STUDY REPORT

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NEW ZEALAND
2005 HOUSE CONDITION SURVEY

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PREFACE

This report summarises the results of on-site inspections of the physical condition of 565 houses during 2004 and 2005. The houses were chosen at random from the three main regions, and inspections were carried out by BRANZ and Building Research staff and inspectors supervised by BRANZ and Building Research staff. The report also includes the results of a telephone survey of more than five hundred homeowners, including owners of those houses inspected. The telephone survey recorded demographic, economic and maintenance information about the homeowners.

ACKNOWLEDGEMENTS

This work was funded by the Building Research Levy. The Centre for Research Evaluation and Social Assessment undertook the social survey of homeowners on BRANZ Ltd's behalf. The involvement of Mike O'Malley (BRANZ Ltd) and Bill Ash and Bill Irvine (Building Research) in carrying out and supervising the house inspections is gratefully acknowledged.

BRANZ Ltd is also very grateful to the many homeowners who allowed access to inspect their houses. Without their cooperation this survey would not have been possible.

KEYWORDS:

House Condition Survey, household condition, household problems, insulation, hot water systems, maintenance, home maintenance, ventilation

READERSHIP

This report is intended for researchers, manufacturers, economists and maintenance persons.

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1. SUMMARY

This report is the third study into the condition of New Zealand houses. Surveys were carried out in 1994[1] and 1999[2], and the third survey has now been completed on a new representative sample. Five-hundred and sixty-five owner-occupied houses in the Auckland, Wellington and Christchurch regions were inspected, and their owners interviewed on their family circumstances and maintenance practices[3].

These surveys provide "snapshots" of our housing stock at different points in time, by investigating a group of houses (and owners) that broadly represent the underlying range of designs, ages and varying conditions of New Zealand houses. As more surveys are completed, trends and problems are identified, and a reliable information base is established on which to base comparisons.

Overall condition

The 1994 and 1999 surveys found similar overall average conditions of surveyed houses, with some improvements in the condition of older houses. The 2005 survey indicates that the overall average condition of surveyed houses has improved, mainly due to increasing numbers of newer houses in the sample.

Condition for ages of houses

The first survey had indicated a general deterioration with increasing ages of houses, while the next survey showed a slight improvement in the condition of older houses in the Auckland and Wellington regions. This survey shows further signs of improvements resulting from renovation, this time over all regions. The average condition of the oldest group of houses is now similar to that of houses more than 50 years younger.

The condition of interiors of older houses is still higher than exteriors, but the difference is reducing – allaying some of the concern that renovation efforts may be too focused on cosmetic changes, with these taking precedence over more critical elements. However, many of the envelope problems found in older houses are expensive defects to remedy – which is reflect in the increasing repair costs with age.

Common defects

The defects found in the sample houses were generally similar to those found in past surveys. These included: poor sub-floor ventilation, inadequate clearance of wall claddings from the ground, poor or missing sub-floor fasteners, poor ventilation of bathrooms and kitchens, and lack of earthquake restraints on hot water cylinders and header-tanks.

Many houses had one or more of these components in *poor* or *serious* condition. Cladding clearance deficiencies have increased with each successive survey, and are particularly apparent in houses built after the 1960s.

New information was collected in this survey, which shows additional common issues – including too high or too low shower flow rates, hot water thermostats that deliver hot water at temperatures above or well below the settings, decks with unsafe barriers, and stair pitches that do not comply with current requirements.

Costs of repair

The average condition of a house is derived by averaging all component ratings, which weights all components equally, whereas some component defects cost a great deal more to remedy than others. Estimating the costs of upgrading components takes these differences into account by allowing for the varying significance of different defects. This has the effect of weighting components according to their estimated costs of repair - reflecting this in the resulting average cost per house.[1]

The overall average condition of surveyed houses has improved by about 10% over that shown in the past surveys, and this is reflected in the decrease in the costs of repairing the more serious defects found in the houses. The 1999 cost to repair the more serious defects, updated on movements in house construction costs [4], was estimated at $4,900. For the 2005 survey, the cost is estimated at about $3,700, with the decrease reflecting fewer serious defects and the difference in age distributions between the two samples.

When the 2005 sample is weighted to the same age distribution as the 1999 sample, the cost at $4,500 is about 10% below the 1999 figure. Based on owners' responses in the telephone interviews, it appears that an average of less than $1,300 is currently spent on home maintenance – implying that insufficient maintenance is being undertaken to maintain the housing stock in a satisfactory condition.

[1] *Results are considered to be statistically significant – refer Appendix 16.1.7 for analysis.*

Data compiled includes:

- **Physical survey** *(Tables 1 and 2, Figures 1 to 10)*
  Inspection of the physical condition and features of 565 houses from the Auckland, Wellington and Christchurch regions in 2004/2005

- **Telephone survey** *(Appendix 16.5)*
- A telephone survey of 611 homeowners (including those in inspected houses), collecting socio-demographic details, and information on home maintenance practices and expenditure.

- **Data from inspections**
  The physical condition, performance condition, material types and frequency of defects for about 40 components or features – including those covered by the 1994 and 1999 surveys. Additional information was collected on security measures, attached decks, shower flow rates, hot water temperatures, interior stairs, hot water systems, sub-floor plumbing pipes and heaters.

The analyses carried out include:

- **Condition** *(Figures 11 to 24, 29 to 53, Appendix 16.1.1)*
  Comparisons of assessed conditions by inspectors and owners, comparisons of component conditions with past surveys, by region, interior and exterior and ages of houses, condition of common exterior materials, and type and extent of defects.

- **Costs** *(Figures 55 to 62, Appendix 16.1.5)*
  Calculation of costs of repair or delay, by component, region and ages.

- **Other areas** *(Figures 64 to 108)*
  Analyses of household characteristics, insulation, hot water systems, heating systems, security measures, maintenance information, dampness and fire protection.

2. INTRODUCTION

New Zealand's housing stock consists of between 1.5 and 1.6 million (*1999:1.4M*) dwellings valued at about $178 billion. The first survey to collect information on the physical condition of this national asset was carried out in 1994[1] when more than 400 houses were given a detailed inspection, and the condition of a wide variety of components assessed, with visually apparent defects identified where possible. The second and third surveys have followed a similar pattern (with each survey including additional components or features) in order that trends could be considered.

In common with the 1999 survey [2], the 2005 survey gathers information on the house and on the owner, by means of a telephone survey. This social survey [3], designed to uncover the key social and economic variables associated with homeowners' maintenance practices, was undertaken on BRANZ's behalf by the Centre for Research Evaluation and Social Assessment (CRESA).

The social survey consisted of a short structured telephone interview that covered household characteristics, perceptions of past and present house condition, expenditure on maintenance, deferral of maintenance, types of maintenance carried out and by whom, maintenance intentions, information sources and other maintenance practices. Answers to interview questions supplement information collected in the inspections of the sample houses, and add to our understanding of the current state of our housing stock. A copy of the questionnaire and summarised findings are provided in Appendix 16.5.

It should be noted that House Condition Surveys are not detailed weathertightness or structural surveys, as it is only possible to gain a general impression of obvious defects within the limited time available for inspections on each house. Weathertightness surveys require specialised inspections using measuring instruments and techniques, some of which require destructive testing in order to establish the condition of inaccessible framing. Such inspection services are available from professional assessors such as members of the New Zealand Institute of Building Surveyors.

3. SURVEY DESIGN

The design of the 2005 survey has been based on the past two surveys, modified and expanded where necessary to accommodate the changing nature of our houses and to give additional information where required. The survey sample was derived in a similar fashion to the 1994 and 1999 survey samples.

3.1 Sample size

In 1994 and 1999, a sample of 500 houses was aimed for. The 2005 survey increased that target to 550, to allow for the increase in numbers of houses over the past six years, and for a potential 10% dropout rate.

Regional and house age distributions were also investigated, to ensure that the final sample would broadly represent the underlying house population. This has lead to increases in the samples for Auckland and Christchurch regions, to better align with the numbers of newer houses in those regions.

3.2 Sample selection

House condition surveys are restricted to stand-alone, owner-occupied dwellings, so a random selection of **4,000** of these, within the target localities, was obtained from Marketreach, a subsidiary of RPNZ. This list included property details originally from the property database maintained by Quotable Value NZ (QV), who has a near complete record of all New Zealand dwellings. Telephone numbers were matched to **2,463** names and addresses, and a pre-contact letter (refer Appendix 16.3.1) was sent to each homeowner. This letter provided information on BRANZ, explained the project, offered incentives for participation, and said that the owner might be contacted.

CRESA then sub-contracted the National Research Bureau (NRB) to undertake telephone interviewing for the social survey. In common with the 1999 survey, in order to take part in the survey the respondent had to agree to an inspection of their house in addition to the telephone interview. Interviews were completed with a total of **611** homeowners, and physical inspections were subsequently completed on **565** houses – leading to a dropout rate of about 10% as anticipated.

3.3 Regional sample

In order to simplify management of house inspections, the house condition surveys to date have been limited to the largest population centres (Auckland, Wellington and Christchurch). Each region includes a mix of city, suburban and rural locations. The 1999 final sample had under-represented houses built since

1990, so the particular localities within each region were adjusted to more accurately align with the New Zealand distribution of houses. Regional totals were also adjusted to reflect 2001 census distributions.

Table 1: 2005 survey sample

Locality / **Region**	Target Sample (to match 2001 census) no.	%	Interview Sample no.	%	**Inspected Sample no.**	**%**	(1999 final sample) (no.)
Auckland City	**135**	25%	145	24%	**131**	23%	(66)
Manukau City	**85**	16%	97	16%	**84**	15%	(63)
Waitakere City	**57**	10%	68	11%	**61**	11%	
Rodney District	**29**	5%	30	5%	**28**	5%	
Papakura							(27)
AUCKLAND total	**306**	56%	340	56%	**304**	54%	(156)
Wellington City	**64**	12%	73	12%	**75**	13%	(108)
Upper Hutt City	**13**	2%	16	3%	**17**	3%	(32)
Kapiti Coast District	**18**	3%	20	3%	**19**	3%	(29)
WELLINGTON total	**95**	17%	109	18%	**111**	19%	(169)
Christchurch City	**125**	23%	132	22%	**121**	21%	(113)
Waimakariri District	**10**	2%	15	2%	**15**	3%	(27)
Selwyn District	**14**	2%	15	2%	**14**	3%	
CHRISTCHURCH total	**149**	27%	162	26%	**150**	27%	(140)
TOTALS	**550**		**611**		**565**		***(465)***

Table 2: Sample characteristics

Household size	HCS 2005	2001 census
1 person	**13%**	23%
2 members	**37%**	34%
3 members	**14%**	16%
4 members	**25%**	15%
5 members	**7%**	7%
6 members or more	**4%**	5%
Mortgage status		
With mortgage	**50%**	52%
Without mortgage	**50%**	48%
Time in dwelling		
Less than 5 years	**23%**	59%
5 to 7 years	**14%**	
More than 7 years	**63%**	
Homeowner's age		
Under 50 years old	**42%**	47%
50 to 64 years old	**31%**	29%
65 years old and over	**27%**	24%
Family income		
Under $20,000	**10%**	23%
20 to$30,000	**9%**	15%
30 to $40,000	**8%**	11%
40 to $50,000	**14%**	11%
50 to $70,000	**18%**	17%
Over $70,000	**41%**	23%
House size		
Less than 3 bedrooms	**6%**	25%
3 bedrooms	**62%**	48%
4 bedrooms	**25%**	21%
5 bedrooms	**6%**	5%
6 or more bedrooms	**1%**	3%

Table 1 shows that the decrease in numbers between the interviewed sample and the inspected sample is 10%, the same as for the 1999 survey, leaving the final sample with a distribution very similar to that of the target sample.

