occupancy Standard<sup>2</sup> as a measure of household crowding. The Standard defines household crowding as a deficit of at least one bedroom when the standard is applied to a household. It is recognised that such a definition of crowding is more likely to reflect the dominant ethnic group (Koloto & Associates et al., 2007). Consequently when applying this standard the 2006 census revealed that household crowding amongst Māori was four times that of New

<sup>2</sup> Canadian National Occupancy Standard - no more than two people per bedroom; couples share a room; children under five of either gender, or under 18 of the same gender can share a room; children aged five to 17 should not share a room with a child under five of the opposite gender; single adults and unpaired children require a separate room (Statistics New Zealand, 2015b).

Zealand Europeans, and overcrowding amongst Pacific peoples was eight times that of New Zealand Europeans.

Households are also more likely to be crowded if they have a younger age structure, have more dependent children, contain two or more families, or are a single parent family. Both Pacific and Māori whānau are more likely than European families to live in extended family groups representing more than two generations and are often living in homes built to house a traditional European nuclear family. Household crowding may therefore be affected by both affordability and suitability.

According to Environmental Health Indicators New Zealand (EHINZ) 10.1 percent of people lived in a crowded house in 2013 and 3.3 percent in severely crowded houses (i.e. requiring more than two more bedrooms). Māori and Pacific people were more likely to live in a crowded house with 40 percent of Pacific people and 20 percent of Māori reporting this compared with 5 percent of Europeans/Other ethnicity (Environmental Health Indicators New Zealand, 2018).

EHINZ reports that nearly 16 percent of children lived in a crowded house in 2013 and of these a third (5.2 percent) were living in severely crowded houses. Māori and Pacific children were more likely to be impacted by household crowding than children of other ethnicities. Nearly 25 percent of Māori children and 43.4 percent of Pacific children were living in crowded houses, as defined by the Canadian standard, in 2013 (Environmental Health Indicators New Zealand, 2018).

In addition to ethnicity a number of other factors associated with higher likelihood of household crowding have been identified and include living in a rental house, being a member of a multi-family household, having a low equivalised household income, being unemployed and lacking educational qualifications (M Baker, Goodyear, Telfar Barnard, & Howden-Chapman, 2012).

Geographically, crowding is reported by EHINZ to occur more often in the North Island where 11.7 percent of the population were living in crowded households (in 2013) compared with 5.1 percent of the South Island population (Environmental Health Indicators New Zealand, 2018).

### Fuel poverty

In New Zealand it has been estimated that 25 percent of households are in fuel poverty (O'Sullivan, Howden-Chapman, & Fougere, 2015). Fuel poverty is typically defined as needing to spend more than 10 percent of net annual household income to heat a residential dwelling to an adequate standard of warmth. A fuel poor household is one that is forced to spend more than 10 percent of income on heating, or to deliberately live in a cold home due to under-consuming energy, in order to save money (Marmot Review Team, 2011). An alternative definition was adopted in England in 2013. The 'low income high costs' definition considers a household as fuel poor if its income is below the poverty line (taking into

account energy costs) and its energy costs are higher than would be considered typical for the household type (Archer et al., 2016).

The key factors contributing to fuel poverty are household income, the cost of energy, and the energy efficiency of the dwelling. Although a household may be in fuel poverty on a relatively high income, fuel poverty is more closely linked to low incomes as 'the likelihood of living in inappropriate or poor housing conditions is greater among those experiencing poverty' (Archer et al., 2016, p. 18).

A New Zealand study used two postal surveys conducted in 2010 and 2011, followed by a qualitative research phase in 2012 to explore different methods of measuring fuel poverty among those using prepaid metering to purchase electricity. Describing fuel poverty as a 'complex and pervasive policy problem' (p. 99), O'Sullivan et al. (2015) found that prepayment metering offers a useful proxy for identifying households in fuel poverty. Respondents variously reported that they had:

- spent less on electricity than required,
- been unable to pay utility bills in the last year,
- self-disconnected in the past year,
- stayed in bed to avoid heating, and
- cut back on groceries to pay for electricity (O'Sullivan et al., 2015).

