A national study of the health effects of insulating homes: the baseline data (Report 1)

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We would like to acknowledge the following supporters without whom we could not carry out this important public good research

Health Research Council of New Zealand

Ruth at Punakaiki 2001

We would like to acknowledge the very special contribution that Ruth Nepia made to this project. Her enthusiasm and skills set the momentum for the project to continue on its course.

She is greatly missed, and we are deeply saddened by her passing in September 2001.

CONTENTS

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SUMMARY

- This is the first of a series of reports from the *National Study of the Health Effects of Insulating Homes*.

Design

- The study design, based on two pilot projects, is an experimental between-group design of 1400 houses, 700 experimental houses were compared with 700 control group houses during the baseline winter 2001 and after the insulation intervention will be compared again in the follow-up winter of 2002.
- The enrolled householders were selected in seven communities by community leaders to meet the following criteria: the ceilings were not insulated; at least one person in the household had a respiratory problem; they were not intending to move in the next year; and they agreed to take part in the random allocation.
- Information hui, organised by our community partners, were held that involved the participants and the researchers in all seven communities.
- A variety of subjective and objective measures were collected over winter. In each household, the head of household recorded their subjective feeling of well-being each evening and detailed the household, the structure of the house and the household's fuel consumption. All members of the household completed health questionnaires.
- Householders' energy consumption is being collected from the electricity and gas companies and their health service utilisation data from GPs and hospitals.
- In 10% of households, objective measures of temperature and relative humidity were collected and a housing condition survey of the houses carried out by independent building inspectors.
- Dust samples were also collected from 90 randomly-selected houses in three of the areas which are being analysed for Der p 1 (the main allergen from the domestic house dust mite), endotoxin (bacterial wall product) and beta glucans (wall product from fungi).
- Householders were notified by letter in early November 2001, about the results of the random allocation, i.e. whether their house would be insulated after winter 2001 or after winter 2002.

Study Sample

- From 1417 households enrolled in the study, there have been 95 confirmed withdrawals (a dropout rate of 7%) leaving 1322 houses in the study. Data are reported here on 1282 households where 4417 people live.

- Children under 10 years old are over-represented in the sample (25% of the total sample).
- Three-quarters of the householders are eligible for Community Services Cards.
- About three-quarters of the householders owned their own dwelling and the remainder were tenants. People who owned their dwelling were more likely to have had a long tenure than those who were renting.

Dwelling and Indoor Environment

- The dwellings are predominantly older buildings with nearly half having been built before 1960.
- A third of householders reported that they only got *little* sun in winter.
- Half the householders had pets, a significant factor in allergen production.
- About one tenth of the householders reported that the power company had turned off power to their house.
- Most of the householders (58% of the control, 61% of the experimental group) reported that no one had smoked inside over the past three months.
- At least a quarter of the households have no smoke alarms protection.
- Most houses (87%) had had condensation on the windows in the previous three months, and many (55% of the control, 60% of the experimental) had dampness problems in rooms excluding the kitchen, bathroom and laundry.
- Bedrooms were the room most likely to be listed as damp (49% of the control group, 55% of the experimental).
- Most households dried clothes outside, but just over 40% of households at least sometimes dried clothes inside on a rack.
- Over half the householders opened windows to get rid of moisture, less than 20% both had, and used, extractor fans.

Warmth and Heating

- Many households used more than one form of heating. The most commonly used form of heating was electricity used in 40% of households. LPG was the next most common, in just under 30% of households.
- Over 90% of the households had curtains that they closed in the evening.
- Most householders used their heating either *often* or *sometimes* when it was cold and for about two-thirds of them it either *always* or *mostly* made them feel comfortable, but only 19% of householders said that their house had never been colder than they would have liked.
- When giving reasons why they were cold, 14% of the householders listed the 2001 power crisis as a reason for being cold, but in Otara, over a third of householders (35%) cited this as a reason for being cold.
- About a third of people said that they expected to use the insulation to make their house warmer, i.e. keep their fuel bill the same, while about 40% said that they would take the savings in cash, by having a cheaper fuel bills.

- There was a wide gradient in the amount people were prepared to pay theoretically for insulation, but most people seemed not to value it highly.

Mould

- Most households reported a damp or musty smell in the house (60%). Over two-thirds reported some mould in their dwellings, with bedrooms being the most commonly listed.
- Half of the mould reported was *obvious* or *widespread.*

Neighbourhood Communities

- About three-quarters of both groups reported that they *always* feel safe in their neighbourhood, although a sizeable minority (22% of the control group, 16% of the experimental) believed that there was a high rate of burglary in their neighbourhood.
- Most people thought that their community was either *very satisfactory* or *fairly satisfactory.* Only 6% of the householders felt that there community was *not very satisfactory* or *not at all satisfactory*.
- In response to a generalised trust question only 40% of people thought that *most people can be trusted*; the remainder were equally divided between those that *you must be wary of* or *didn't know*.

INTRODUCTION

This is the first in what will be a series of reports on the *National Study of the Health Effects of Insulating Homes*. This first report describes the baseline data for the study from the Head of Household questionnaire. Subsequent reports will describe the data from the other questionnaires, temperature and humidity reports of the dwellings, energy-use patterns and analysis of the mould data. The sample is not representative of the general New Zealand population as people with respiratory symptoms have been targeted.

STUDY OBJECTIVES

(a) To establish the relationship between poor health and damp cold housing among people with existing respiratory problems;

(b) To test whether insulation makes the houses drier and warmer;

(c) To investigate whether insulating the houses improves the occupants' health, well-being and comfort;

(d) To investigate whether insulating the houses affects energy consumption;

(e) To carry out cost-benefit and cost-effectiveness analyses of the results;

(f) To investigate the effect of insulation on mould, endotoxins & house dust mite allergens; and

(g) To investigate regional variations in mould, endotoxins & house dust mite allergens.

STUDY DESIGN

The study design is based on two pilot projects: the first in pensioner housing units in Wellington[1] and the second in households in Waitara. The main study is an experimental between-group design where a randomly selected experimental group of 700 houses are compared with 700 control group houses in the same regions in winter 2001 and will be compared again in the winter of 2002. The comparisons were made before and will be made after the intervention is introduced. The study also incorporates an intra-subject 'before' and 'after' design.

Sample population

The total sample consists of 1400 households, at least one of whose members has a history of respiratory problems, in seven different areas of New Zealand (Otara, South Taranaki, Eastern Bay of Plenty, Nuhaka/Mahia, Porirua, Hokitika and Christchurch). Two hundred households in each community were selected from applicants by a community committee consisting of community leaders to have their

[1] Howden-Chapman P, Crane J, Cunningham M, Matheson A, O'Dea D, Herrington A, Woodward A. (2000) *The Impact of Housing on the Health of the Elderly: a pilot study of insulating pensioner units*. Housing and Health Research Programme, Department of Public Health, Wellington School of Medicine and Health Sciences, University of Otago.

homes insulated. One hundred of the 200 households in each community were randomly assigned to having their homes insulated in 2001. The remaining hundred homes in each area form the control group and will have their houses insulated in the year after the study has concluded.

The sample size was calculated by Robyn Green, HRC biostatistican, based on the difference between the percentage of people in the lowest versus the medium income group, (11% compared to 14%) who thought their health was poor in the New Zealand Health Survey (Ministry of Health, 1999). This is estimated to be the effect size in the experimental group, which will then be compared to the control group, in whom no change is expected. Assuming an alpha level of 5%, a sample size of 323 individuals in each group (646 in total) would give an 80% power to detect a difference of 11% compared to 14%.

It should be noted that the present study is unique; we do not have comparative studies on which to base our power calculations, so we have assumed a modest health effect. However, as we expect clustering of respiratory problems within households and as the pilots have indicated a significant drop-out rate due to high mobility which makes the occupants ineligible for the study, we have increased the sample size to 1400 households to allow for clustering, ineligibility and a potentially smaller effect size. With an estimate of three individuals in each household, we have thus allowed for 2100 individuals in each group. The increased sample size allows us to analyse the health impacts on different age groups, who have different vulnerabilities. This sample size should also enable us to separate out the individual versus the family response to the intervention and allows us to analyse an urban/rural effect and the north/south gradient in terms of climatic conditions.

Drop-outs

From an initial 1417 houses in the study there have been 95 confirmed withdrawals (a dropout rate of 7%) leaving 1322 houses nominally in the study. There were various reasons for withdrawals – people moving, deciding that they did not want their dwellings to be insulated after-all, landlords trying in various ways to get their properties insulated for free, or participants dying. Work is ongoing to reconcile the remainder of houses in the study with the questionnaires received.