3.4 Sample profile and bias

The social characteristics of the sample have been compared to 2001 census data where possible in order to establish any potential bias. Table 2 shows some of the key characteristics of the sample, comparing them where appropriate to the census data. The analysis shows that the sample is largely representative with:

- ***household size:*** *under representation of one-person households and over representation of 4 member households*
- ***mortgage status:*** *broadly representative*
- ***time in dwelling****: over-representation of longer times spent in the dwelling*
- ***homeowners' ages:*** *broadly representative*
- ***family income*** *under represented at lower levels and over represented at upper levels*
- ***house size*** *under represented for smallest sizes*

It should be noted that census comparisons for family sizes, years in dwelling, incomes and dwelling sizes include rented accommodation – which helps to explain variances for the lower levels of these factors.

Almost 60% of the sample had a family income of more than $50,000. To put this in context, the 2001 census showed that only 40% of households had a combined income of more than $50,000, implying that the sample is biased towards those with incomes higher than the national average.

Some bias may be expected as rented accommodation is included in the census data. However, some remaining potential bias is reinforced by house size, with the average house area of the final sample being about 5% over that derived from the initial Marketreach random sample. It is also reinforced by comparing the average property valuations of the initial (large) QV sample and the average of the inspected sample, which (except for the newest age groups) is higher.

Figure 1 shows these household characteristics compared to New Zealand totals.

Figure 1: Sample characteristics

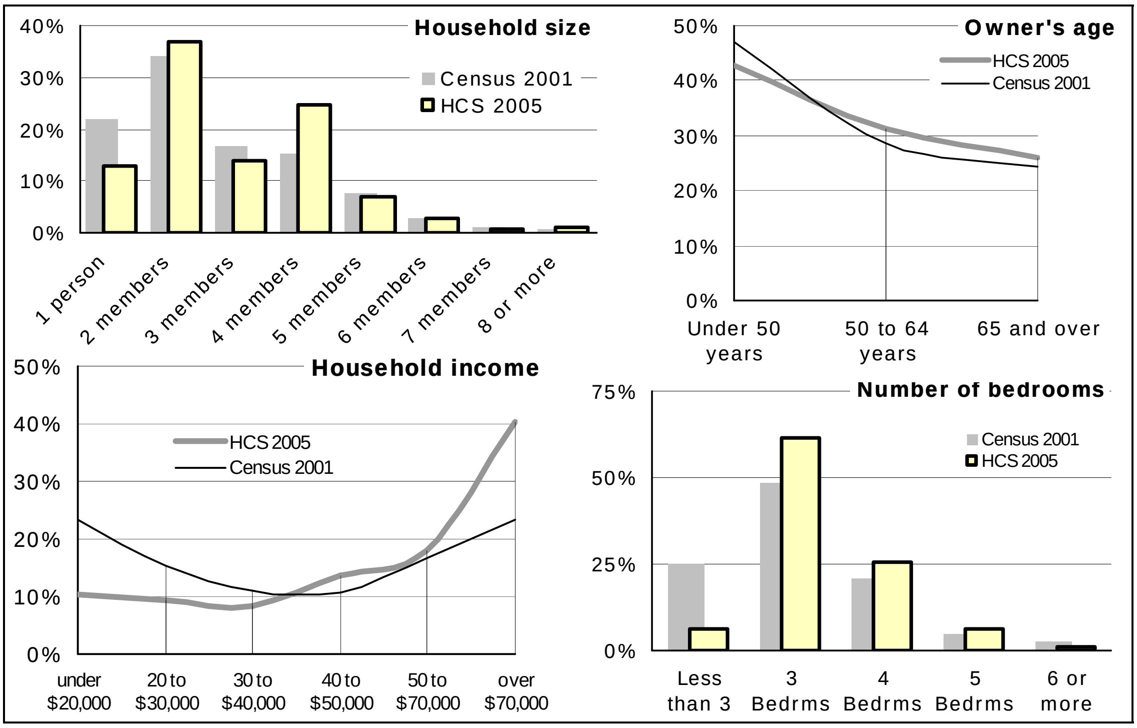


Figure 2 shows floor areas and building valuations related to the ages of houses, and compares these to the initial large QV sample.

Figure 2: Average valuations and areas for ages

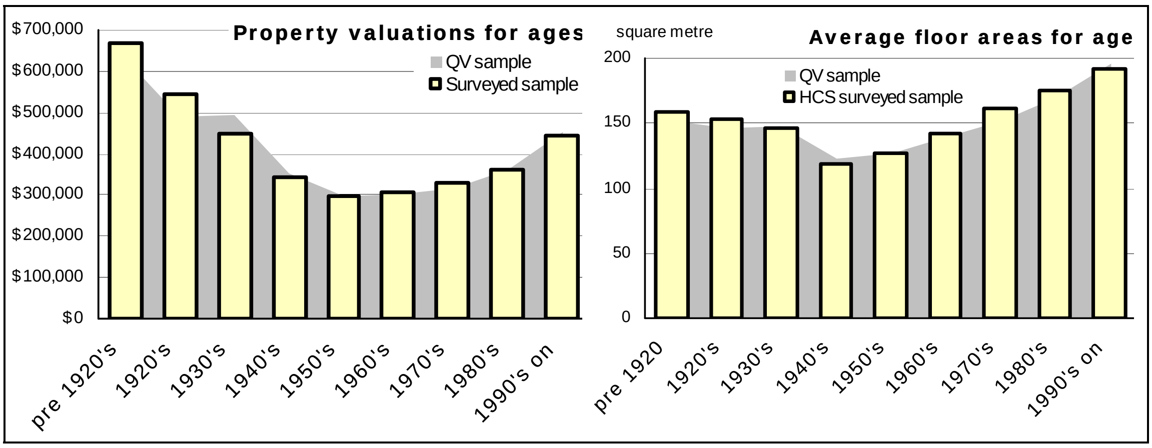


Figure 2 indicates that, while the inspected sample is broadly representative, some self-selection bias has taken place between the original random sample and the surveyed sample. It is possible that owners with houses in poor condition are less likely to offer their houses for inspection.

The 1999 survey indicated a similar potential bias, which suggests that these surveys may under-estimate the extent of deterioration in the housing stock. However, the differences indicated in the charts are not major, so it is unlikely that results will differ markedly from those expected for the original sample.

The main features of the surveyed sample are:

- ***Age of homeowners**: the majority of owners are 50 years old or greater. This age group makes up 58% of the surveyed sample.*
- ***Household size**: most homeowners are living at least with partners, and a significant proportion also has children living at home.*
- ***Employment status**: a significant proportion has partners also in paid employment (which relates to the income levels of the sample).*
- ***Length of ownership**: only 23% of owners have been in their house for less than 5 years, in contrast with almost 60% for the total population.*
- ***Household income**: the relatively high combined household income, with almost 60% having a family income greater than $50,000, compared to the national proportion of just over 40%.*
- ***Areas of houses over age groups**: average areas for each age group of houses are similar to those of the original QV sample, although there are fewer smaller houses with two bedrooms or less than in the total New Zealand population.*
- ***Property valuations**: average property valuations for each age group of houses are similar to those of the original QV sample, except for the oldest cohorts.*

3.5 House inspections

3.5.1 Inspector training

The same inspectors were involved in inspection (and/or supervision of inspections) as in 1994 and 1999, so no additional training was undertaken. The main aim is to achieve standardisation of condition assessment, and this has been helped by the survey forms being checked and processed centrally as inspections were completed, in order to resolve any apparent inconsistencies between regions as early as possible.

3.5.2 Survey forms

A copy of the survey questionnaire is provided in the Appendix 16.4. Overall information about the property, building and other features was collected by inspectors, together with an assessment of the condition of specific components in the house.

Photographs of all external elevations were taken, along with several other features and any defect of unusual severity. A selection of these, showing common problem areas, is included in Appendix 16.6.

3.5.3 Rating scales

Inspectors identified and assessed materials, defects and overall condition, on a scale ranging from serious to excellent, for about 40 components and features *(1999: 33)*. The extent of defects in exterior components was recorded as to frequency, so that cost implications could be more accurately assessed. Descriptions of condition assessment ratings are shown in Table 3.

Table 3: Rating scale

CONDITION	Description			Rating
SERIOUS	Health & safety implications, needs immediate attention.			1
POOR	Needs attentions shortly - within the next three months			2
MODERATE	Will need attention within the next two years			3
GOOD	Very few defects - near new condition			4
EXCELLENT	No defects - as new condition			5
Frequency of defect	0-10%	10-25%	25-50%	50-100%

As well as those components assessed on the five point scale, many other features were recorded, for example: plumbing materials, ground clearance, sub-floor moisture levels, roof type and slope, material types, wiring type, insulation materials, security measures, water temperatures and flow rates, fire safety devices etc. This information is used for analyses included in this report, and provides valuable background information that may be used for further detailed analysis on the houses.

3.6 Distribution of sample

3.6.1 Distribution by locality

Figure 3: Regional distribution

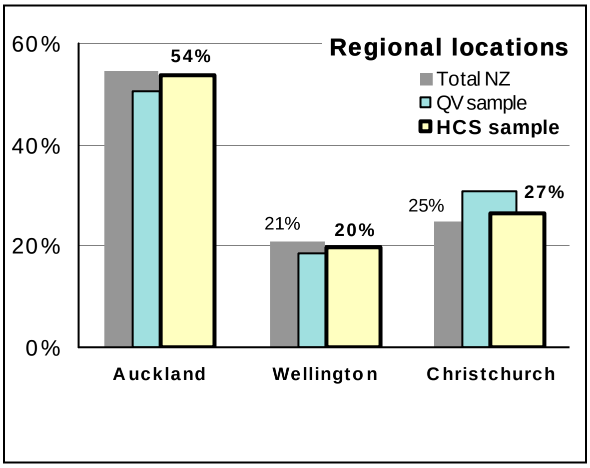
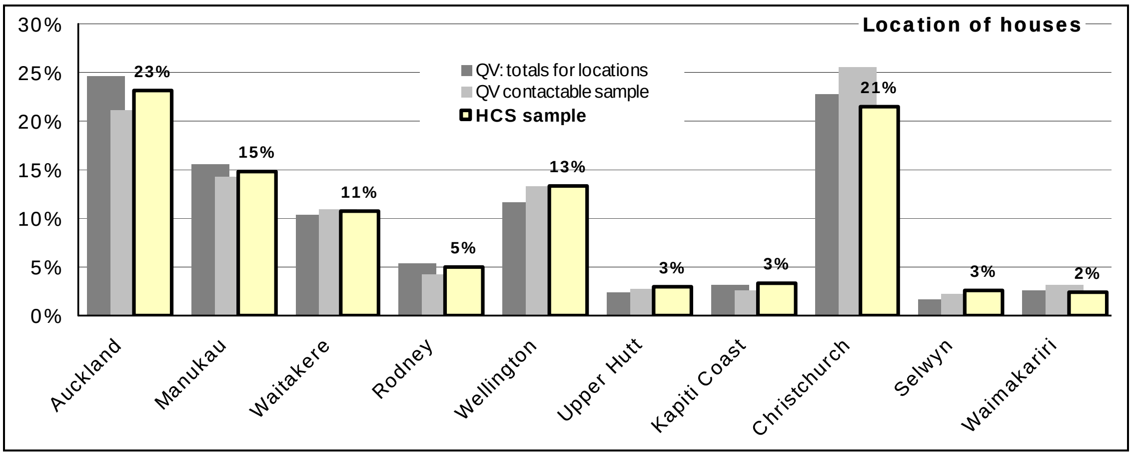


Table 1 showed target figures for each region together with the actual samples for the telephone interviews and the physical inspections. The final sample is broadly representative of the initial target distribution.

Figure 3 shows regional distributions and compares the sample distribution with the total QV sample and also to the total New Zealand population of houses.

Figure 4 shows inspection localities within each region, also comparing the distribution with the total QV sample and the total New Zealand population of houses (derived from analyses of all houses in the QV national database).