An Australian study found that the health and wellbeing of low-income households was suffering due to sustained high energy costs. Chester (2013) found that the households participating (via an online survey, interviews and focus groups) were never or rarely leaving home (although some focus group attendees reported frequenting large shopping malls when it was very hot or very cold), were using only one room, were taking shorter (or occasionally, no) showers, were watching less television, and were going to bed fully clothed (or early) to avoid the use of heating.

Families were also using a common sleeping room when cold, and reported rarely inviting friends or extended family to their home in order to avoid using cooking appliances and/or worrying about the room temperature being uncomfortable. In addition to these measures, households were cutting expenditure on essentials such as food, and other items in order to reallocate the money to energy bills (Chester, 2013).

The Marmot Review Team (2011) reported that people living in fuel poverty are often faced with the choice to 'heat or eat' meaning that either less is spent on the basics such as a healthy diet, or less on heating the dwelling to a reasonable temperature.

Some households in New Zealand use unflued gas heaters as a way to budget energy costs (refilling the gas bottle as money allows). Despite a relatively low purchase price unflued gas heaters are the most expensive form of heating per unit of energy, and pose a health risk through the emission of toxic gases

to the indoor environment, the risk of fire and explosion, and the release of water vapour promoting damp and mould (Energy Efficiency and Conservation Authority, 2017; Ministry of Health, 2012).

Although the use of unflued gas heaters in New Zealand has declined over the last decade, the 2010 BRANZ House Condition Survey found that 25 percent of rental households and 17 percent of owner occupied households participating in the survey (representative selection) were using unflued gas heaters (Buckett, Jones, & Marston, 2012). It has been noted that the burden of unflued gas heating is borne disproportionately by those in lower socioeconomic groups, and by single parent, and Māori families (Gillespie-Bennett, Keall, Howden-Chapman, & Baker, 2013). Warnings about the dangers of unflued gas heater use have been issued by many agencies including the New Zealand Energy Safety Service, the Ministry of Health, the Energy Efficiency and Conservation Authority, local authorities and regional public health services. In 2015 the Canterbury District Health Board adopted a position statement advocating for the prohibition of unflued gas heater sales in New Zealand.<sup>3</sup>

#### Affordability

When the proportion of income spent on housing becomes too great, accommodation can become unaffordable and result in compromises being made regarding living arrangements. It can also limit a household's ability to acquire basic necessities such as food, clothing and health care. The Ministry of Social Development's 'Social Report 2016'<sup>4</sup> defines affordable housing as housing costs that do not exceed 30 percent of the disposable income of a household. The proportion of New Zealand households spending more than 30 percent of their disposable income on housing costs has risen since the late 1980s. In 2014, 27 percent of New Zealand households are reported to have spent more than 30 percent of their disposable income on housing, 15 percent to have spent more than 40 percent, and eight percent spent more than 50 percent of their disposable income on housing costs (Ministry of Social Development, 2016).

In 2014, 34 percent of children aged under 18 years lived in households that spent more than 30 percent of their disposable income on housing costs. Due to small numbers, results by ethnicity were averaged over the period 2011-2014 and indicate that 23 percent of Europeans, 34 percent of Pacific peoples, 30 percent of Māori, and 40 percent of the Other ethnic group were living in households spending more than 30 percent of their disposable income on housing costs over this time period. The authors note that this ranking has persisted over the life of the survey (i.e. 1988-2014 inclusive)(Ministry of Social Development, 2016).

An American study exploring housing affordability and health using data from the 2008 Southeastern Pennsylvania Household Health Survey (10,004 resident participants) found that the financial strains of unaffordable housing were associated with households making trade-offs with the potential to harm

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<sup>3</sup> [Unflued Gas Heaters Position statement and background paper for the Canterbury District Health Board](#)

<sup>4</sup> <http://socialreport.msd.govt.nz/documents/2016/msd-the-social-report-2016.pdf> Accessed April 2018

health. For example, those living in unaffordable housing were more likely to report poor self-related health, cost-related healthcare non-adherence and cost-related prescription non-adherence. Fair or poor self-reported health and cost-related healthcare non-adherence showed significant interaction effects between affordability and housing tenure. For both these outcomes the effect among renters was greater than for home-owners (Pollack, Griffin, & Lynch, 2010).