METHOD

The research began in haste to take advantage of a natural experiment going on in the energy and housing sectors, the timing of funding and the imperative that the 'before' measures began in June 2001.

Ethics Approval

Ethical approval for the project was sought from the seven regional Ethics Committees representative of our communities; Auckland, Bay of Plenty, Canterbury, Hawkes Bay, Taranaki, Wellington, and West Coast. Applications were filed in all of these regions, and the Wellington Ethics Committee, being the primary committee, gave final approval on their behalf in June 2001.

Community Participation

An essential component of our research is the partnership with communities. Although the random-control study design is prescriptive by nature, as far as possible the involved communities have been enabled to take ownership, maintain control over how the project is acted on and presented in their community and participate fully in its implementation.

The project is complex and involves many players. It would have been far more difficult, if not impossible, to elicit the trust of participants without community representation. Our link organisation in each in each community is different in terms of mandate, organisational structure and funding structure (See Appendix 1 for a full list). However, their reasons for participating in the research seem based around a desire to help their immediate community and the value placed on the wider significance of the research. Through a Memorandum of Understanding a partnership was formalised with this key group, providing a community-based co-ordinator and facilities for a local team of interviewers within each community.

Interviewers

From each community potential interviewers were identified and recommended who had local knowledge and suitable experience. Two or three applicants were selected from each region and an Interviewers Training Day was held in Wellington on the 19th June. (See Appendix 2 for a full list of interviewers). The training served to provide interviewers with background knowledge to the project, information on the study design, timeframes and objectives, and the roles and responsibilities of all involved. More specific training such as informing participants, safety, cultural issues, administering questionnaires, and working as a team were addressed, along with practical aspects such as employment contracts and invoicing procedures. The opportunity for the researchers and interviewers to come together was essential in ensuring they gained understanding of the project in order to disseminate information confidently about the project within their community.

Interviewer Training Day - Wellington

Application process

Research participants in all communities were sought through word of mouth, local networks and by advertising through health providers, local newspapers and other media. Households were considered for inclusion in the study if, at least one person in the house had a respiratory problem, the house or flat was single storey and uninsulated, the occupants were planning on staying there for the duration of the study and they agreed to participate.

Application forms were collected by the community organisation and those applicants fitting the criteria were then chosen to have their house ceilings checked for insulation levels. Houses were categorised as having no insulation, less than 50mm, between 50-75mm and over 75mm and were prioritised accordingly, with those with none or the least insulation being at the top of the list.

Obtaining 200 eligible applicants proved more difficult in some communities than others. In most, however, a community selection panel was required. In these cases, a committee comprising the Community Co-ordinator, a local GP or public health nurse and various community representatives met to determine the final 200 households who would be included.

Informed consent

Households were notified by the community organisation whether or not they would be part of the study. Those who were selected were contacted by a local interviewer to discuss the study further and were requested to sign a form consenting to be part of the research. All households were provided with information sheets about the study and local interviewers explained the nature of the study, what was required of them as participants and what they could expect throughout its duration.

Information hui

During the time the research measures were being introduced to households, in each area, information hui were held as an attempt to increase understanding of the nature and importance of the research. This was a chance for researchers to explain the study more fully and for participants to ask questions. This

Nuhaka

visit also served to strengthen the relationships with community coordinators as well as being a chance to run through the questionnaires with local interviewers and once again go through the necessary research protocols.

Christchurch

South Taranaki

Opotiki

Porirua

Otara

MEASURES

Baseline data was collected from participants during June, July and August 2001.

Temperature and relative humidity

Subjective
Participants were asked to fill in a coloured form with a daily record of their indoor comfort levels over the three winter months.

Objective
Data loggers that record temperature and relative humidity were placed inside 10% of the participating households. These were first calibrated by the Building Research Association of New Zealand (BRANZ) and set for three months to make a reading every 15 minutes. The 10% of households were randomly selected and equally split between the experimental and control groups. Interviewers were given detailed instructions as to where and how to place the loggers in the houses. Two external data loggers were placed in two houses in each community in order to have a measure of the outside temperature and relative humidity in each region.

House condition surveys were also carried out by independent building inspectors from BRANZ on this sub-sample of households.

Questionnaires

In September 2001, immediately following the winter months, interviewers contacted households to make appointment times to carry out interviews with participants. One Head of Household questionnaire was completed face-to-face with every household. This questionnaire gathers information on dwelling type and size, condition of

dwelling, household behaviour and the community environment and trust. Every member of the household was also asked to fill in a self-rated health questionnaire with specific questions regarding respiratory symptoms and a standard validated questionnaire for determining respiratory symptoms.

Dust collection

Towards the end of the winter period of data collection (late August/September) dust samples were taken from the Christchurch, Porirua and Mahia/Nuhaka communities. Fifty of the participating households in each or these areas were randomly selected. Dust from their bedroom floors was collected with consistent sampling procedures within and between communities.

Samples have subsequently been analysed for Der p 1 (the main allergen from the domestic house dust mite), endotoxin (bacterial wall product) and beta glucans (wall product from fungi). The purpose for this analysis is manifold. The relationship between the presence of these compounds with occupants' respiratory symptoms and whether insulation leads to a change will be investigated. A comparison of levels in the North and South Islands can also be made. Apart from a few measurements that we have made previously, nothing is known about the distribution of endotoxin and beta glucans in the New Zealand environment.

Energy data collection

Currently, data on household energy utilisation is being sought from power and gas companies. We are seeking to obtain the units and cost of energy consumed by each household. Companies whom have customers included in our study have been, or are in the process of being, approached to assist in the retrieval of such data for the months of June, July and August 2001.

GP visits and hospitalisations

General Practitioners and hospitals identified by participants are currently being contacted to gain objective data on utilisation.

RANDOMISATION

At the start of November households were randomly assigned to either the experimental or control group. Early that same month letters were sent informing the participants which group they were in. The randomisation was carried out at that time (after the collection of the baseline data) to ensure that the first year's data would be unbiased by the participants' knowledge of which group they had been assigned to. However about 60 interviews have in fact taken place since mid-November.

The sample was stratified only by place of residence that is by community and, if necessary, by climatic sub-region. The age/gender/health status of participants (or even whether the participant specifically stated they were intending to move in the next year) was not taken into account in the randomisation.

BASELINE DATA FROM HEAD OF HOUSEHOLD QUESTIONNAIRE

The following data section looks at some of the data from the questionnaires inputted so far. The data collected from other measures has not yet been entered.

There are data from 1282 fully identified, unique households still participating in the study. There are an additional eight households where we are awaiting final confirmation of ID codes for the forms, and the data from one region are still trickling in. Eighteen households withdrew from the study after completing their forms – mainly due to the occupant dying, the house being sold, or (in rural regions) the household moving to find work.

This analysis covers the fully identified 1282 households only.

People Demographics

631 (49%) of the remaining households are in the control group, and 651 in the experimental.

Just over half (52% of both groups) of people whose gender was listed are female.

Approximately 4417 people live in these houses. This figure can only be approximate as the population is somewhat transient, and there are children who divide their time between different households. About 2141 people live in the control houses (a mean of 3.4 people per house) and 2276 in the experimental houses (a mean of 3.5 people in each house).