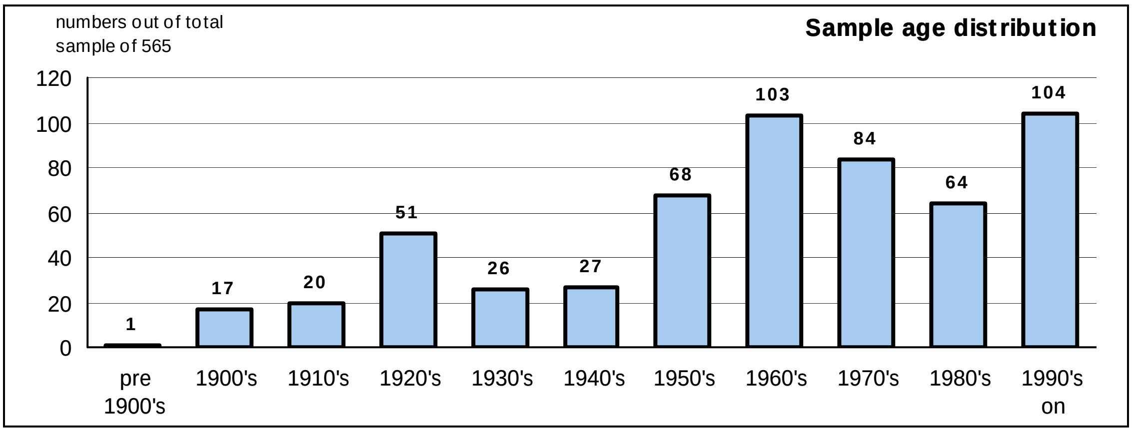
Figure 4: Location of houses



3.6.2 Distribution by age group

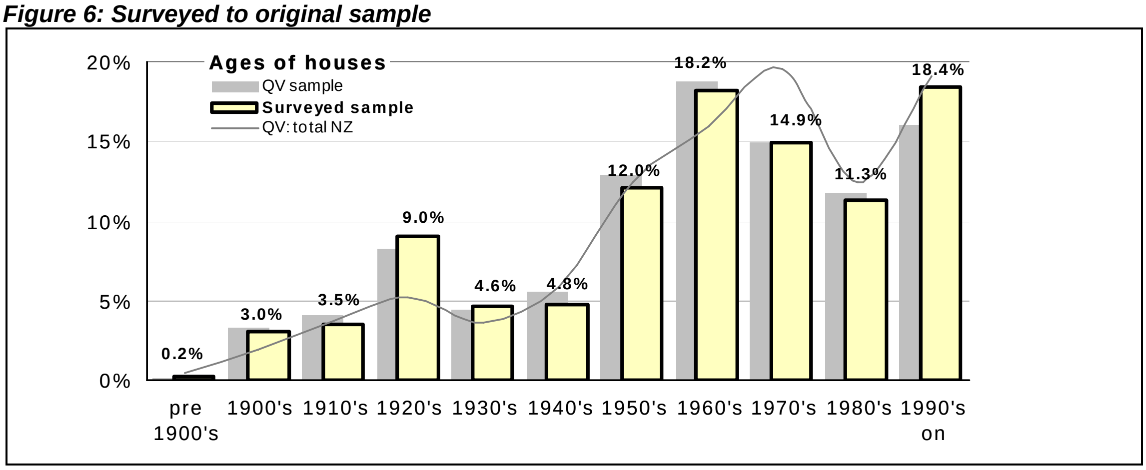
Figure 5 gives the numbers of sample houses within each age cohort.

Figure 5: Sample age distribution



The distribution is further explored by comparing it with the total QV sample and the underlying national population. The age distribution of the surveyed sample indicates that the sample is broadly representative of the New Zealand-wide distribution, with some variations, as shown in Figure 6.

Figure 6: Surveyed to original sample

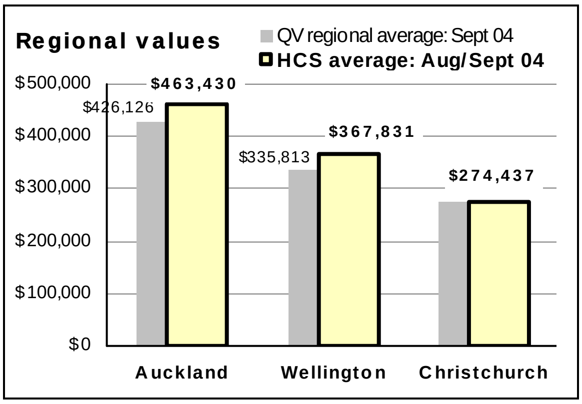


As shown in Figure 6, houses built during the 1920s are over-represented in both the initial QV sample and the final surveyed sample and those built during the 1970s are under-represented, while other cohorts are broadly representative.

The original QV sample was a random selection of all owner-occupied houses within each chosen locality (without controls as to ages of houses), with the aim of being representative of the total housing stock in those regions. Because of the locations chosen, the QV sample is limited in its representation of rural and provincial housing stock, which may explain some of the differences when age cohorts are compared to total New Zealand age distribution.

3.6.3 Distribution by building value

Figure 7: Average regional average property values



Another indication of the overall representation of the surveyed sample is to compare **property** valuations (including land) to those in the original QV sample. Valuations for each property are based capital value figures available from QV.

When 2004 estimates were not available, valuations were updated to September 2004 using the relevant QV quarterly house price index movements for each locality.

Figure 7 gives the average valuations for each region (as surveyed) against the QV total averages for all localities within each region.

This shows that the surveyed sample broadly represents overall average regional property values.

Figure 8: Property values at September 2004

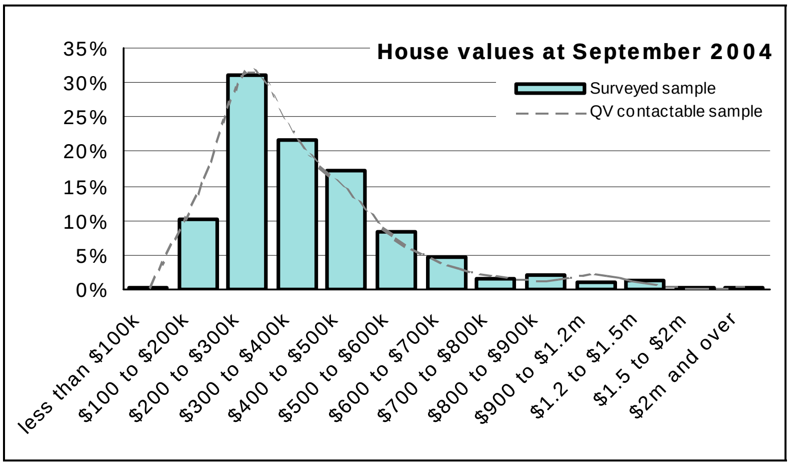


Figure 8 gives the spread of **property** valuations for the surveyed houses compared to that of the total QV sample.

As shown, the spread of property values for the inspected sample addresses is similar to that of the original larger QV sample.

The next check of the surveyed sample was to compare the **building** values (excluding land value) to those in the original QV sample.

Figure 9: Building valuations for age groups

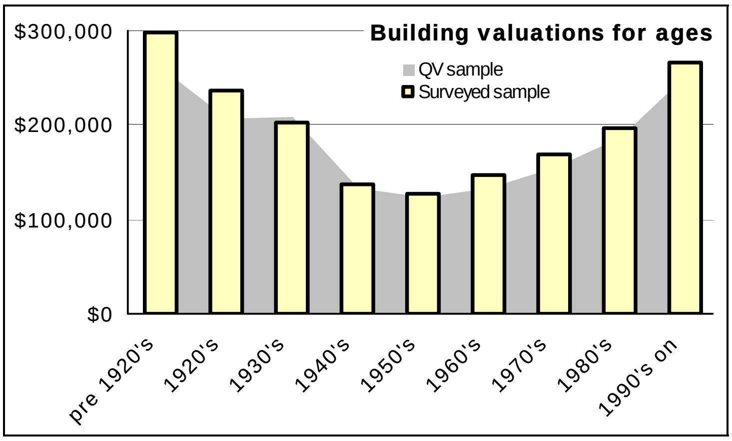
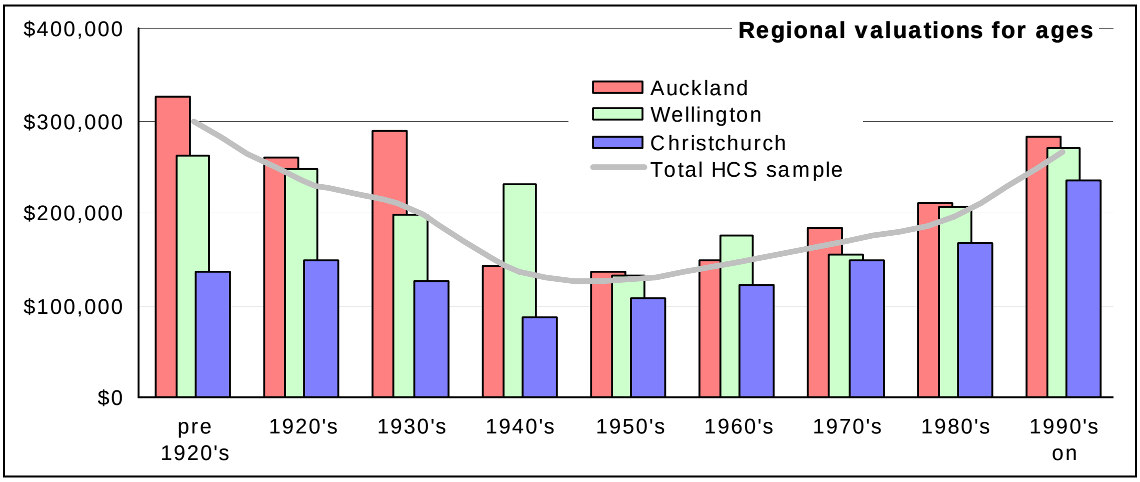


Figure 9 shows building values distributed over age groups, and Figure 10 shows the same for each region.

As shown, building valuations for the oldest houses are notably (about 15%) above those of the QV total sample, while other age groups are within 10%. This supports the theory that some self-selection on the part of owners has occurred, as previously discussed in Section 3.4: Sample profile and bias.

It is also interesting to note differences between the regions, as shown in Figure 10.

Figure 10: Regional building valuations for age groups



In common with the 1999 survey, Auckland generally has the highest building valuations for each age cohort – with the exception of the 1940s and 1960s decades. It should be noted that the 1930s and 1940s age groups include the smallest number of houses (at 25 and 35 respectively), meaning that the number of houses in each region for these age groups are very low and results should be treated with caution. In particular, Wellington had only 4 houses that were built during the 1940s and the high average value shown for Wellington houses of that decade is unlikely to be representative.

Christchurch houses have the lowest values for each age group – with the variance from the average being greatest for older houses. The same effect was observed in the 1999 study – but it interesting to note that the variance from the average for older houses has decreased in this survey, which seems to indicate that older Christchurch houses are increasing in value at a greater rate than in the other regions.

In common with the 1999 survey, the 1950s age group has the lowest average building valuation for every region.

4. AVERAGE CONDITION

4.1 Overall assessments

4.1.1 Inspectors' assessments

As well as assessing individual components, each inspector also made a more subjective overall judgement on whether the house was:

- ***well maintained***
- ***reasonably maintained***
- ***poorly maintained.***

In many cases, this overall assessment may not correspond with the average component condition derived from all component ratings. Several important components ranked as being in *poor* condition may be enough to establish a judgement that a house is poorly maintained, but be insufficient to pull the average component condition below a *good* or *moderate* level. While there is insufficient detail in this overall subjective judgement to allow further analyses, the assessment is valuable as it indicates opinions of experienced inspectors who will weight their assessments according to the perceived importance of particular areas that may be in poor condition.

For average component condition rating figures, equal weighting is given to each component. However, each component does not contribute equally to the overall physical condition of the house. An example of this is the condition of those components that, if *poor*, could lead to further serious implications in other components e.g. a leaking roof or rotting weatherboards – in contrast with, for example, a *poor* condition for interior linings which would have no flow-on effects.

4.1.2 Owners' assessments

During the telephone survey, owners were asked to put the condition of their house into one of five categories, varying from *excellent* to *very poor*. It was notable that very few houses were described by owners as being *poor* or *very poor*. These five levels have been simplified into three groups (*good*, *moderate* and *poor*) to align with the levels used by the inspectors in order to allow comparison.