For information regarding housing affordability in the New Zealand residential market the reader is referred to the Massey University Real Estate Analysis Unit. The Home Affordability Report<sup>5</sup> is produced quarterly and takes into account the cost of borrowing as well as house prices and wage levels. In addition, a new housing affordability measure is being trialled by the Ministry of Business Innovation and Employment. The experimental measure explores housing affordability for two groups: first home buyers and renters.<sup>6</sup>

### Housing and associated health issues

An increasing body of evidence has shown an association between housing quality and morbidity from infectious diseases, chronic illnesses, injuries, poor nutrition, and poor mental health (M. Baker, Keall, Au, & Howden-Chapman, 2007; Bonnefoy, 2007; Kreiger & Higgins, 2002; Marmot Review Team, 2011). Surveys indicate that New Zealanders spend about 70 percent of their lives in the indoor home environment with the very young, the elderly and those with disabilities and chronic health conditions spending the most time in the home environment (M. Baker et al., 2007). This has significant health implications particularly when a dwelling is not providing a healthy living environment for occupants. An Australian study investigating housing conditions and the health outcomes of household members (using surveys and face-to-face interviews) found that those in the worst health were also more likely to be living in housing that was contributing to their poor health (E. Baker et al., 2013).

### Excess winter mortality<sup>7</sup>

L. Telfar Barnard (2010) found that hospitalisation in New Zealand was higher in winter; higher in the very young and older people, among Māori and Pacific people; and that it increased with increasing levels of deprivation. Winter hospitalisation was higher among those living in villas and pre-war bungalows than in post-war bungalows and quality bungalows. Winter mortality rates in New Zealand between 1980 and 2000 were 18 percent higher than expected from non-winter rates, similar to rates in the United Kingdom and above those seen in Scandinavia (Davie, Baker, Hales, & Carlin, 2007). Excess winter mortality is not directly related to climatic conditions, with higher rates often found in countries with milder winters (Vasconcelos, Friere, Morais, Machado, & Santana, 2011). For example, cold countries with more energy

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<sup>5</sup> Available at: <http://www.massey.ac.nz/massey/learning/colleges/college-business/school-of-economics-and-finance/research/mureau/home-affordability-report.cfm>

<sup>6</sup> <http://www.mbie.govt.nz/info-services/housing-property/sector-information-and-statistics/housing-affordability-measure/latest-results>

<sup>7</sup> Excess winter mortality (EWM) can be described as the ratio between average daily deaths across winter, and the other months of the year.

efficient housing and high building standards such as Finland and Germany have lower excess winter mortality compared with Spain, Ireland and Portugal (Marmot Review Team, 2011; Vasconcelos et al., 2011).

A study investigating the trends and determinants of excess winter mortality in New Zealand established, in common with international findings, that excess winter mortality is a particular problem for those in older age groups, with those aged eighty or older 66 percent more likely to die in winter than expected. In addition, the study identified that New Zealand infants and children are also at higher risk of death, particularly from respiratory-related causes. Children under five years of age were estimated to have a mortality associated with respiratory disease almost 2.5 times higher in winter than expected (Davie et al., 2007).

Hales, Blakely, Foster, Baker, and Howden-Chapman (2012) found that excess winter mortality in New Zealand varied by household income with those in the lowest income tertile at higher risk of death in winter than those in the highest tertile. Those renting also had a higher risk of winter death compared with homeowners. The authors suggest that these findings are potentially explained by the existence of an income gradient in housing quality in New Zealand (Philippa Howden-Chapman et al., 2009) and that in addition poorer households are more likely to be suffering fuel poverty and to be spending longer periods of time at home in low temperatures (Hales et al., 2012; Lloyd, 2006).

#### Thermal discomfort

The impacts of cold homes on health include excess mortality from cardiovascular and respiratory disease amongst the elderly, increased respiratory problems in children, increased illnesses such as colds and influenza, mental health problems, and the exacerbation of existing conditions such as arthritis and rheumatism (Marmot Review Team, 2011).

In addition, cold housing has been found to negatively affect children's educational attainment, and emotional wellbeing and resilience; to increase the risk of accidents and injuries in the home (due to lost dexterity), and in association with fuel poverty, to impact dietary opportunities and choices within households, and negatively impact the mental health of all age groups (Marmot Review Team, 2011). Those most at risk include the elderly, the very young and those suffering chronic physical and mental health conditions (Marmot Review Team, 2011; Ormandy & Ezratty, 2012). In New Zealand, older people, young children and people with long term illnesses have been found to be the most vulnerable to the effects of cold homes, and these groups have also been identified as spending the most time at home (M. Baker et al., 2007).