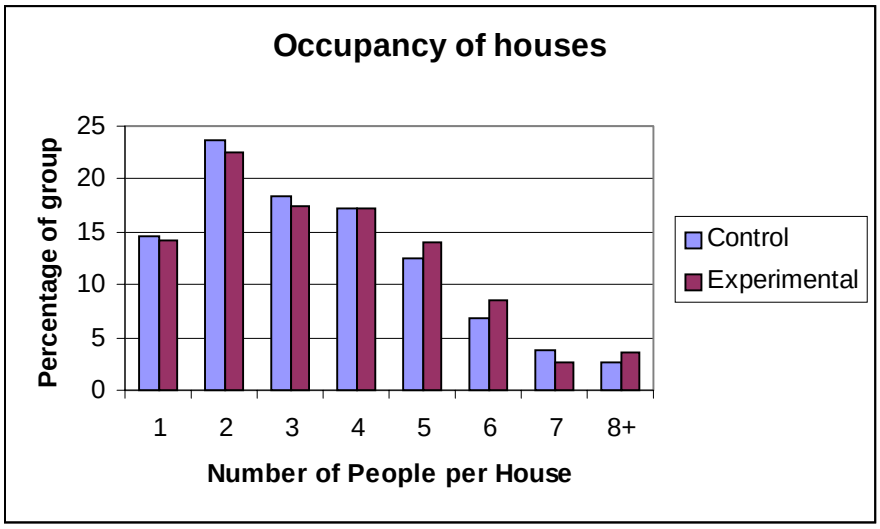

Figure 1: Occupancy of houses

About 36% of the sample of people in the households are children under 15 years of age compared to 23% in the general population.[2]

[2] (1998) *"New Zealand Now Children"* Statistics New Zealand

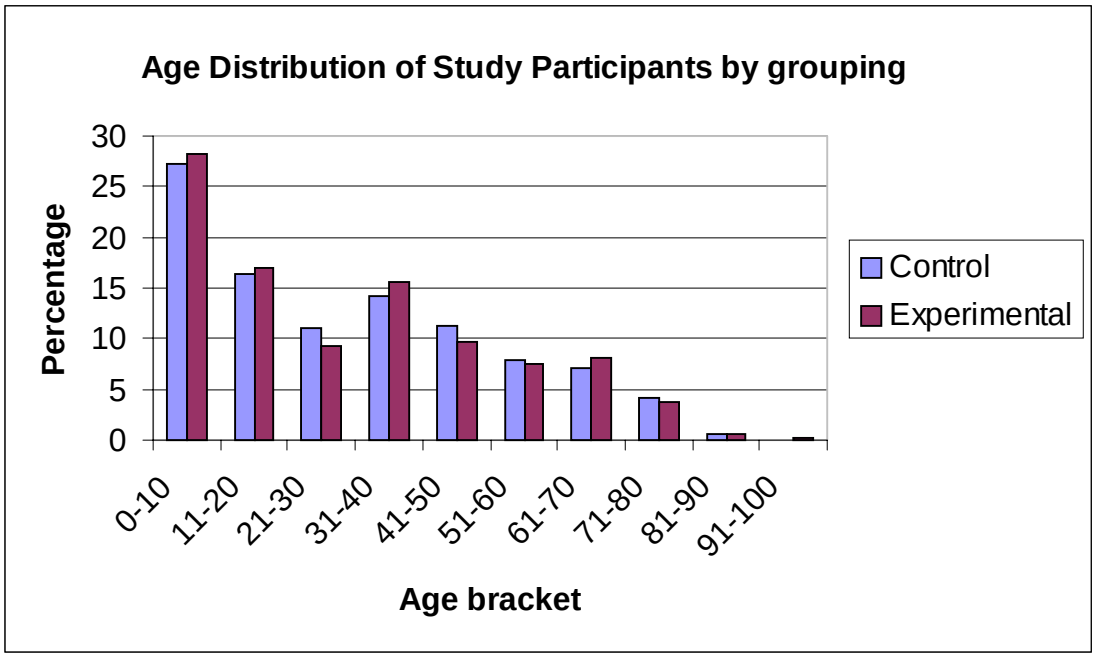

Figure 2: Age Distribution of Participants

88% of the control group and 89% of the experimental group were definitely not planning to move in the next 12 months, with a further 8% of each group unsure. Three percent of each group were definitely planning to move, with one percent leaving the question unanswered.

About three-quarters of both groups are eligible for a community service card (74% of the control group, 78% of the experimental) with only a small proportion (2% of each group) unsure of their eligibility.

Housing

The great majority of both groups (over 90%) live in separate houses, with the remainder roughly equally divided between purpose-built flats, houses divided into flats and conjoined houses.

	Control (percentage)	Experimental (percentage)
Separate house/flat	91	92
Separate house divided into flats	1	2
Semi-detached house	4	2
Block of flats	3	3
Unstated	1	1

Table 1: Type of Dwelling

About 76% of the houses in the study are owned by their occupier - which is greater than the national average of 71.5%[3]. Of the dwellings that were rented nearly half

[3](1998) *"New Zealand Now Housing"*, Statistics New Zealand

(44%) were rented from Housing New Zealand, this is much greater than the national average of 19.4%[3]

Over half of the participating householders have lived in their dwelling for more than 7 years, with most of the remainder having lived there for between 1 and 4 years. Overall about three-quarters of each group owned their dwelling and it was notable that the people who owned their dwelling were far more likely to have had a long tenure than those who were renting. Housing New Zealand tenants were also more likely to have had long tenure than those renting from private landlords.

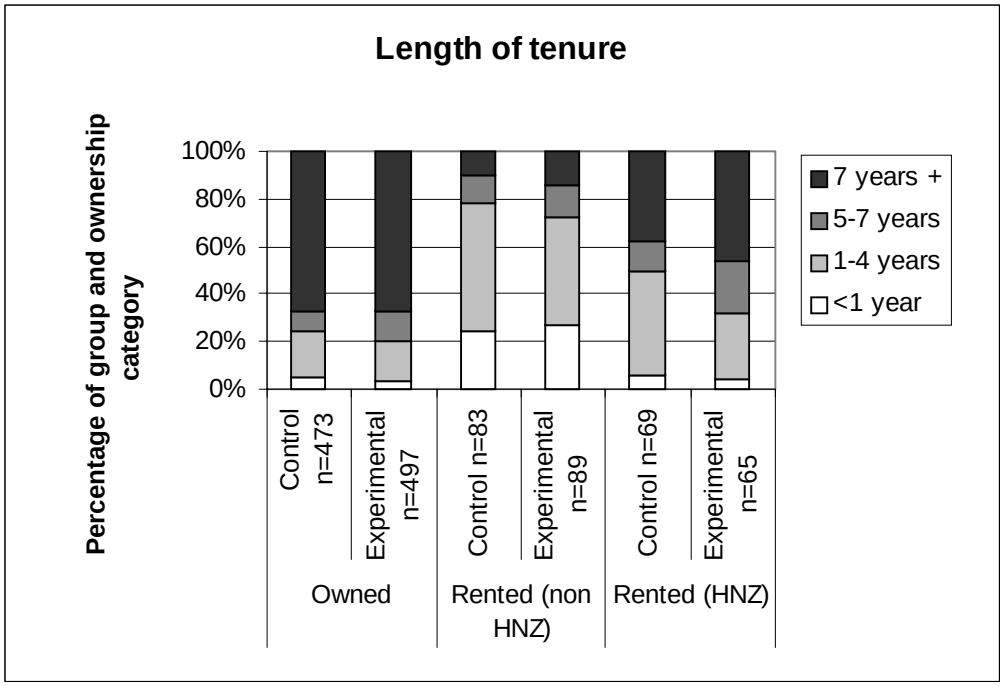

Figure 3: Length of Tenure

The dwellings are predominantly older buildings with nearly half having been built before 1960. There are few houses built in or after 1991 in the survey.

	Control (percentage)	Experimental (percentage)
1991 or later	1	1
1978-1990	6	6
1960-1977	29	29
1959 or earlier	46	48
Unknown/Unstated	18	16

Table 2: Age of Dwellings

The householders were also asked to assess the condition of their dwelling. Only 80% of the householders both knew their house age and answered the question on house condition. Most of the homes were reported to be in "*average*" condition, however this varied considerably. Older houses were more likely to be reported in "*poor*" or "*very poor*" condition. Figure 4 shows householders perceptions of house condition against house age.

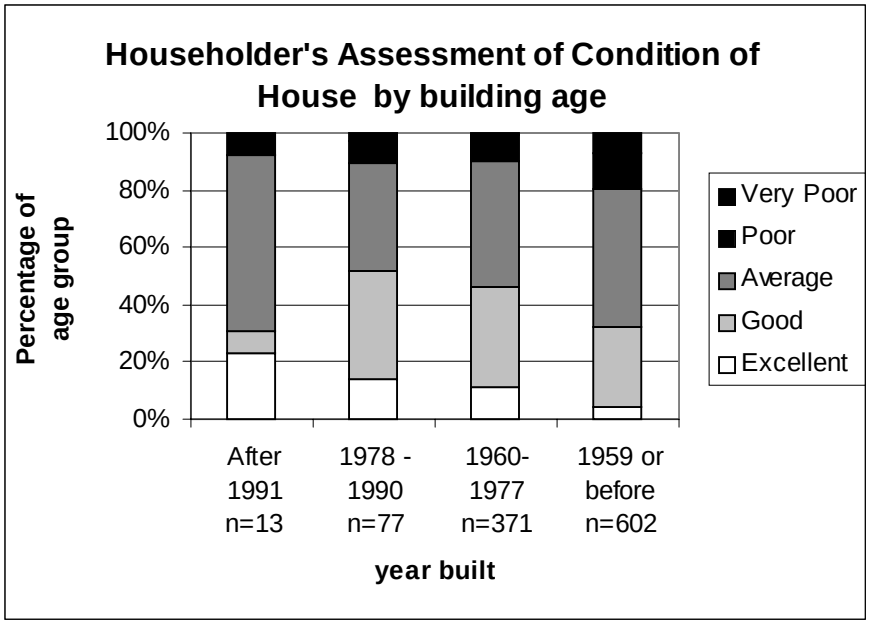

Figure 4: Reported House Condition by Age

The reported condition of the dwelling also varied by the type of ownership.