4.1.3 Comparisons between assessments

The 1999 survey found notable differences between the inspectors' subjective assessments (based on experience) and other subjective assessments - those of QV (who maintain records of their last assessment of the condition of the exterior of the house), and those of the homeowners themselves. A similar analysis has therefore been made for the 2005 survey.

A point that should be taken into account is that most owners tend to concentrate on the condition of the interior because that is what they most readily understand. On the other hand, QV's assessments are generally based only on the exterior, as few houses are inspected inside (unless a valuation is appealed). The inspectors' assessments are made after inspecting both interior and exterior components.

Figure 11: Assessed overall condition

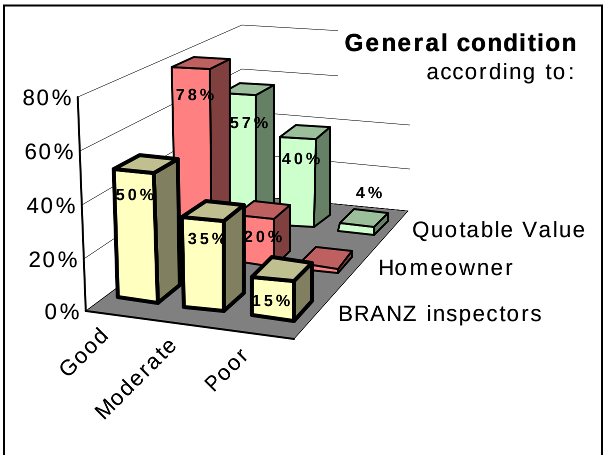


Figure 11 shows the differences between the inspectors' assessments and the other two judgements, which have been translated into three broad categories in common with those used by the inspectors.

The BRANZ inspectors' and QV's judgements are similar, but notable differences are shown between these and the owners' assessments.

As shown, the BRANZ inspectors considered that 50% of the surveyed houses were well maintained, while almost 80% of owners considered their houses were in good or excellent condition.

This level of difference is a marked increase from the 1999 study, when only 50% of homeowners assessed their houses as good or excellent. Figure 12 therefore explores changes since 1999.

Figure 12: 1999 and 2005 assessments

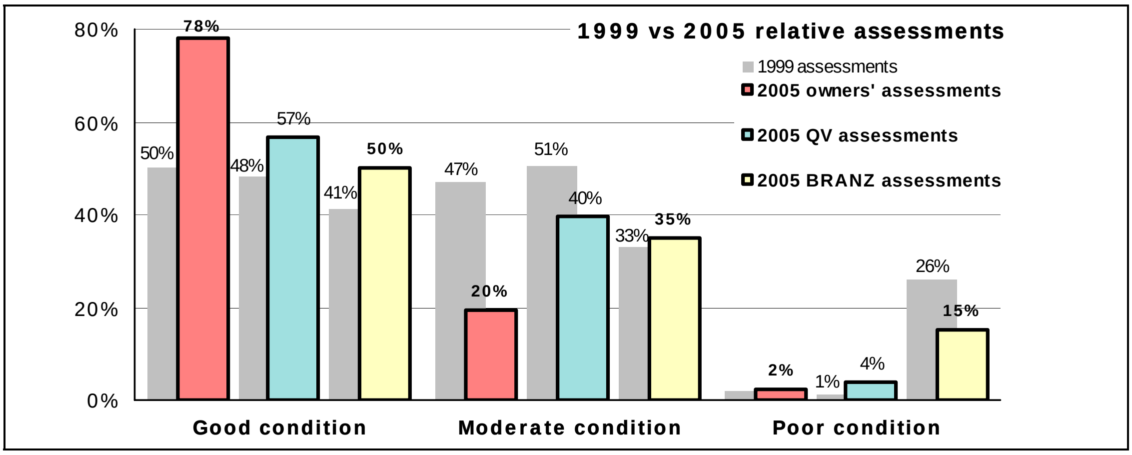


Figure 12 shows the increase since the 1999 survey in the proportion of owners who appear to consider their houses to be in good condition. Part of this will be due to the condition actually improving, as proportions of QV and BRANZ assessments have also increased. However, QV and BRANZ assessments have increased by less than 10% - in contrast to the almost 30% increase in owners' assessments.

Figure 13: Regional assessments

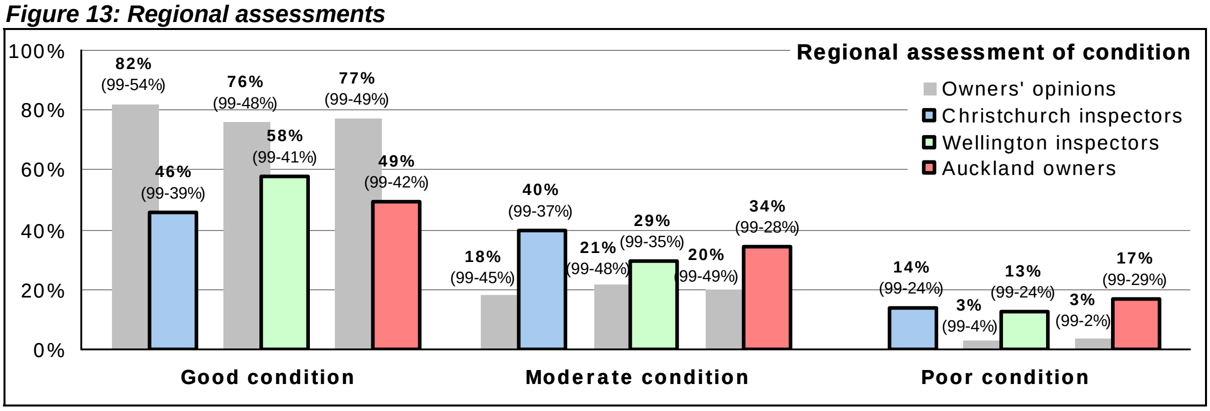
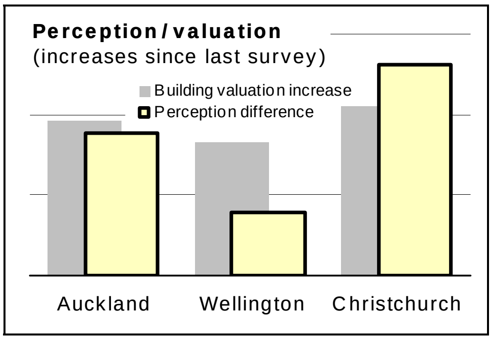


Figure 13 shows regional differences between BRANZ and owners assessments. This shows that, in the surveyed sample, the differences between the two judgements are similar for Auckland and Christchurch over all conditions. This is an interesting change from the 1999 surveys, where the difference increased from North to South – with Christchurch having the largest difference. In 2005, Christchurch still has the largest difference, but Wellington now has the smallest difference.

Figure 14: Regional building valuations for ages



To investigate this difference, Figure 14 shows the relative increases in average building valuations and owners' perceptions of house condition since 1999.

It may be that an owner's perception is related to the valuation (or movements in valuation) of their house: the higher the valuation (or recent increase in value), the higher the perception of the condition of the house.

Auckland, for example, has the highest average valuations (reflecting demand rather than actual physical condition).

However, while Christchurch has the lowest average valuation, this region has experienced the highest relative increase in average building valuation since the 1999 survey, which may well encourage unrealistic perceptions of condition.

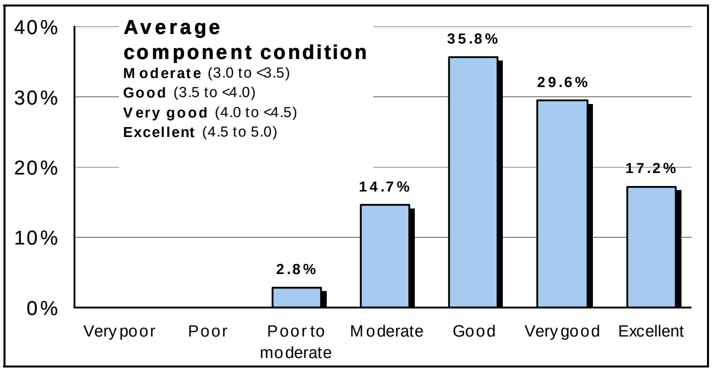
Wellington has experienced the lowest relative increase and also has the lowest difference in perception. Although this is interesting, there is insufficient evidence to draw any firm conclusions, and it is unlikely that any simple correlation exists as there are likely to be many other contributing factors.

4.2 Average component conditions

The rating levels used to assess component condition were shown in Table 3. These are used as the basis for the inspector to provide a condition rating for each component inspected. These ratings are then simply averaged (with no weighting) over all houses to derive average component condition ratings, which are shown in detail in Appendix 16.1.1, with comparisons to 1999 and 1994 ratings.

To give an overall picture of the sample, one average rating has also been derived for each house in the survey. These average ratings are then classified to the distribution shown in Figure 15.

Figure 15: Average component conditions

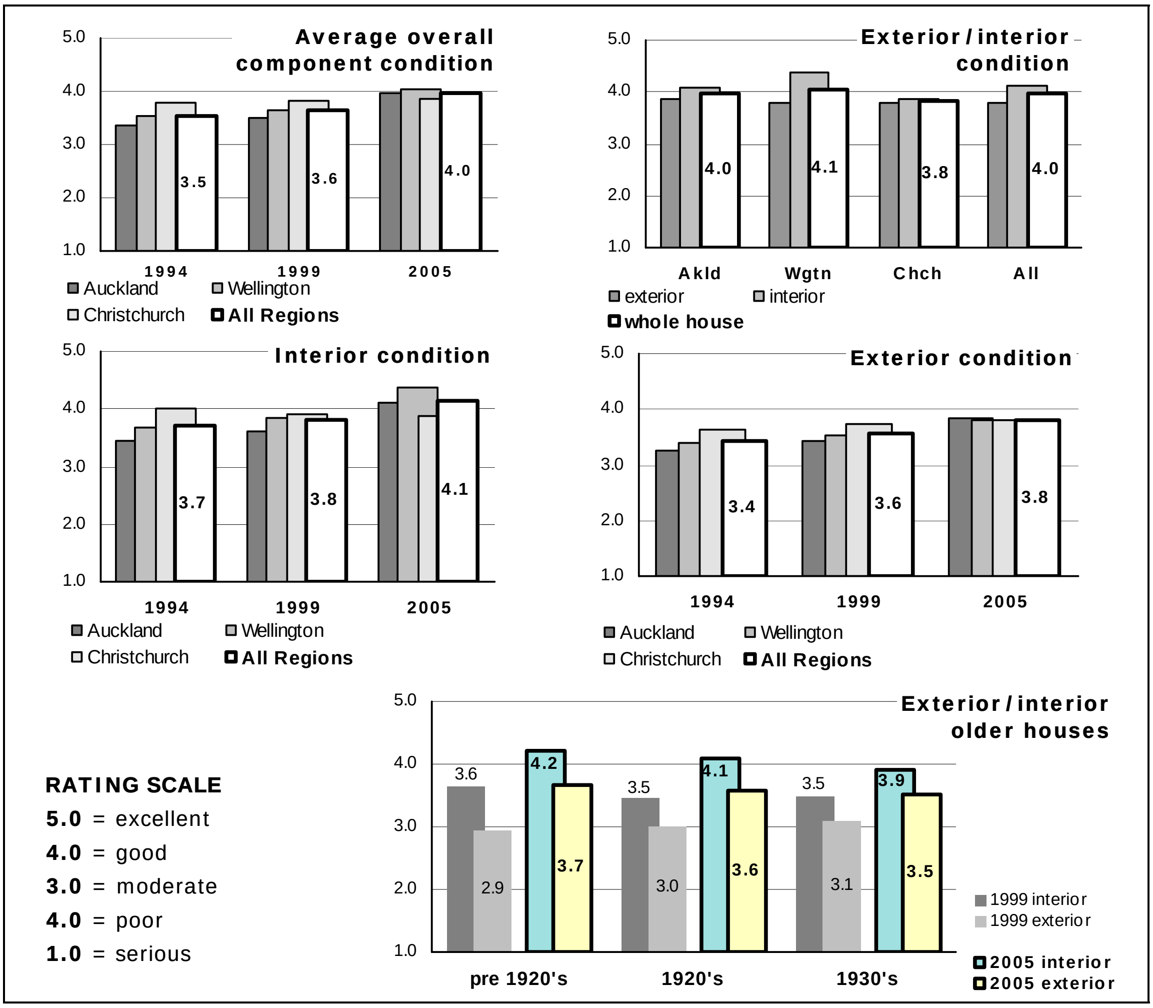


As shown, more than 80% of surveyed houses have average component ratings that are *good*, *very good* or *excellent*, with only 3% that are classified as below *moderate*.