The Pacific Families: First Two Years of Life (PIF) study interviewed 1376 Pacific mothers when their children were six weeks old. Over half (53.8%) of those interviewed reported having a cold home and

housing dampness or mould were reported by 509 (37%) mothers. Nearly 30 percent of those interviewed reported both issues as problematic. Following multivariate analyses the PIF study found a small but significant association ( $p < 0.01$ ) between damp/mouldy housing and a risk of having asthma (adjusted OR=1.82; 95% CI= 1.18-2.83) and probable depression ( $p < 0.05$ ; adjusted OR=1.4; 95% CI=1.02-1.91). Cold housing was significantly associated ( $p = 0.02$ ) with asthma (adjusted OR=1.73; 95% CI=1.10-2.71) and probable depression ( $p < 0.01$ ; adjusted OR=1.57; 95% CI=1.14-2.15) (Butler, Williams, Tukuitonga, & Paterson, 2003), supporting earlier research highlighting an association between deprivation, ethnicity and health (Kearns et al., 1991; Salmond, Crampton, Hales, Lewis, & Pearce, 1999).

As temperatures fall below 18°C the potential health impacts become more serious. Low temperatures cause thickening of the blood and hypertension, increasing the risk of cardiovascular or cerebrovascular events. Below 16°C the risk of respiratory distress increases and below 12°C the risk of cardiovascular stress increases (Ormandy & Ezratty, 2016).

It is important to note that excess heat can also have serious health impacts. Significant excess mortality is associated with heat waves due to the significant short-term effect of ambient temperature on morbidity, i.e. heat-related impacts can occur soon after exposure (Ye X et al, 2012; McMichael, 2008 as cited in Ormandy & Ezratty, 2016). Exposure to high temperatures can increase the risk of heat stroke and other issues such as cardiovascular and respiratory hospitalisations and deaths (Anderson et al, 2013; Hoshiko et al, 2010 as cited in Ormandy & Ezratty, 2016). Those most at risk of severe heat-related impacts are those with chronic conditions, mental health conditions, reduced mobility or being bed-ridden, and those who are living alone (Ormandy & Ezratty, 2016).

Although the impacts of excess heat are less than those caused by excess cold in New Zealand, it has been predicted that the number of heat-related deaths may increase due to climate change. There are on average 14 heat-related deaths each year in people aged over 65 in Auckland and Christchurch and this is estimated to increase to 28, 51 and 88 deaths for temperature increases of 1, 2 and 3 degrees Celsius, respectively (Ministry of Civil Defence and Emergency Management, 2010).

### Household crowding

In New Zealand, household crowding has been found to be associated with an increased risk of gastroenteritis, pneumonia/lower respiratory tract infection, *Haemophilus influenzae* disease, respiratory syncytial virus, and bronchiolitis. Statistically significant associations between household crowding and the risk of hepatitis A, *H. pylori* infection, meningococcal disease, tuberculosis and trachoma have also been identified (M. Baker, McDonald, Zhang, & Howden-Chapman, 2013). The authors note that the contribution of crowding was particularly large for some diseases. For example, the meta-analysis showed the risk of meningococcal disease was strongly associated with household crowding with an estimated 34

percent of the disease burden for Pacific children attributed to household crowding (45 percent exposed to household crowding) and for Māori children (28 percent exposed to household crowding) an estimated 23 percent of the disease burden was attributed to household crowding (as opposed to 9 percent in European/Other children of whom only 8 percent were reported as being exposed to household crowding) (M. Baker et al., 2013).

M. Baker et al. (2012) found that infectious diseases make the largest contribution to acute hospital admissions of any cause in New Zealand. As well as identifying increasing age-standardised rates for infectious diseases compared with rates for non-infectious disease admissions, the authors found that the risk of an infectious disease was heightened in Māori and Pacific peoples, amongst the youngest and oldest groups and in the most economically deprived populations. The authors suggest that the pattern of increasing incidence of infectious diseases in addition to rising inequalities are likely to be caused by ‘fundamental social determinants such as disparities in income, housing conditions, and access to health services’ (M. Baker et al., 2012, p. 1118).