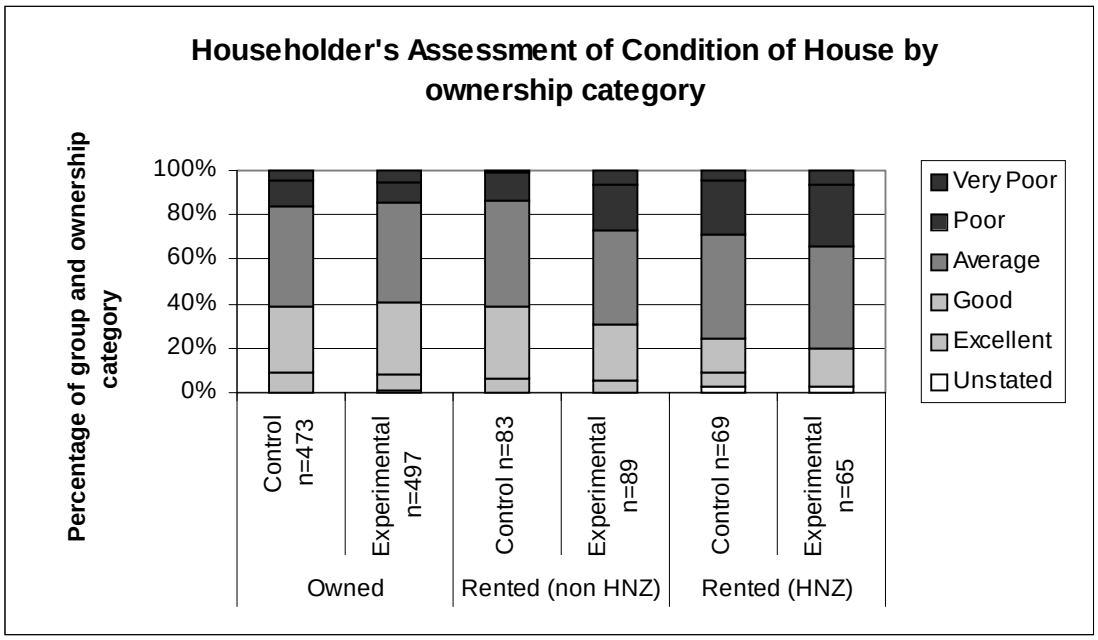

Figure 5: Condition of Dwellings

Nearly a third of houses (30% of the control, 31% of the experimental) reported getting only "*little*" sun during winter, while between a fifth and a quarter (24% of the control, 22% of the experimental) reported getting "*plenty*", the rest (aside from a small non-response rate of under one percent) reported getting "*moderate*" sun.

Most of the houses had three bedrooms, with very few (6% of the control, 4% of the experimental group) reporting fewer than two, or more than four, bedrooms.

	Control	Experimental
0 or 1	4	1
2	15	17
3	62	61
4	18	18
5	2	2
6+	0	1

Table 3: Number of bedrooms

Indoor Environment

Over half the dwellings had an indoor pet of some kind (54% control, 53% experimental). Most of the pet owning households had a furry pet. Thirty-nine percent of both groups had at least one cat, and rather fewer a dog (24% of the control, 21% of the experimental). Few (3% of the control, 2% of the experimental) households had only non-furry pets.

About one tenth (10% control, 9% of the experimental) of the houses reported the power company ever having turned off power in their house. However since a number of the participants live in rural areas which sometimes have unexpected power cuts this figure is only an estimate (some of the rural people included those cuts and others presumably did not)

Most of the householders (58% of the control, 61% of the experimental group) reported that no one had smoked inside over the past three months.

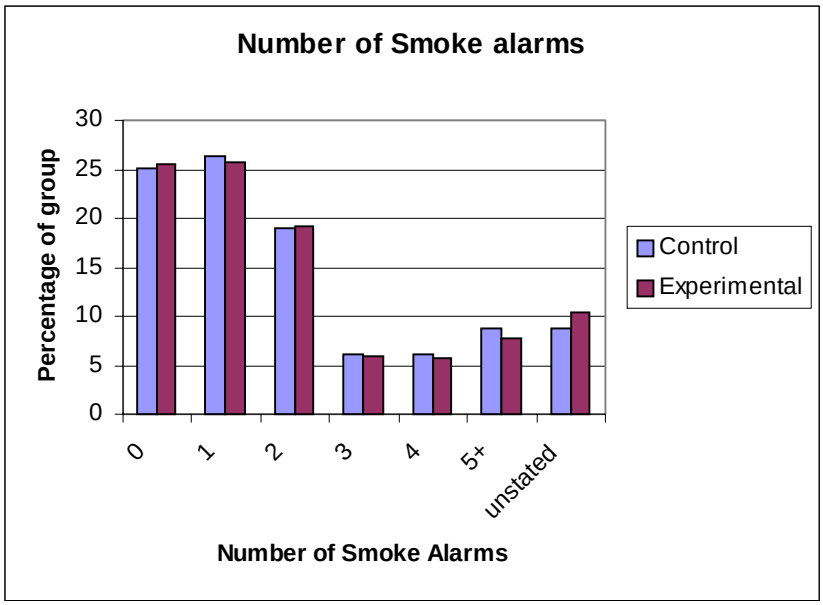

Figure 6: Number of Smoke Alarms

A sizable number of participants did not answer the questions on smoke alarms – (around 10% of both groups for the first question about the number of alarms in their house, and nearly 30% of both groups for the second on how many of the alarms were currently functioning). However we can tell that at least a quarter of the households in the survey have no smoke alarm protection.

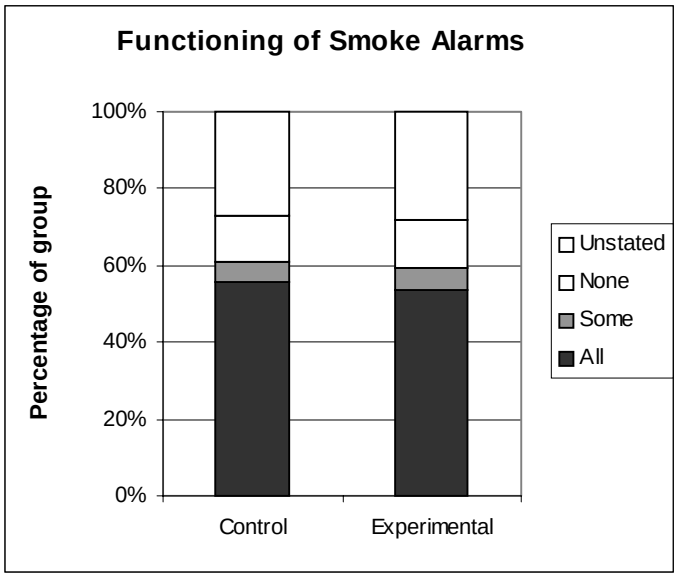

Figure 7: Functioning of Smoke Alarms

The number of adult-equivalents per bedroom gives an estimate of how crowded a house might be. Children aged 12 and under were counted as half an "adult equivalent" and everyone else in a dwelling as one.