No houses have sufficient poor components to pull their average component condition into the *poor* or *very poor* category.

The analyses in Figure 16 use average component condition ratings for each house, averaged over all surveyed houses, and then grouped in various ways to illustrate changes in average component conditions over the surveys to date – by regions, interior condition, exterior conditions and for older houses.

Figure 16: Component conditions – exterior/interior



The main features of the breakdowns in Figure 16 are:

- *In both 1994 and 1999 surveys:*
  - *Christchurch houses had the highest overall average component condition*
  - *Auckland houses had the lowest average component condition.*
- *In 2005, Christchurch houses had the lowest overall average component condition, with the other 2 regions at very similar levels to each other.*
- *The interior component condition was higher than the exterior over all three regions, with Wellington houses having the largest difference and Christchurch the smallest.*
- *The above differences (although notable) were not large.*
- *Older pre-1940s houses show greater differences between exterior and interior conditions than other ages groups – but less % difference than in past surveys.*

As explained above, all components are given equal weighting in calculating these averages, so composite results should be considered with caution, as some components are more significant than others.

4.3 Defect rankings

The following charts give average condition ratings for assessed components in order of increasing severity, comparing these with the 1994 and 1999 surveys. Table 8 in Appendix 16.1.1 provides full details of all component ratings – including those for each region.

4.3.1 Exterior components

Figure 17: Envelope component condition ratings

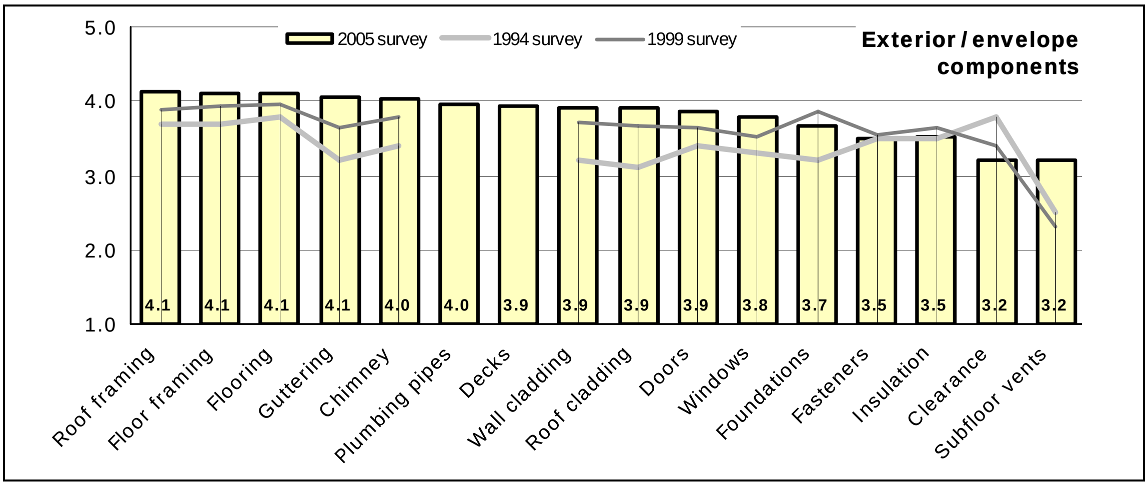


Figure 17 shows similar patterns to the 1994 and 1999 surveys, with several exceptions as follows:

- **Guttering** appears to have progressively improved in each survey – possibly due to increasing numbers of older houses replacing aging galvanised steel gutters with uPVC or coil-coated steel gutters. This is explored further in Section 6.2.2.3.
- **Roof and wall cladding** ratings have improved in each survey – possibly due to the increasing improvement in the exterior condition of older houses as shown in Figure 16.
- **Chimneys** appear to have progressively improved in each survey – possibly due to increasing numbers of older houses with chimneys removed, or to the numbers of newer houses with steel flues.
- **Cladding clearance** adequacy appears to have progressively deteriorated in each survey, probably due to increasing numbers of newer houses with near-level access to outside areas.
- **Sub-floor vents** (for houses with timber-framed floors), although still concerning, have improved in average condition since past surveys.
- **Two new components** have been added to this survey, sub-floor plumbing pipes and decks. Both of these have an average rating of about 4 (very good).

4.3.2 Interior components

Figure 18: Internal component conditions

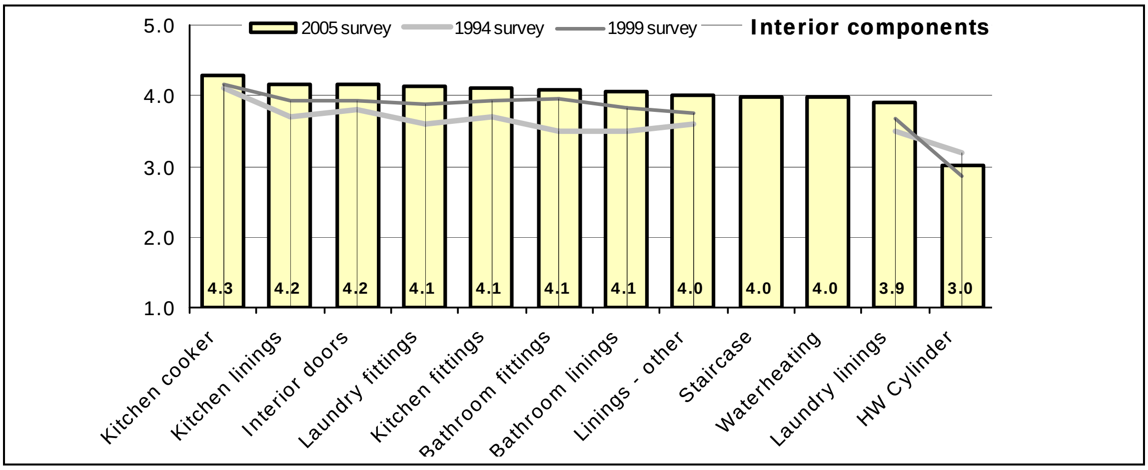


Figure 18 shows similar patterns to the 1994 and 1999 surveys, with the average component conditions generally increasing over the past three surveys.

Staircases have been added to the 2005 survey, while the water heating system is now given an overall rating, in order to recognise the increasing numbers of second systems in houses along with those that do not involve traditional styles of hot water storage cylinders. The average condition of the overall water heating system(s) is notably higher than that of electric cylinders alone (refer Section 10.2).

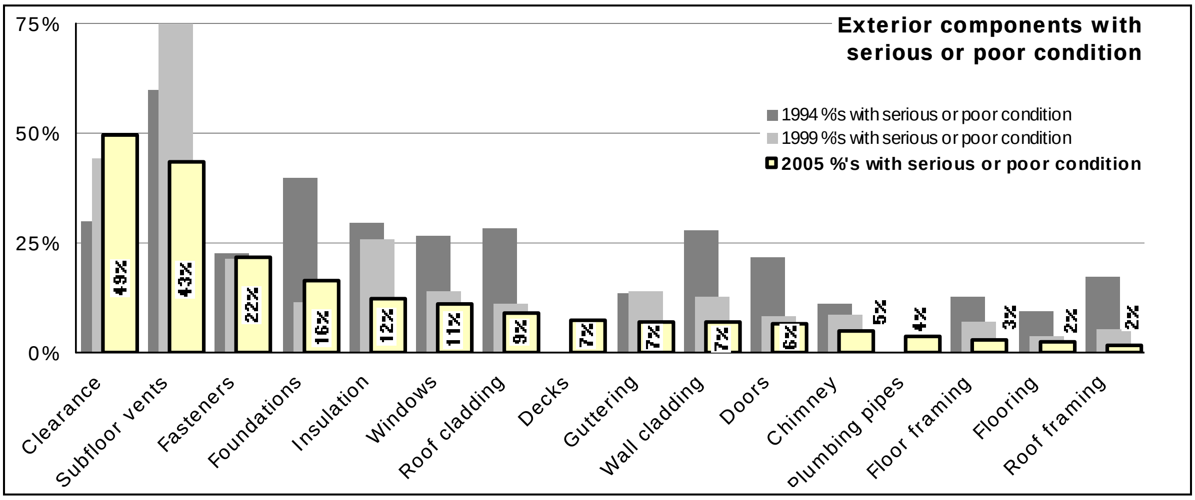
4.4 Serious and poor conditions

While average component condition is important to an overall picture of the sample, those components that are rated as *serious* or *poor* require the most urgent attention, so these are separated out for extra consideration. Figure 19 and Figure 20 compare the 2005 results, in order of descending severity, with those for 1999 and 1994 - for components with an average condition of *serious* or *poor* in each survey. Table 9 in Appendix 16.1.2 shows the comparison with the ranking found in the 1999 survey, and classifies defects into three categories (lack of compliance with current building requirements, poor management of maintenance tasks and poor building or design practice).

It should be noted that the ratings for some components relate to their **design** rather than their physical **condition**. This particularly applies to cladding ground clearances, and sub-floor ventilation. These components may be rated very low, but the design defects may not have lead to deterioration in actual condition (although the risk of future deterioration is increased). These components are considered further in Section 7.2.

4.4.1 Exterior components

Figure 19: Exterior components with serious or poor condition



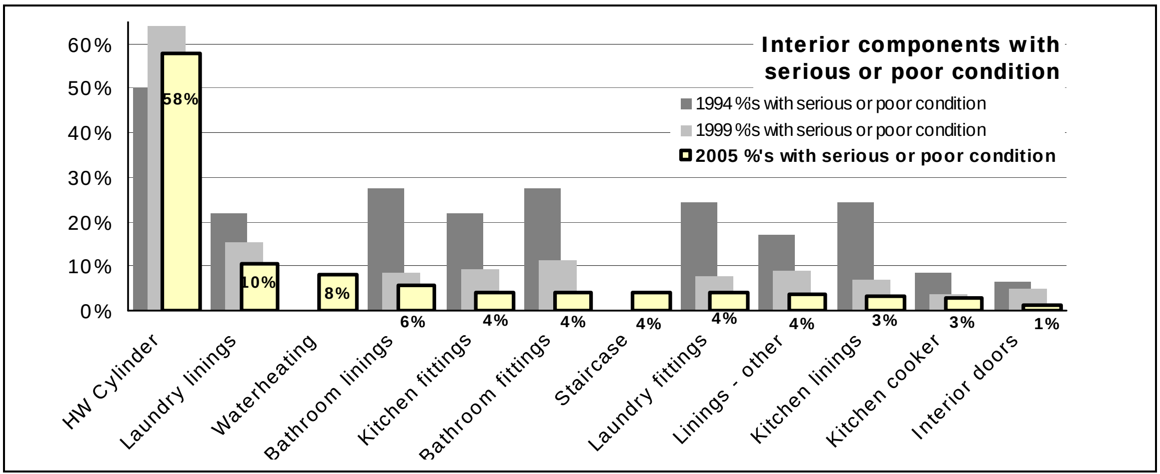
The percentage of components categorised as *serious* or *poor* in Figure 19 are in line with the ranking of components by average conditions shown in Figure 17.

Those components with the worst average condition across the sample also tend to be those with the highest incidence of *serious* or *poor* condition. There is a notable (more than 10%) change in the percentages of the sample with *serious* or *poor* ratings from 1999 to 2005 for:

- **sub-floor ventilation** – decrease
- **clearance of wall claddings** from adjacent ground or paving – increase.

4.4.2 Interior components

Figure 20: Interior components with serious or poor condition



Interior components with serious or poor condition are generally in line (with some decrease in the percentages of components with *serious* or *poor* conditions) with those of the 1999 survey (which saw significant improvement in the condition of linings and fittings over those of the 1994 survey).