The complex relationship between housing and health has been illustrated and summarised as follows by the Scottish Public Health Network:

*Table 1. Overview of the complex relationship between housing and health (summarised) (Tweed, 2017)*

<b>Bi-directional</b>	Housing can influence health but health may also influence housing through employability and financial status, and constraints on housing design and location.
<b>Multi-dimensional</b>	Many different aspects of housing have the potential to influence many aspects of health at the individual, household and community level.
<b>Context-dependent</b>	How housing affects health may vary between different places, eras, and populations.
<b>Direct and indirect</b>	Housing may affect health directly through exposure to specific hazards such as dampness, cold, noise, or overcrowding, but indirect effects are also important. For example, high housing costs can reduce households’ access to other health promoting factors such as nutritious food or leisure activities; the availability of affordable housing in a particular area can constrain or facilitate access to good employment.
<b>Individual experience, local environment, and societal context</b>	Particularly those relating to socioeconomic circumstances.
<b>Population groups</b>	Children and older people may be more vulnerable to the effects of poor housing as they tend to spend a greater proportion of their time within the home. Young people may also be vulnerable at the point they transition out of the family home. Certain ethnic groups, migrants, and refugees may be less familiar with their housing rights or be disadvantaged by language barriers, discrimination and/or a precarious financial situation.

### [Housing improvement for improved health outcomes: evidence to inform action](#)

A recent Cochrane review investigating whether or not investment in housing improvement was linked to health improvement, found that housing investment to improve the thermal comfort of homes can lead to health improvements. Improvements in health were most likely when thermal improvements



were targeted to those living in inadequate housing conditions (particularly cold homes), and those experiencing poor health (e.g. a chronic respiratory disease) (Thomson, Thomas, Sellstrom, & Petticrew, 2013).

The review identified that absences from school and work may be reduced when households are provided with adequate and affordable heat. Housing which was appropriate in size for the householders and also affordable to heat, was found to be linked to improved health outcomes and also appeared to promote improved relationships within and beyond the home. It was noted that when households are able to heat more of the dwelling, this increases the amount of useable living space which can in turn positively influence how the home is used, and privacy for household members (Thomson et al., 2013).

Informed by focus groups, household surveys, interviews and open forums with the Tokelauan community, the 'Tokelauan House' action research project culminated in a series of design workshops and ultimately a demonstration house was built in Wellington, New Zealand in 2007 (Gray & McIntosh, 2011). The partnership between the Wellington School of Medicine and the Wellington Tokelau Association was focused on designing a multi-family state house which would be appropriate, sustainable and affordable.

As well as addressing cold, damp and mould issues, socio-cultural demands for privacy regulation and supervision were achieved in the project through 'the design of the building layout and the relationships between circulation public and private areas' (Gray & McIntosh, 2011, p. 87). Those living in the dwelling were able to alter how spaces were used and consequently to adjust to any changes in household composition. The family reported that they were less crowded, were experiencing less illness, were having fewer privacy issues, 'appreciated the sense of space and light' (Gray & McIntosh, 2011, p. 89), and felt that their family life had improved.

The 'Housing, Insulation and Health'<sup>8</sup> study which involved retrofitting older New Zealand houses with insulation has shown that the initiative increased indoor temperatures and decreased relative humidity (P. Howden-Chapman et al., 2007). This study (identified by and included in the Cochrane review above) involved 1350 randomised households in low income communities in New Zealand in which at least one family member had reported respiratory symptoms in the previous year (or had a history of asthma, pneumonia or chest infections). Insulating existing houses was found to result in statistically significant improvements in self-rated health (adjusted odds ratio 0.50, 95% CI 0.38 to 0.68), self-reported wheezing in the past three months (0.57, 0.47 to 0.70), days off work (0.62, 0.46 to 0.83) and school (0.49, 0.31 to 0.80), and visits to a general practitioner (0.73, 0.62 to 0.87) (P. Howden-Chapman et al., 2007). A cost-

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<sup>8</sup> Research led by University of Otago, Wellington

benefit analysis of the intervention concluded that the health and energy benefits outweighed the cost of insulation by a factor of one and a half to two (Chapman, Howden-Chapman, Viggers, O’Dea, & Kennedy, 2009; P. Howden-Chapman et al., 2007).