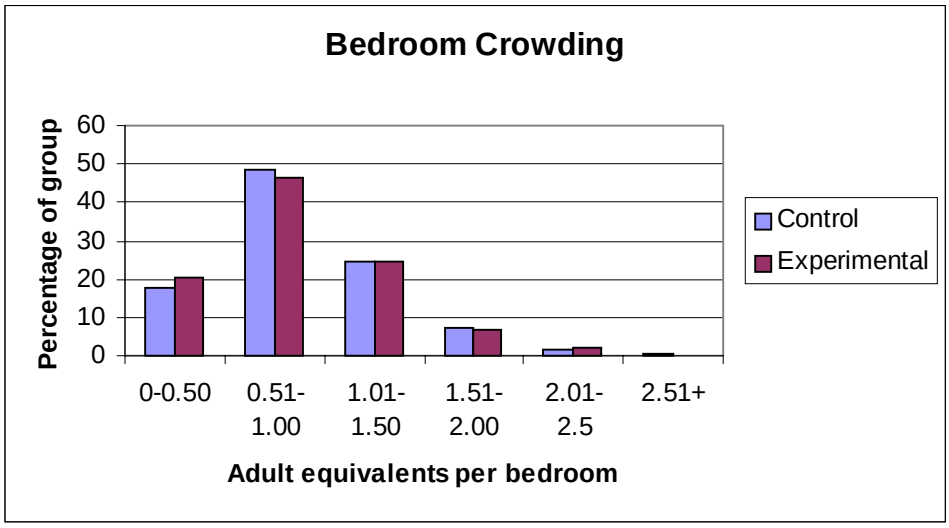

Figure 8: Crowding

Dampness

Most houses (87% of both groups) had had condensation on the windows in the previous three months, and many of them (60% of the control, 61% of the experimental) had further dampness problems.

When householders were asked about specific rooms, some mentioned dampness that they had not mentioned when asked about the house overall (62% of the control, 66%

of the experimental). Even when rooms that might be expected to occasionally get damp (the kitchen, bathroom and laundry) were excluded over half of the houses reported dampness (55% of the control, 60% of the experimental). Bedrooms were the room most likely to be listed as damp (49% of the control group, 55% of the experimental), followed by bathrooms (36% of the control group, 41% of the experimental).

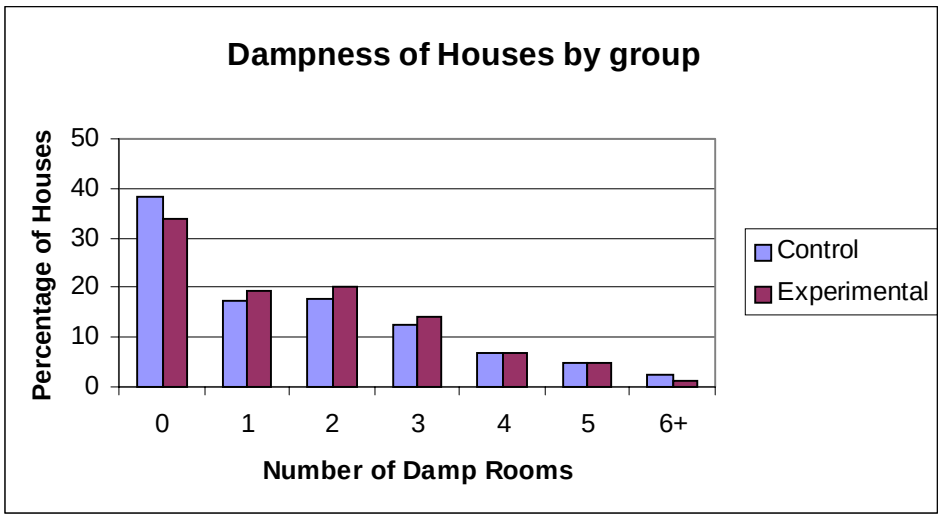

Figure 9: House Dampness

By far, the most common method of drying clothes was on an outside line (87% of the control group, 83% of the experimental), the next most common method – on an inside rack or line - was only about half as prevalent (43% of the control, 42% of the experimental). In cities an "other" method frequently mentioned was using Laundromats; for both urban and rural regions drying clothes in garages or outside sheds was also used.

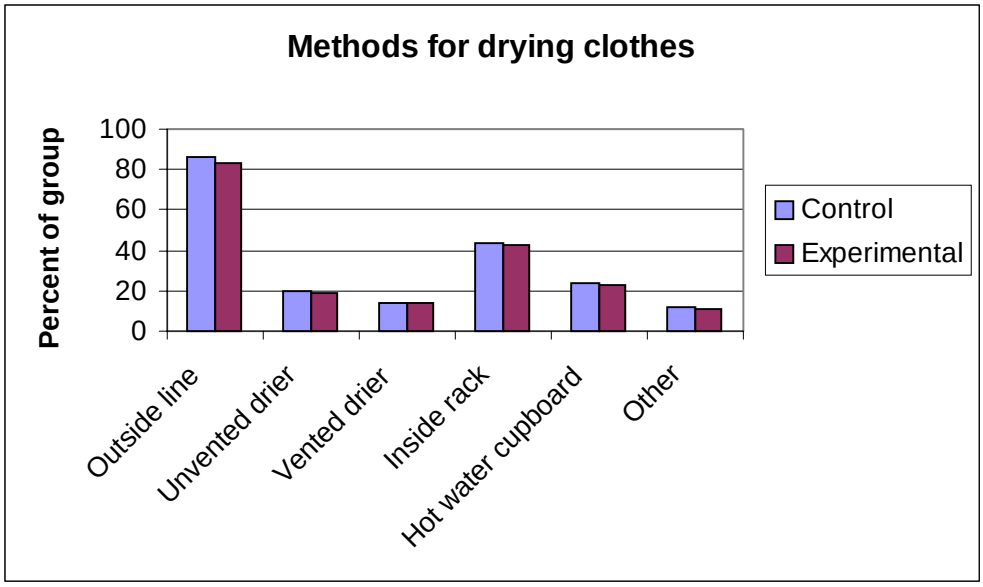

Figure 10: Clothes drying methods

A high proportion of the respondents did their best to reduce moisture in the house from cooking or showering by opening windows, but rather fewer of them used extractor fans. Some of them wrote in that their houses did not contain things such as extractor fans, and that therefore they couldn't use them; and others wrote in that the reason they didn't open the window during showering was that it was too cold if they did. Although not shown in Figure 11, the non-response rate to this question was low – generally just under 1% (the maximum of 2.1% was for the control group kitchen window question).

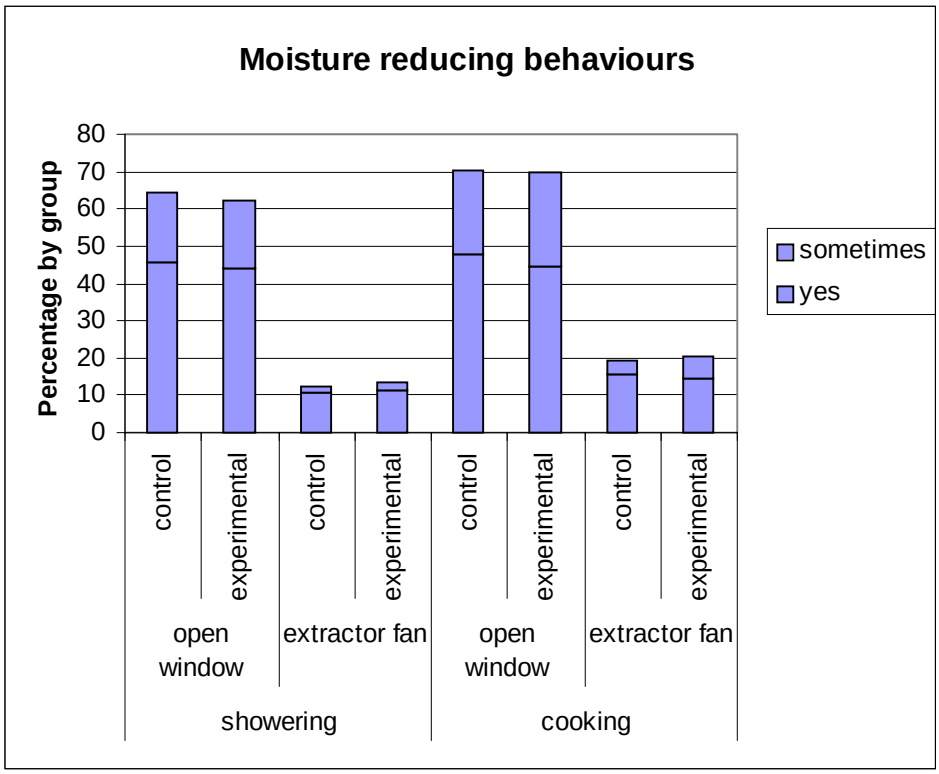

Figure 11: Getting rid of Moisture

Although other research[4] has shown considerable use of dehumidifiers in New Zealand homes few (10% of the control group, 13% of the experimental) reported using a dehumidifier during the winter.

Warmth and Heating

Nearly all (97%) said that their house had been at least "*sometimes*" cold during the winter.