4.5 Average component condition and house age

These component ratings are the average ratings of all components for each house, and then the average of these over all sample houses within each age group.

Figure 21: Average conditions over age groups

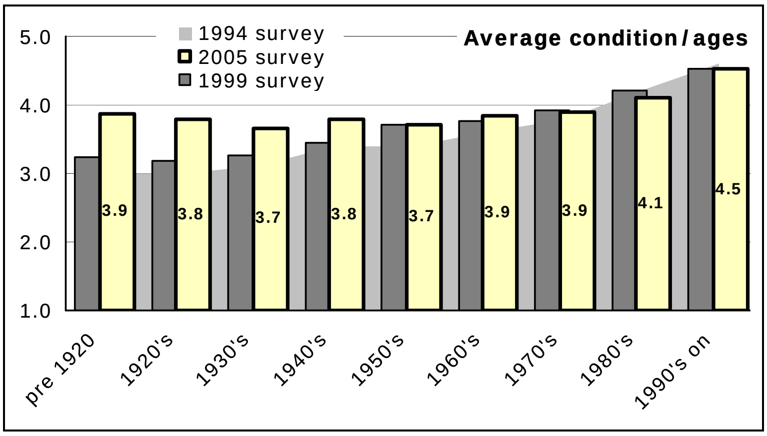


Figure 21 shows the relationship of average component condition to the age of the house.

The 2005 condition ratings are also compared with the 1999 and 1994 ratings, and show improvements in the average condition of older houses.

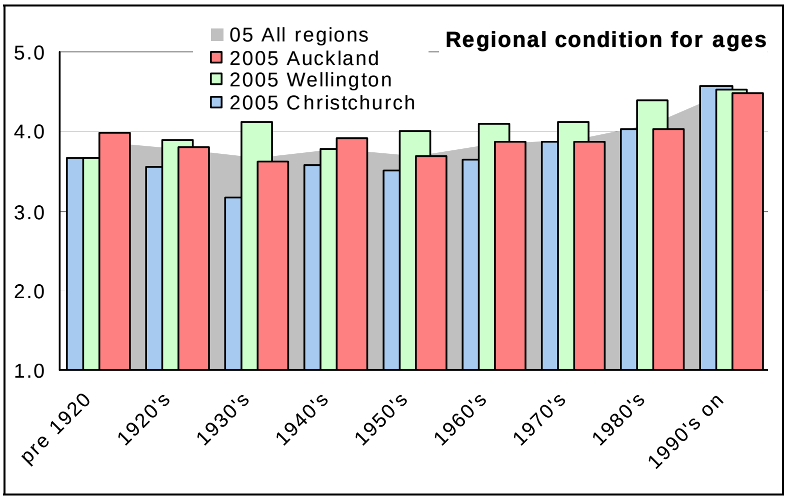
The 1999 survey showed some indication of an improvement, but the difference was too small to rely on. This time, however, the change is more obvious.

4.5.1 Condition for age over regions

In the 1999 survey, improvement in the average condition of older houses was evident in the Auckland and Wellington regions, but not in Christchurch – where average condition continued to decrease with age in the same manner as in the 1994 survey.

The 2005 results indicate that this has changed. Figure 22 shows the average rating for each age group split into the three regions, in order illustrate the different patterns applying for each.

Figure 22: Regional average conditions over age groups



As shown, older Christchurch houses are now more in line with the other two regions (except for the small 1930s cohort).

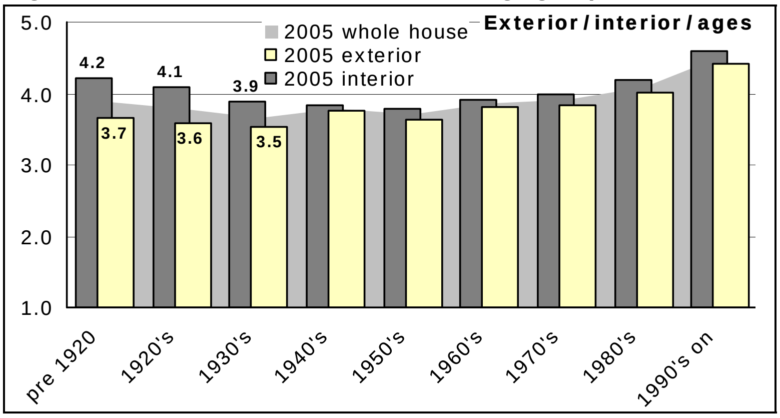
This change may relate to changing patterns of building values for age groups in the Christchurch region.

In 1999, Christchurch, values steadily decreased with age, while those in the other two regions "bottomed out" at the 1950s cohort and then steadily increased with age.

For this survey, Figure 10 showed that Christchurch values are now lowest for 1940s houses, with older houses now having higher average values.

4.5.2 Exterior/interior condition for age

Figure 23: Exterior/interior condition over age groups



Another interesting breakdown is to consider the exterior versus the interior condition across age groups, and the results are shown in Figure 23.

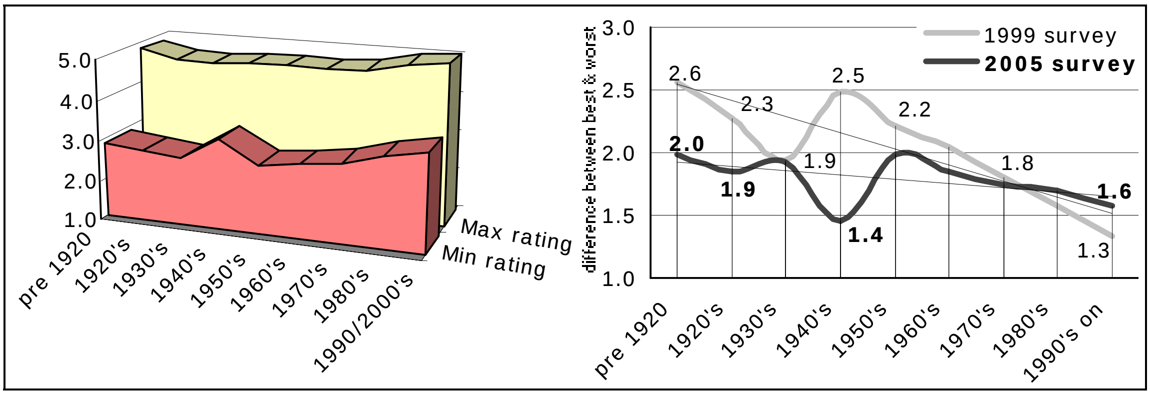
In common with the 1999 survey, there is increasing disparity between the internal and external component condition for those houses of the 1930s and older.

It appears that more work is still being done on the interior of these houses rather than the exterior shell. However, it is reassuring to note that the difference has decreased from 24% in 1999 to 13% in 2005.

4.5.3 Range of conditions within age groups

As shown previously, the average condition of houses deteriorates with age up to about 60 years old; then for older houses, the condition starts to improve as many are renovated. However it also seems that the range of overall house ratings increases with age, and the 1999 study indicated that the disparity between the best and worst houses generally increased with increasing ages.

Figure 24: Polarisation of condition with age



The 2005 analysis explores this, and we can now compare results with 1999 as shown in Figure 24. As shown, the houses show a difference in condition rating between the worst and the best houses of around 1.6 for houses built in the 1990s and 2000s. This difference increases to about 2 for the oldest houses.

However, when the condition disparity is compared to that for the 1999 survey, we can see that the polarisation effect of the 1999 houses is about twice that of the 2005 houses, implying that, while the condition of the best houses are improving, the condition of the worst older houses is improving at a greater rate. The 1930s and 1940s cohorts do not fit the overall trend lines, but these are small cohorts (of around 25 houses) and are unlikely to be representative.

4.5.4 Conclusion

The average condition of houses in the 2005 survey, when taken over all age cohorts, has improved by around 10% above those of the 1994 and 1999 surveys. Interesting trends show up when the composite or overall average condition is broken down into interior and exterior, age groups, and regions.

At an age of 50 years the decline in condition of the average house appears to level off, and then to improve for those of 80 years of age or older. This appears to be the consequence of renovation of the older housing stock. There was some small sign of this trend in the 1999 survey, in that the condition of older houses tended to level off, but this survey shows a distinct improvement, with the oldest pre-1920s group having the same overall rating as houses built in the 1960s and 1970s.

As older houses have become more popular over the past decades (as illustrated by the increase in building valuations of this group), many have been repaired, modernised, and upgraded; in some cases to the extent that their condition becomes comparable to that of a much newer house (particularly in the interior components). These houses now more than counteract the effect of those houses that continue to deteriorate, and the net result is that the average condition shows an upward movement.

However, although the average level of deterioration appears to have stabilised, the **range** of condition of these older houses still increases with age although at a much smaller rate than was shown in the 1999 survey. This “polarising” effect is a result of selective renovation in all three regions, and it will be interesting to see if the effect continues to decrease in the next survey.

5. HOUSEHOLDS AND HOUSE CONDITION

In order to try to establish patterns related to average house condition, the following questions were explored in the 1999 survey by relating information gathered during the physical inspections of the houses to that collected from owners on the following:

- ***Ages*** *of those owners*
- ***Sizes*** *of households*
- ***Income levels*** *of households*
- ***Mortgage status*** *of households*
- ***Length of time*** *house owned for*
- ***Intention to sell*** *house.*

One of the aims was to explore the probability that particular households will own the best or the worst houses and similar analyses have been done for the 2005 houses. When considering the results, it must be noted that sample houses are owner-occupied, and conclusions are likely to differ for rented dwellings.

5.1 Households in worst and best condition houses

Table 4: Condition groups

Condition	Ratings	Nos.	%'s
Serious		**0**	*0%*
Very poor		**0**	*0%*
Poor (in-between)	below 3	**17**	*3%*
Moderate	3.0 - 3.4	**82**	*15%*
Good (in-between)	3.5 - 3.9	**207**	*37%*
Very good	4.0 - 4.4	**164**	*29%*
Excellent	4.5 - 5.0	**95**	*17%*
		565	

The spread of houses within classifications are shown in Table 4.

Those houses with an average condition of 3 (*moderate*) or less, and 4.5 or higher (close to *excellent*) were identified and correlated to the household characteristics of size, mortgage status, owners’ ages, length of ownership, and income levels in order to identify whether any group was over-represented in these categories.

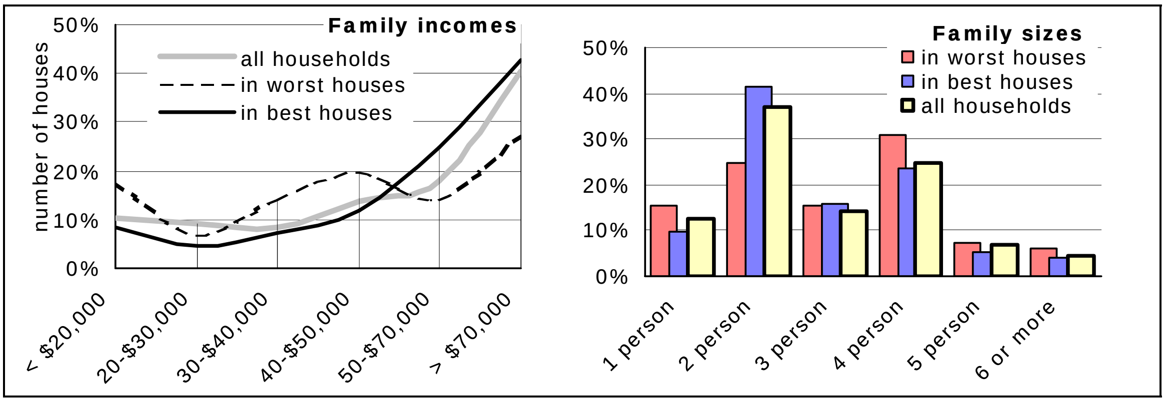
The *worst* houses in this survey include all with an average component condition of 3 (*moderate*) or less. Only 18% of houses fit into the *moderate* or below category, and it should be noted that these are not actually houses in very poor condition as there were no houses in the *very poor* or *serious* category. (However, it must also be noted that past research[5] has indicated that some of the actual worst houses in New Zealand are to be found outside of the three regions covered in this survey such as in some parts of the Bay of Plenty and Northland. It is therefore important that this part of the study is not taken as necessarily indicative of some more rural areas in the country).