The ‘Housing Heating and Health’<sup>9</sup> study (also identified by and included in the Cochrane review above) examined the effects of temperature and indoor pollutants on 409 asthmatic children’s (aged 6-12 years) health in households based in five New Zealand communities. The houses of all participating households were insulated (to the current building code standard) prior to winter 2005. Baseline measures were collected in the winter of 2005 (June to September) and prior to winter 2006 non-polluting, more effective heating (heat pump, wood pellet burner, or flued gas) was installed in the intervention households (and in the control group at the end of the study).

During the winter of 2006 the average living room temperature in intervention households was 17.07°C and in the control households the average temperature was 15.97°C. Average temperatures in the child’s bedroom were 14.84°C in intervention households and 14.26°C in the control households. Exposure to low temperatures (hours per day by number of degrees less than 10°C) was over 50 percent less for those in intervention households compared with those in the control group (P. Howden-Chapman et al., 2008).

Although the children in the intervention households did not experience significant improvements in lung function, significant reductions were noted for symptoms of asthma (i.e. reduction in sleep disturbed by wheeze and dry cough at night), the number of days off school (1.80 fewer days off school; 95% CI 0.11 to 3.13,  $p=0.04$ ), visits to a doctor for asthma (0.40, 95% CI 0.11 to 0.62  $p=0.01$ ), and visits to a pharmacist for asthma (0.25, 95% CI 0.09 to 0.32  $p=0.01$ )(P. Howden-Chapman et al., 2008).

Exploring the impact of the Healthy Housing Programme<sup>10</sup> in reducing acute hospitalisations in South Auckland, this New Zealand study found that post-intervention, individuals aged 0 to 34 years of age had a reduced rate of acute admission to hospital. For children aged 0-4 years, acute hospitalisations reduced by 11 percent (HR<sup>11</sup> 0.89, 95% CI 0.79 to 0.99 ) and for those aged 5-34 years, acute hospitalisations reduced by 23 percent (HR 0.77, 95% CI 0.70 to 0.85) (Jackson et al., 2011). The intervention involved working with families to implement a range of agreed actions following a property assessment. This included providing education regarding health risks, referrals to health providers, the installation of insulation to make dwellings warmer and dryer, undertaking modifications to support health and

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<sup>9</sup> Multi-disciplinary team of researchers from the Universities of Otago, Massey, Victoria and Auckland, and BRANZ.

<sup>10</sup> The Healthy Housing Programme was a joint initiative between the district health boards in Counties Manukau, Auckland, Northland, and the Hutt Valley and the Housing New Zealand Corporation. The programme focused on improving the housing conditions of families living in Housing New Zealand homes to reduce the risk of infectious diseases related to crowding. The programme began in 2000 and concluded in 2012.

<sup>11</sup> The Cox proportional hazard model was used with the Andersen-Gill counting method to estimate crude and adjusted HRs.

disability needs, and transferring families to other houses to address overcrowding, or in some cases, adding bedrooms to the current dwelling (Jackson et al., 2011).

The Warm Up New Zealand: Heat Smart (WUNZ:HS) programme<sup>12</sup> began in July 2009. The programme provided funding for insulation refits and the provision of grants for the purchase of clean, efficient heating for New Zealand households. A retrospective observational cohort study was conducted by matching the 'treated' dwellings (i.e. those that received insulation or heating retrofits - treatment) to up to 10 similar (control) dwellings in the same Census Area Unit. Sixty-seven percent of the treatment dwellings (31,423) were able to be matched to at least one control address. Using an anonymisation process the New Zealand National Health Index records for all those resident at the treatment and control addresses were identified.

Despite a range of identified methodological limitations and potential confounders, the study was able to show that retrofitting dwellings with insulation had significantly reduced the cost of hospitalisations and pharmaceutical cost for those living in treated houses compared with those in matched houses in the same area who had not received insulation or heating. The findings also suggest that the intervention (i.e. living in a treated dwelling) prevented about 18 deaths among those aged 65 and over who had previously been hospitalised with a circulatory illness (95% CI; 0 to 45 deaths prevented) (L Telfar Barnard et al., 2011). Additionally, a cost-benefit analysis estimated the overall benefit to cost ratio of the intervention at 3.9:1 (Grimes et al., 2012).