Many households used more than one form of heating. The most commonly used form of heating, cited for about 40% of households was electricity, followed by LPG in just under 30% of households. Almost all the households (93% of the controls, 92% of the experimentals) had curtains that they closed in the evening.

[4]Howden-Chapman P, Saville-Smith K, and Crane J. (2002) "*Housing and Mould: A Quantitative Telephone Survey*", report commissioned by the Building Research Association of New Zealand for the Building Industry Association

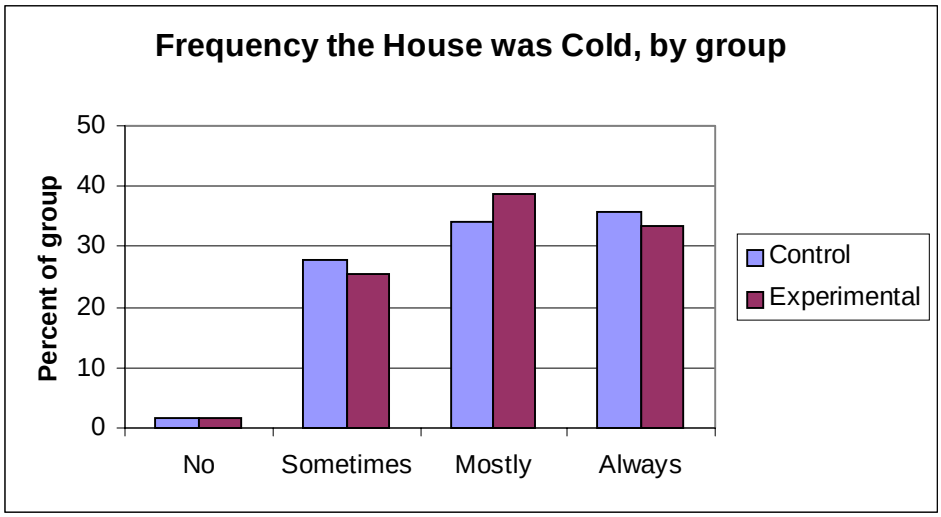

Figure 12: House Coldness

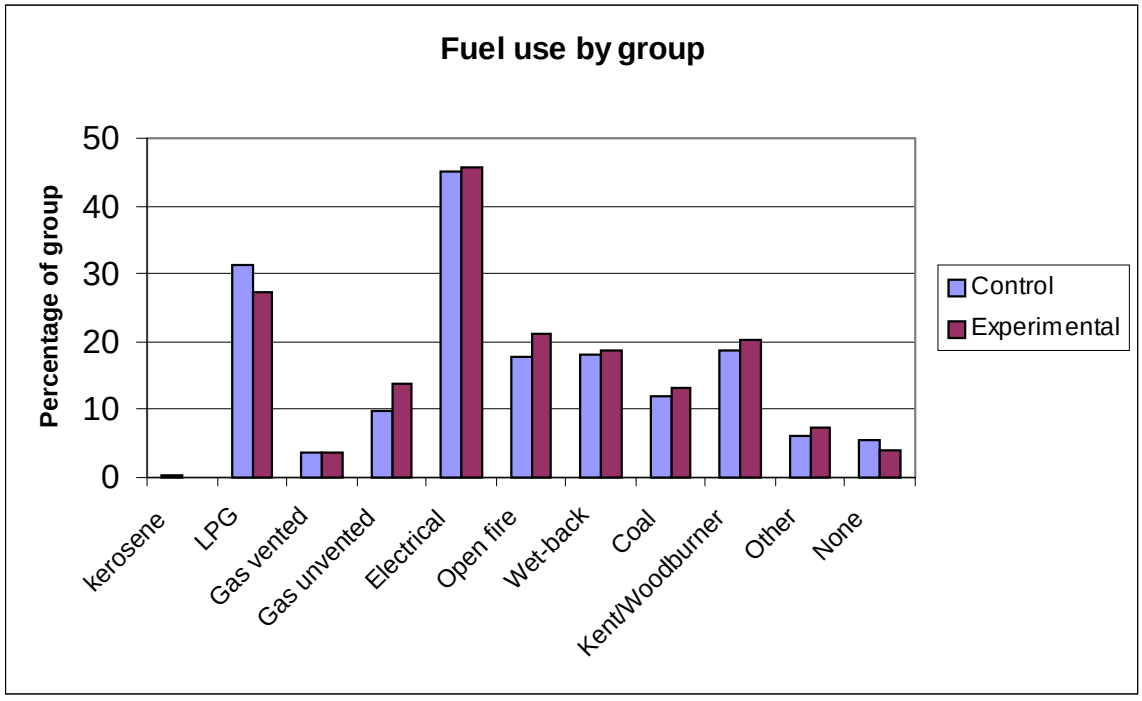

Figure 13: Types of Heating

Nearly everyone (93% of the control group, 95% of the experimental group) used their heating either "*often*" or "*sometimes*" when it was cold. And for about two-thirds of them (66% of the control group and 69% of the experimental) it either "*always*" or "*mostly*" made them feel comfortable. However only 19% of both groups said that their house had never been colder than they would have liked.

Overall 14% of the householders listed the 2001 power crisis as a reason for being cold, in one of the regions – Otara – the figure was much higher with about 35% of each group citing that as a reason for being cold. The reasons given in the "other" category ranged over a variety of things – from the location/design of the house, the coldness of the winter, not being home during the day, to firewood being wet, or

running out of fuel. The reasons for being cold that hinge on personal preference ("*like to have windows open*" and "*It is healthy to make your body work harder*") were the reasons cited least often.

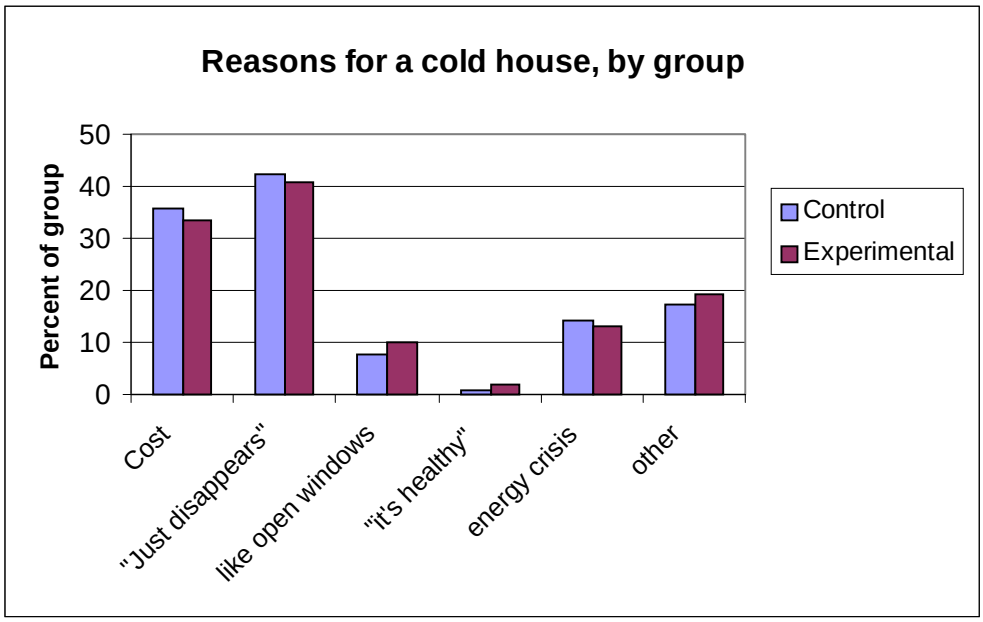

Figure 14: Reasons for being cold

Overall, nearly two-thirds (61% of the control, 62% of the experimental) believed it had been colder than most winters with few (5% of the controls, 8% of the experimental) saying that they thought the winter had been warmer than usual.