Establishing a means of assessing housing quality and its potential impact on health has resulted in the development of various tools locally and internationally. Developed and tested in New Zealand, the Healthy Housing Index (HHI) provides a number which is formed from a series of housing factors (examining the structure and condition of the house) that have been found to indicate the 'healthiness' of a house. The Index has also been described as a 'measure of the material determinants of health'.<sup>13</sup> Modelled on the British Housing Health and Safety Rating System (with accommodations for New Zealand's unique housing context) the HHI provides some insight into the likelihood that occupants of a house will experience accidents or illness due to identified housing factors.

The Hutt Valley pilot study investigating the utility of a HHI, found that in addition to a range of safety issues, one third of the surveyed houses had no wall insulation, one quarter were damp and there was evidence of mould in more than half the houses inspected (Keall, Baker, Howden-Chapman, Cunningham, & Cunningham, 2007). Primarily focused on identifying hazards, a Taranaki study, found that an HHI can

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<sup>12</sup> The WUNZ:HS was funded by the NZ government and administered through the Energy Efficiency and Conservation Authority (EECA). The cost-benefit analysis of the programme was undertaken by He Kainga Oranga (Housing and Health Research Programme of Otago University) and Victoria University, and consultancy firms Motu Economic and Public Policy Research, and Covoc.

<sup>13</sup> <http://www.healthyhousing.org.nz/research/past-research/healthy-housing-index/>

be helpful in identifying and addressing injury hazards in homes and that homeowners could, for a relatively low cost, fix common hazards (e.g. installing working smoke alarms, ensuring safe hot water temperature, and installing safety visibility strips on ranch sliders).<sup>14</sup> Each study offered evidence for the potential usefulness of an HHI in identifying issues with the potential to impact on residents' health and safety.

Making the connection between housing, health and poverty, the New Zealand Children's Commissioner recommended in 2012, *'that the government ensure all rental housing (both social and private sector) meets minimum health and safety standards, according to an agreed Warrant of Fitness, such as the Healthy Housing Index'*<sup>15</sup> (The Children's Commissioner's Expert Advisory Group on Solutions to Child Poverty, 2012).

Since this recommendation was made, two Warrant of Fitness (WOF) assessment tools have been trialled in New Zealand, one by the Housing New Zealand Corporation, and the other by the University of Otago (He Kainga Oranga/Housing Health and Health Research Programme).

A rental housing WOF standard was developed by Housing New Zealand in collaboration with the Ministry of Business, Innovation and Employment and a trial of the WOF criteria (49 criteria plus additional in-criteria splits) was carried out in two phases – phase one involved assessing 100 Auckland properties (to check the survey form and the WOF criteria) and phase two involved using the updated WOF criteria to assess 400 Housing New Zealand properties located around New Zealand (Bosch, 2015).

The assessments established an overall fail rate of five percent across the WOF criteria across the 400 dwellings with only four percent (17 properties) found to be fully compliant. Thirty-nine houses were non-compliant on just one criteria item, and overall 69 percent were identified as having five or fewer non-compliant WOF criteria. The absence of security/restrictor stays in 28 percent of dwellings was problematic as they were offering the only form of ventilation for the house (it was noted that some tenants had disengaged the stays), and in 16 percent of dwellings there was no fixed heating (Bosch, 2015).

It was reported that although a number of improvements were required in terms of the survey, and reporting and remediation processes, 'overall the Warrant of Fitness inspection scheme is feasible and can be achieved at reasonable cost, with results that will lead to improved health and safety outcomes for tenants' (Bosch, 2015, p. 3).

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<sup>14</sup> [Magazine article on the Taranaki Trial in Build](#) June/July 2009

<sup>15</sup> <http://www.occ.org.nz/assets/Uploads/EAG/Final-report/Summary-of-proposed-solutions-to-child-poverty.pdf>

In partnership with He Kainga Oranga, the New Zealand Green Building Council, and the Accident Compensation Corporation, 25 rental houses were recruited by five councils to field test a rental housing warrant of fitness (rWOF) which involved an assessment against 31 criteria (selected from the larger HHI criteria). The housing features identified were ones that were 'considered to have an important impact on health safety and energy efficiency' (Bennett, Howden-Chapman, Chisholm, Keall, & Baker, 2016, p. 405).

The assessments resulted in 94 percent of the 144 houses failing at least one of the 31 criteria; an absence of fixed heating (in the lounge) was identified in 37 percent of the dwellings assessed. Thirty-six percent of the houses were identified as requiring only minor fixes such as water temperature adjustments and the installation of smoke alarms and heaters. Those field testing the rWOF concluded that all the items had been able to be assessed across a range of different dwelling types and that a rental housing WOF was a practical tool that could benefit the health and safety of tenants with many of the issues identified able to be rectified with relative ease and at a low cost (Bennett et al., 2016).

A voluntary rWOF programme has subsequently been made available in Wellington (as of 28 August 2017) by He Kainga Oranga. A checklist is set out for a room-by-room inspection and a rental WOF App is available for download.<sup>16</sup> A rWOF pass requires that a dwelling pass all applicable criteria.<sup>17</sup>

Warm Up New Zealand: Healthy Homes grants are currently available to low-income owner-occupiers and landlords with low-income tenants. The grants which offer a 50 percent subsidy for the cost of insulation are due to end on 30 June 2018. However, eligible owner-occupiers may be eligible to receive a subsidy at a higher level under the Warmer Kiwi Homes programme, a new four-year programme offering two-thirds off the cost of ceiling and underfloor insulation, and ground vapour barriers from 1 July 2018, and the cost of heating appliances from 1 July 2019.<sup>18</sup>

World-leading New Zealand research has been able to show that improved health outcomes can be achieved through housing improvements, particularly those involving insulation retrofits and the provision of improved heating sources. Key health improvements, noted by New Zealand researchers, have included the following (P. Howden-Chapman et al., 2007; Philippa Howden-Chapman et al., 2008; Jackson et al., 2011):

- fewer exacerbations of respiratory illness

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<sup>16</sup> GooglePlay <https://play.google.com/store/apps/details?id=nz.i5.wof> or iTunes <https://itunes.apple.com/us/app/rental-housing-wof/id1271146427?ls=1&mt=8> (Note: from iTunes, this is only available to download on a mobile device).

<sup>17</sup> [http://www.healthyhousing.org.nz/wp-content/uploads/2016/09/WOF\\_Assessment\\_Criteria\\_and\\_Methodology\\_Version-3.0.pdf](http://www.healthyhousing.org.nz/wp-content/uploads/2016/09/WOF_Assessment_Criteria_and_Methodology_Version-3.0.pdf)

<sup>18</sup> <https://www.energywise.govt.nz/funding-and-support/funding-for-insulation/warmer-kiwi-homes/>

To be eligible for a grant the following apply. The applicant must be the homeowner (owner-occupier) and have a Community Services Card or SuperGold combo card, OR own and be living in a home in an area identified as lower-income (details to follow) OR be referred by the Healthy Homes Initiative, and own a home built before 2008.

- fewer visits to general practitioner/pharmacy
- less time off work/school
- improved self-rated health
- reduced acute hospitalisations.

## A role for District Health Boards

‘This shows that the relationship between housing and health is obviously a complex mix. It is also an area where national authorities, local authorities, and individuals can work intensively to achieve health gains through improving housing conditions, be it the physical housing or the social environment of the house’ (Bonnefoy, 2007, p. 413).

District Health Boards have an opportunity to contribute to a reduction in the health impacts of poor quality housing through supporting and advocating for:

- the provision of quality new housing to increase the availability of affordable homes across all tenures (social housing/private renter, owner-occupier),
- the maintenance and growth of a social housing sector that provides quality homes that are accessible to all who need them,
- improved housing quality through the introduction of minimum standards for all New Zealand dwellings (and particularly social housing and private rental properties) e.g. through the adoption of a Warrant of Fitness/Healthy Housing Index assessments,
- programmes that support appropriate home management practices (ventilation, moisture level management, warmth retention, effective use of heating sources),
- ongoing investment in programmes to provide insulation retrofits and safe heating options (including calling for a ban on the sale and use of unflued gas heaters designed for indoor use, and an end to fuel poverty),
- the opportunity for communities and families to shape the place they live, including access to housing that meets and supports their needs throughout the life course, and
- actions that address health equity, related to housing, for District Health Board populations with a focus on Māori and Pacific peoples and those experiencing greater deprivation.

Working alongside local government and other partner agencies, District Health Boards can advocate for a whole of government approach to addressing housing issues, and in so doing can play a role in facilitating and supporting processes which lead to long term improvements in housing, and ultimately equity of health outcomes for all New Zealanders.

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