Valuing of Insulation

The householders were asked how they believed they would take the benefit of insulation – whether post-insulation they would use the same amount of fuel and have a warmer house or if they would keep the house at the same temperature as previously, but save money on their fuel bill. Despite careful training of the interviewers about this question, because of its complexity, some householders clearly

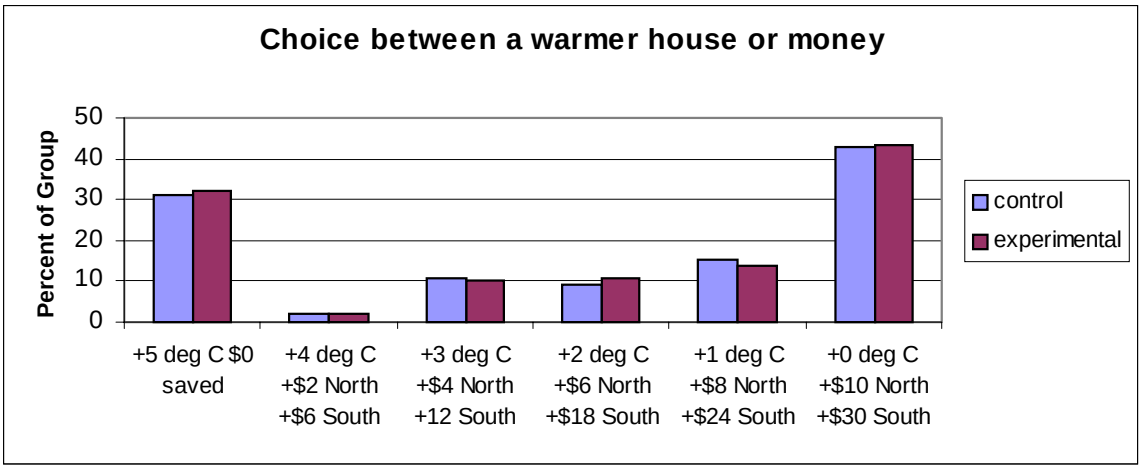

Figure 15: Choosing warmth or money (i)

had some difficultly interpreting the question thus explaining why the percentages on figure 15 add to more than 100. About a third of people said that they expected to use the insulation to make their house warmer (i.e. keep their fuel bill the same, while about 40% said that they would take the savings in cash by having a cheaper fuel bills).

The householders were also asked how much they would be willing to pay (hypothetically) to have their house insulated. A considerable number of them left this question unanswered. Figure 16 shows that there was a wide gradient in the amount people were prepared to pay for insulation, but that most people did not value it highly.

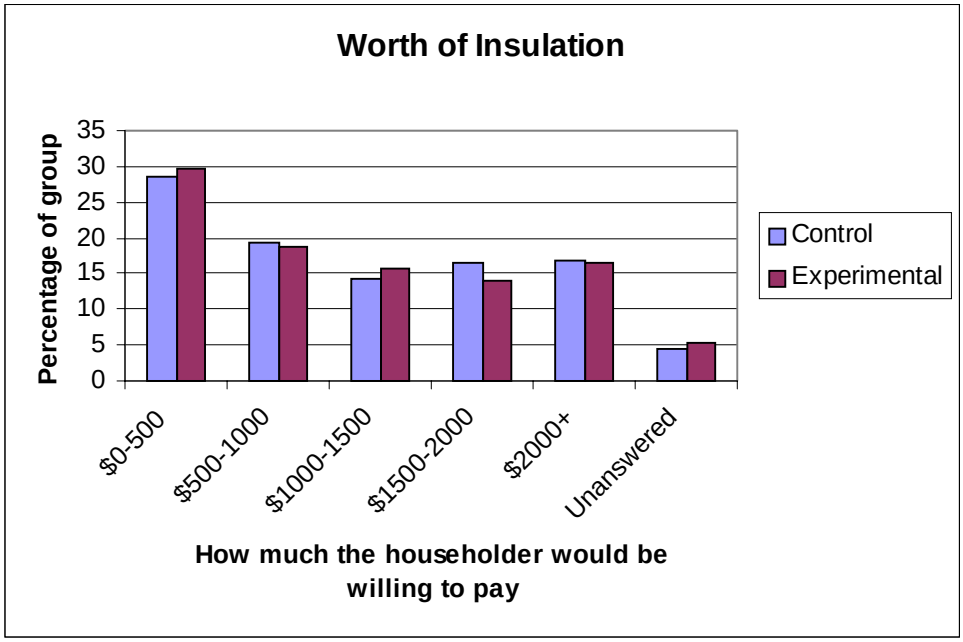

Figure 16: Choosing warmth or money (ii)

Mould

A sizeable number of households reported a damp or musty smell in the house (58% of the control, and 62% of the experimental groups) the non-response or unknown response to this question was also relatively high (7% of the control, 6% of the experimental). A rather greater number (68% of both groups) reported some mould in their dwellings; the non-response rate was still substantial here (6% of the control, 5% of the experimental).

As in the question for dampness, bedrooms were the rooms most likely to be listed as mouldy (56% of the control group, 60% of the experimental) followed by bathrooms (51% of the control group, 53% of the experimental). The types of "other" room most commonly listed as mouldy were hallways and toilets.

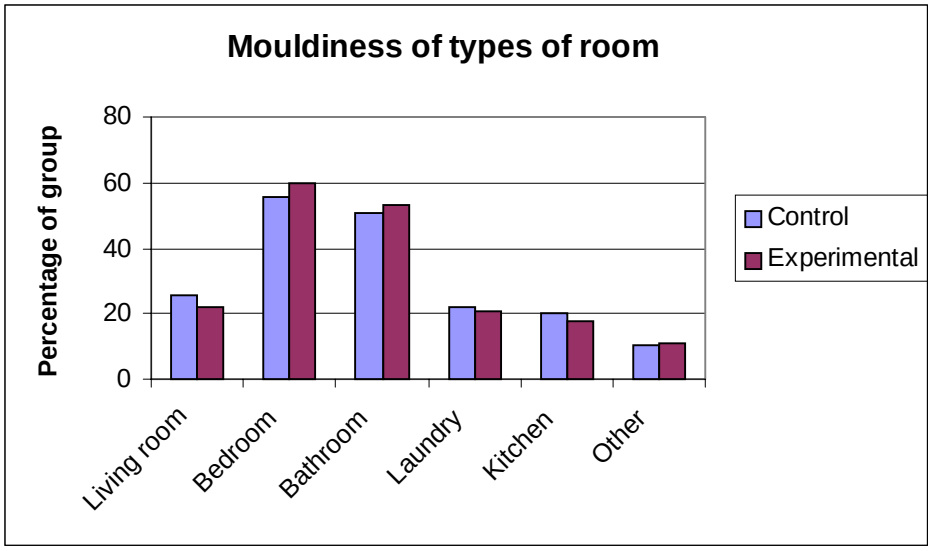

Figure 17: Which rooms were mouldy?

If a room was listed as mouldy the householder was asked to describe how mouldy it was. They were given a list of three to choose from "trace", "obvious" and "widespread." Values of 1, 2 and 3 were assigned to these respectively and the mean taken to get an estimate of how much mould was likely to be in one of these rooms if it was mouldy at all. Bedrooms and bathrooms were the places most likely to have extensive mould with kitchens the least likely.

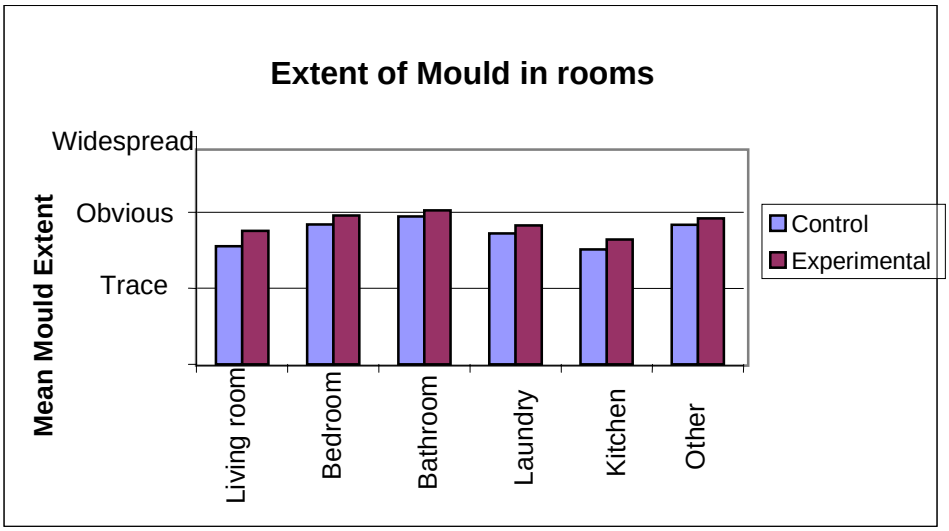

Figure 18: How mouldy were they?

Communities

Nearly three-quarters of both groups (72% of the control, 74% of the experimental) reported that they "*always*" feel safe in their neighbourhood. However a sizeable minority (22% of the control group, 16% of the experimental) believed that there was a high rate of burglary in their neighbourhood.

Most people thought that their community was either "*very satisfactory*" or "*fairly satisfactory*", however marginally more of the experimental group was highly

satisfied with their community. Only 6% of the householders felt that there community was *"not very satisfactory"* or *"not at all satisfactory."*

	Control	Experimental
"Very Satisfactory"	41	47
"Fairly Satisfactory"	48	43
"Not very Satisfactory"	5	5
"Not at all Satisfactory"	1	1
Don't know / Not Stated	5	4

Table 4: Satisfaction with Community

The householders were asked a generalised trust question "Some people say that you can usually trust people. Others say that you must be very wary with people. Which is your view?" A number of the respondents chose more than one answer, so the percentages add to slightly over 100. Only 40% of people thought that *"most people can be trusted"*, the remainder were equally divided between that *"you must be wary with others"* and *"it depends"*. As before the control group seem to be marginally more wary than the experimental group.

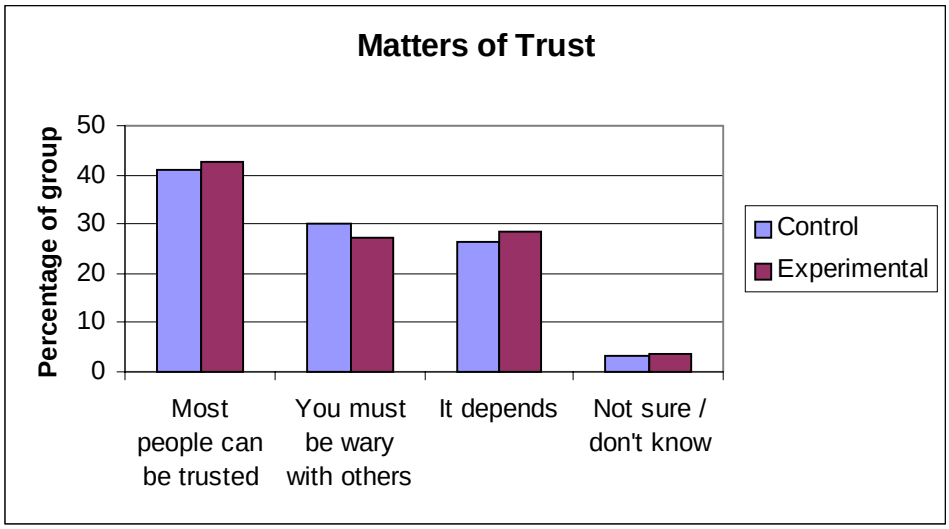

Figure 19: Trusting the neighbours

Figure 20 which shows whether or not the participants believed certain statements to be true about their neighbourhood or not, it again shows that the control group tended to be marginally more dissatisfied with their community than the experimental group.

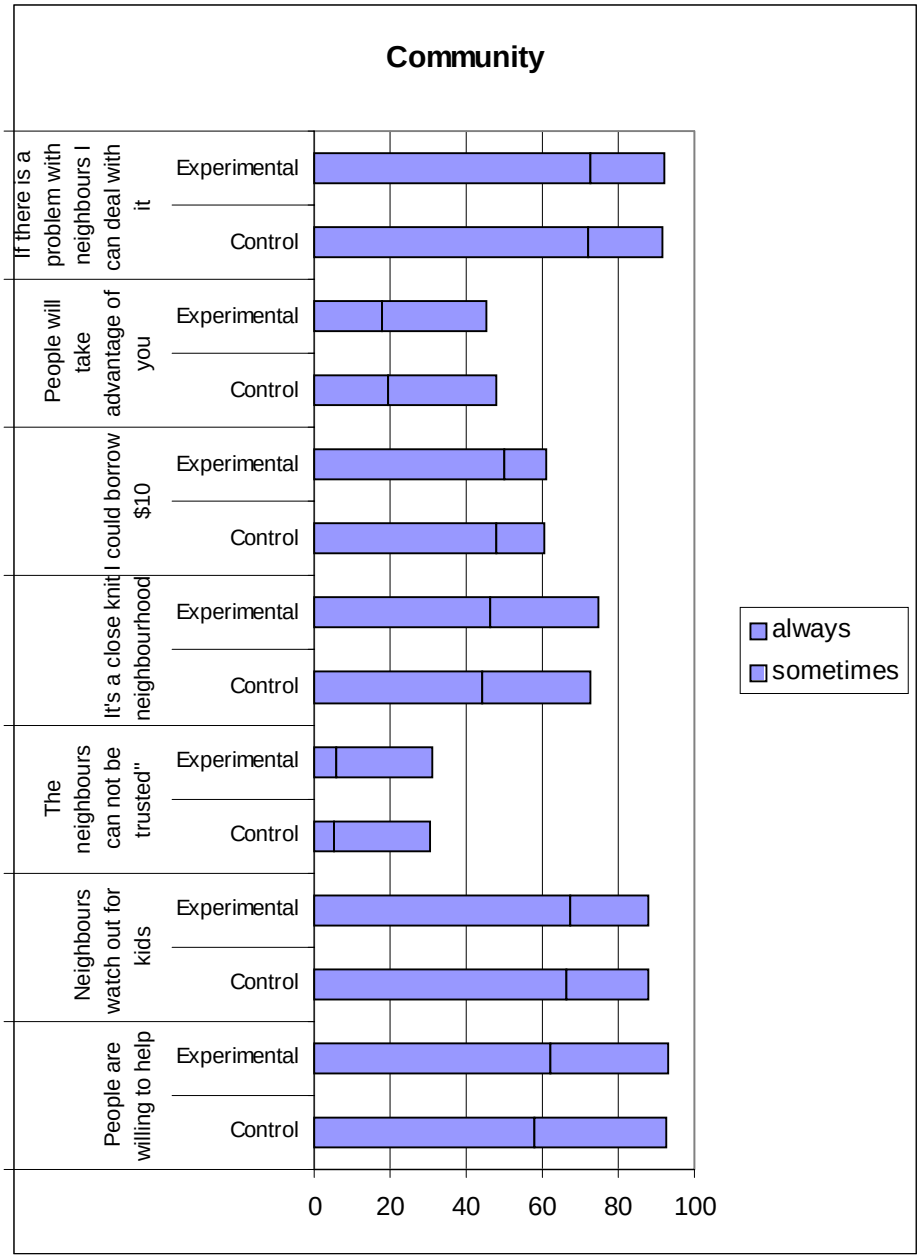

Figure 16: Community Statements

CONCLUSION

The first phase of the project has been completed very satisfactorily with the considerable help of all parties. Our multi-disciplinary research team and our partnership with the community organisations have been the main factors in enabling us to carry out the design as planned and to get such a positive response from householders in these communities. Moreover, the financial support of a wide range of public and private funders has enabled the insulation intervention to be carried out without financial cost to the householders.

The preliminary analysis of the experimental and control groups indicates that there are no significant differences between the two groups.

These baseline data clearly indicate the extent of the problem of cold, damp and mouldy housing in New Zealand and the potential to improve the health of the occupants by improving their housing.

Forthcoming baseline reports will include comparisons with the general New Zealand population, describe the health of the occupants, the structure and condition of the houses, the households' energy consumption and the extent and type of mould, allergens, endotoxins and Beta glucans in the dwellings.

Appendix 1

List of key community organisations

Otara

Otara Health Incorporated

Opotiki

Opotiki Trade Training Limited

Nuhaka/Mahia

Te Iwi o Rakaipaaka Incorporated

Te Hauora o Te Wheke-a-nuku

South Taranaki

Te Puni Kokiri
New Plymouth District Council

Porirua

Housing Action Porirua

Hokitika

Rata Branch of the Maori Women's Welfare Group

Christchurch

Crown Public Health Limited

Appendix 2

List of local community interviewers

Christchurch interviewers

Annabel Driscoll
Angelia Ria
Rhonda Robertson
Julie Whitla

Hokitika interviewers

Vanessa Dale
Hemi Meihana
Linda Wall

Porirua interviewers

Gayle Chalmers
Jasminka Milosevic
Gina Pene
Kaokao Onosai

South Taranaki interviewers

Kawarau Ngaia
Cheryl Skelton
Tina Love

Nuhaka/Mahia interviewers

Elyria Fau
Alberta Hunga
Linda Kawana

Eastern Bay of Plenty interviewers

Karlene Koopu
Maree Koopu

Otara interviewers

Luse Berking
Mate Tipene
Bill Wiki