The problem in setting the cut-off level for the *best* houses is the opposite, as too many houses had an average component condition of more than 4.0. The cut-off was therefore set at 4.5 (the mid-point between *very good* and *excellent*). This category covers the top 17% of houses in the sample.

5.1.1 Incomes and family sizes

Figure 25 shows the incomes and family sizes related to the highest and lowest condition groups:

Figure 25: Incomes and family sizes in best and worst houses



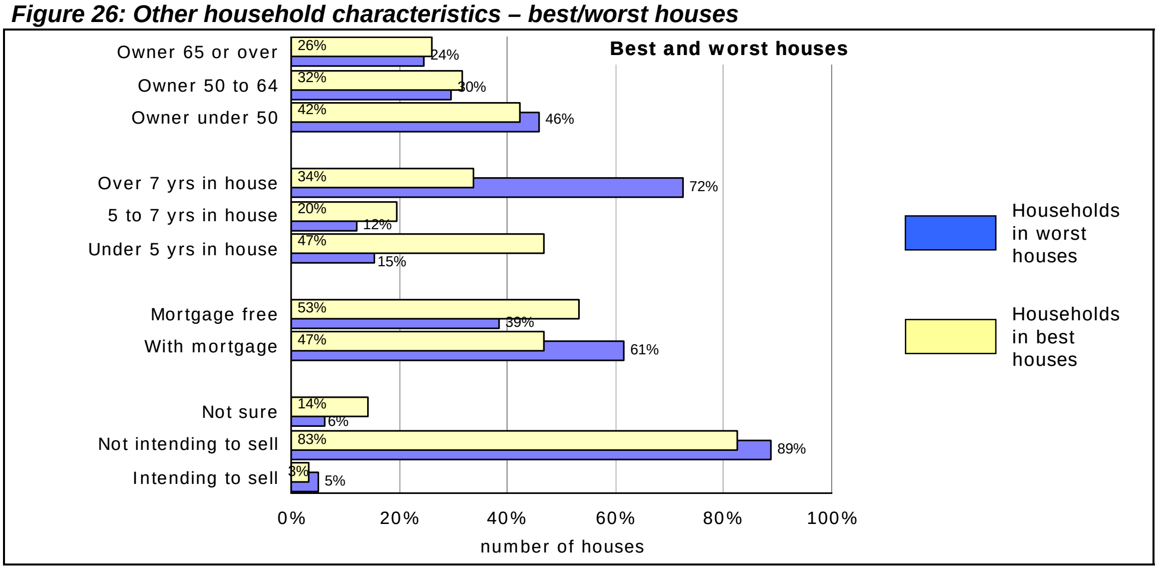
As expected, Figure 25 shows that families with higher incomes ($50,000 and above) are more likely to live in the best group of houses. However for the worst group, the situation appears counter-intuitive, in that the family income least likely to be in this group is low – at $20,000 to $30,000, and the group most likely to be in the worst group has a family income over $70,000.

This may well reflect the difference between a property's valuation and the actual condition of the house, as many low-valued houses are actually in good condition, whereas houses in inner-city suburbs are often in relatively poor condition, despite having high property valuations. Another contributing factor is that about 25% of owners are retired with 50% of these at incomes less than $30,000 (compared with less than 20% of total owners). This group may be 'asset-rich' while 'income-poor' with houses in good condition.

5.1.2 Other household characteristics

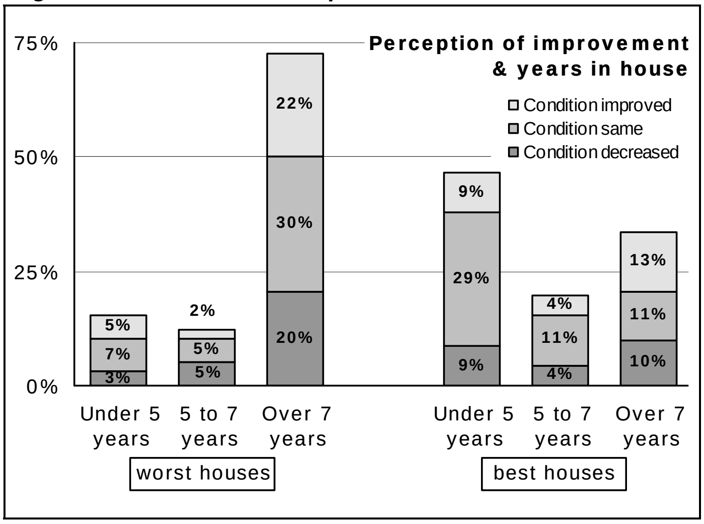
Figure 26 relates the best and worst houses to other household characteristics.

Figure 26: Other household characteristics – best/worst houses



It is interesting to see that the age of the owner, or their intention to sell, appears to have no correlation with best or worst houses. However, there are differences in related to mortgage status and, in particular to the length of time in the house.

Figure 27: Time in house/improvement



The factor showing the largest difference is the length of time that the owners have been in the house. If we exclude the 36 houses built in the past five years, which are expected to fall within the 'best house' category, 41% of houses occupied by current owners for less than five years still remain within the 'best house' category.

It seems that the longer that we stay in the same house, the more likely that the house will be in the worst category.

This may relate to owners moving before conditions deteriorate, a fall-off in renovation effort with continued occupancy, or to renovation performed by the previous owner. However, we can consider the responses to another question covered in the interview - the owner's perception of whether their house has improved since they moved into it.

This is shown for the best and worst houses by Figure 27, which shows that more than 50% of those in the worst houses for more than 7 years believe that their house is either the same or better than when they first owned it. This appears to suggest that perception of condition may be 'blunted' as the length of time in the same house increases.

5.2 Comparison of characteristics

Figure 28 shows some of the characteristics of households in the best and worst houses, as percentages of the sample.

Figure 28: Best/worst houses for household characteristics

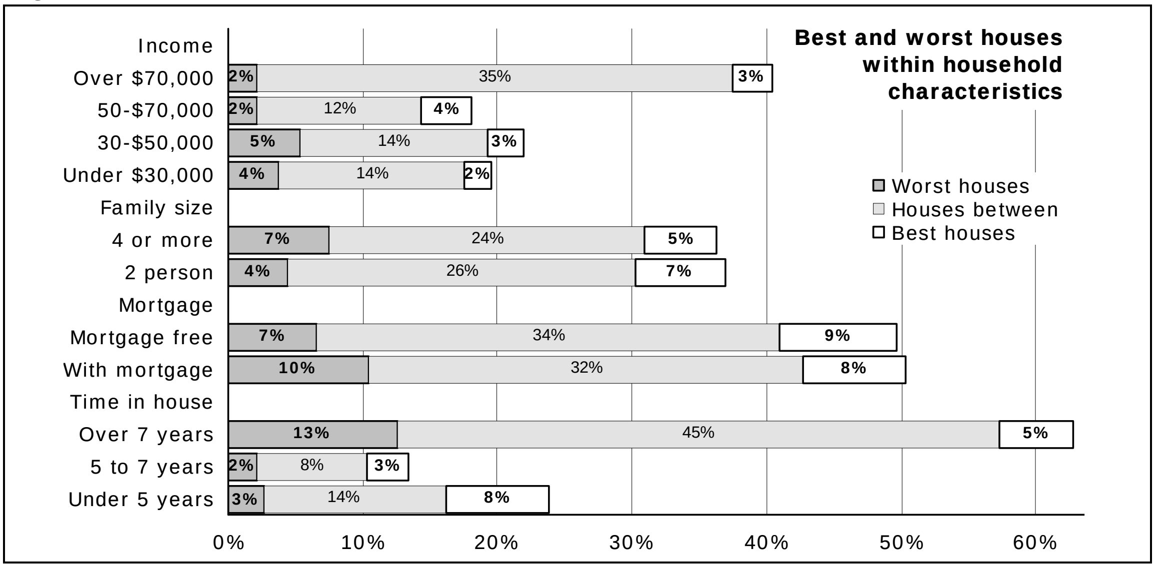


Figure 28 allows us to see the breakdown into best, worst and other houses within each household characteristic. As shown, the two lowest income bands include higher proportions of worst houses. This also applies to families of 4 or more members and to owners with mortgages.

As shown earlier in Figure 26, the largest proportion of worst houses is within the group of owners who have been in their houses for longer than seven years.

Table 5 gives characteristics of households in the best and worst houses, with the particular characteristics that differ markedly from the survey sample shaded for identification.

Table 5: Household characteristics

	Survey Sample	Best Houses	Worst Houses
Total Household Income			
under $20,000	**10%**	8%	**18%**
$20 to $30,000	**9%**	**5%**	7%
$30 to $50,000	**22%**	19%	**34%**
$50 to $70,000	**18%**	**25%**	14%
over $70,000	**41%**	43%	**27%**
Family Numbers			
one person	**13%**	10%	16%
two people	**37%**	41%	**25%**
three people	**14%**	16%	15%
four or more	**36%**	33%	**44%**
Owner's Age			
under 50	**43%**	42%	47%
50 to 64	**31%**	33%	29%
65 and over	**26%**	25%	24%
Mortgage Status			
with mortgage	**50%**	46%	**61%**
Without mortgage	**50%**	54%	**39%**
Length of time			
under 5 years in house	**24%**	**46%**	**15%**
5 to 7 years in house	**13%**	**19%**	12%
More than 7 years	**63%**	**35%**	**73%**

5.3 Conclusion

Worst houses in survey

There appears to be no single group that is over-represented in the worst houses of the survey.

The strongest variances from the sample appear to be proportions of owners in worst houses that are:

- *Lower for higher income households*
- *Higher for families with 4 or more members*
- *Higher for families in the lowest income and middle income bands*
- *Higher for families with mortgages*
- *Higher for families in a house for more than seven years*

Best houses in survey

The strongest variances from the sample appear to be proportions of owners in best houses that are:

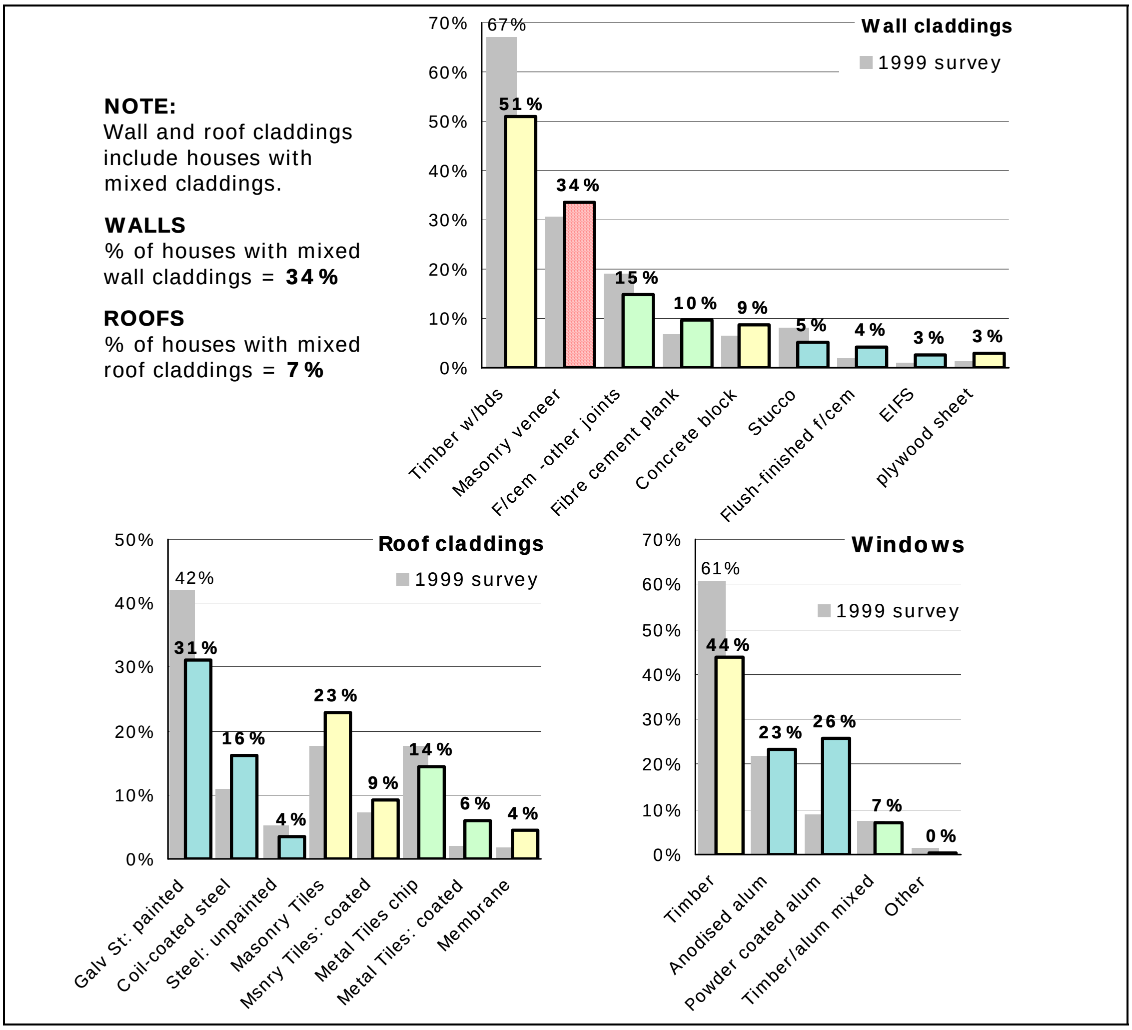
- *Lower for low income households*
- *Higher for households with income from $50,000 to $70,000*
- *Higher for families occupying houses for less than five years*
- *Lower proportions of families occupying houses for more than seven years.*

6. MATERIALS

6.1 Exterior materials

Materials used for walls, roofs and windows were considered in terms of their frequency of use, and compared with the equivalent figures for the 1999 survey. Figure 29 shows these, and it is interesting to note the change in the use of the most common traditional materials since the last survey.

Figure 29: External materials



While the most common New Zealand house still has weatherboard walls, painted corrugated (or similar profile) roofs and timber windows, the proportions of these materials in sample houses has decreased markedly.

The last survey reflected the makeup of the 1999 sample, with almost 70% of surveyed houses built prior to the 1970s (before materials such as aluminium windows, fibre-cement wall cladding and chip-coated metal tile roofing became increasingly common). In the 2005 survey, the proportion of pre-1970s houses has decreased to 55%, as greater numbers of newer houses are now included in the sample, and that is reflected in the decrease in the proportions of timber weatherboards, painted galvanised steel roof cladding and timber windows.

6.1.1 Walls

While timber weatherboards are still the most common cladding, use has decreased from almost 70% in 1999 to just over half of the houses in the 2005 survey. Masonry veneer, although a traditional material, continues to be used in newer houses, so its use has increased from 30% in 1999 to over a third in 2005. The use of newer claddings, such as monolithic cladding, has also increased. However, while monolithic claddings form a substantial proportion of wall claddings in post-1990s houses, these still comprise modest percentages within the total sample group of houses. These claddings may show a reduction in future surveys (with masonry veneer increasing), as a result of fears related to the recent leaking problems.

6.1.2 Roofs

More than half of the sample houses had profiled metal roof claddings – with 60% of these being painted galvanised steel. However, site painted roofs have decreased from more than 40% of sample houses in 1999 to about 30% in 2005, while coil-coated steel has increased from 10% in 1999 to about 15% in 2005.

Masonry tiles are the next most common roof cladding, with almost a third of houses using these (with a third recoated), compared to around a quarter in 1999. This reflects both the decreased size of the Wellington sample (where only 18% of houses have masonry tiles compared with about 36% in Auckland and Christchurch) and the increased use of masonry tiles in houses built from the 1990s onwards.

Profiled metal tiles have remained fairly constant at about 20%, but fewer are now chip-coated and nearly half are coil-coated. The use of membrane roofing has increased – reflecting design styles used in some of the newer houses in this survey.

6.1.3 Windows

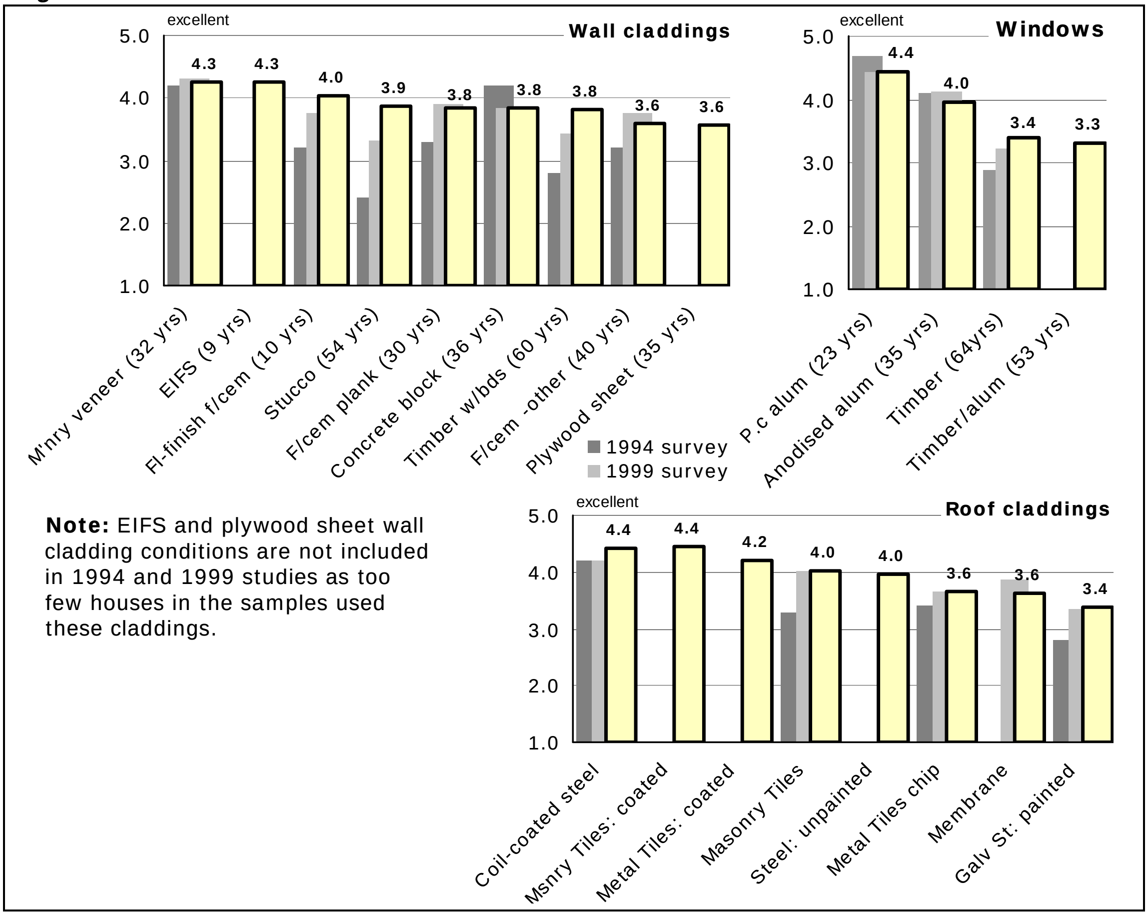
Timber windows are still the most common type of window, although their use has decreased from more than 60% in 1999 to less than 45% in the 2005 survey. That decrease reflects the increased numbers of newer houses in this survey, along with the number of older houses replacing some or all of their old timber windows with aluminium. The increase in powder-coated aluminium windows is notable (again reflecting increased numbers of newer houses), from less than 10% in 1999 to around a quarter in 2005.

6.2 Condition by material

The average condition of all of the more common materials identified by the inspectors has been calculated, and this is shown in Figure 30 together with the equivalent figures for the 1999 and 1994 surveys. Full tables, including condition ratings for regions, are provided in Appendix 16.1.1.

The average ages of houses using the different types of wall cladding and windows are shown in brackets, so that average condition ratings can be assessed against the likely age of the materials. This has not been given for roof claddings, as the numbers of replacement roofs make their house ages largely irrelevant.

Figure 30: Condition of common exterior materials

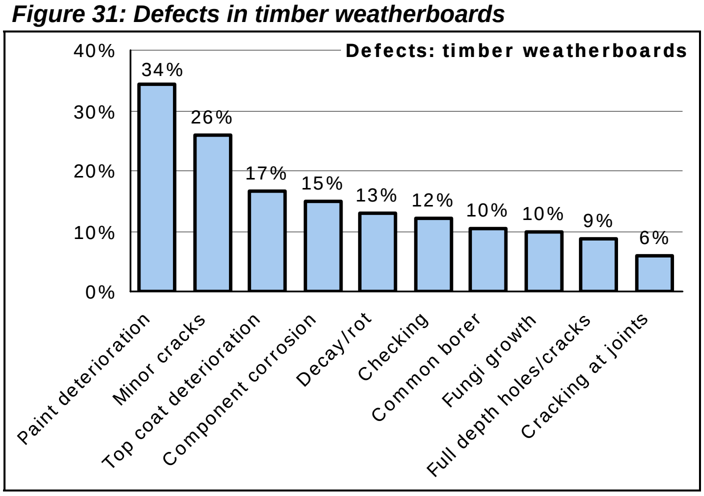


6.2.1 Wall cladding condition

For most materials, the average condition was similar, to or better than, that shown in the past surveys. Timber weatherboards and stucco had improved. However, stucco was used in only 5% of houses (of varying ages) in the 2005 survey so caution should be used when assessing results.

6.2.1.1 Timber weatherboards

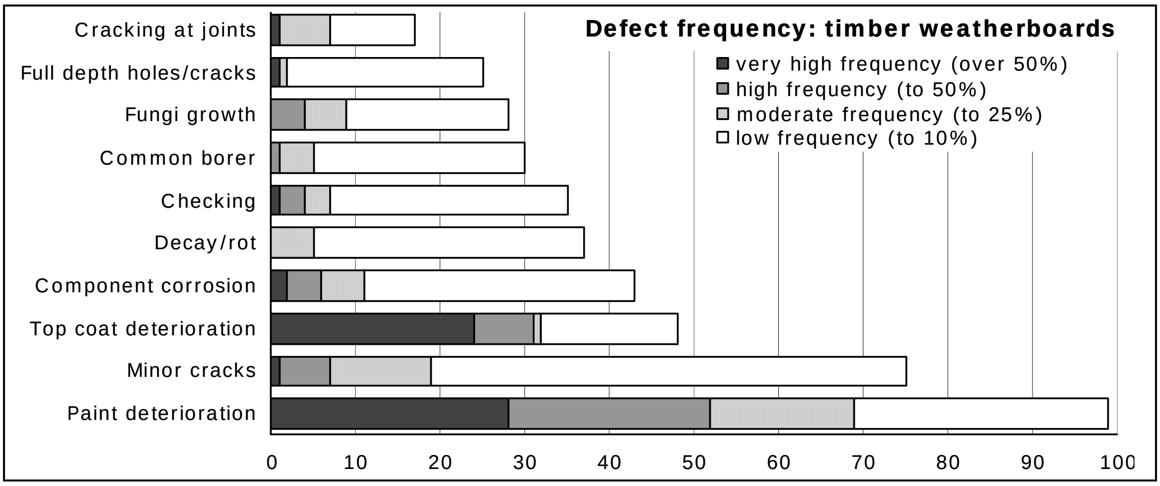
Figure 31: Defects in timber weatherboards



Timber weatherboards were used in more than 60% of houses, and had the oldest average age of 60 years with one of the lower average condition ratings at 3.8. Figure 31 shows the most common defects found in timber weatherboards, and Figure 32 shows the frequency that these defects occur, indicating the level of severity.

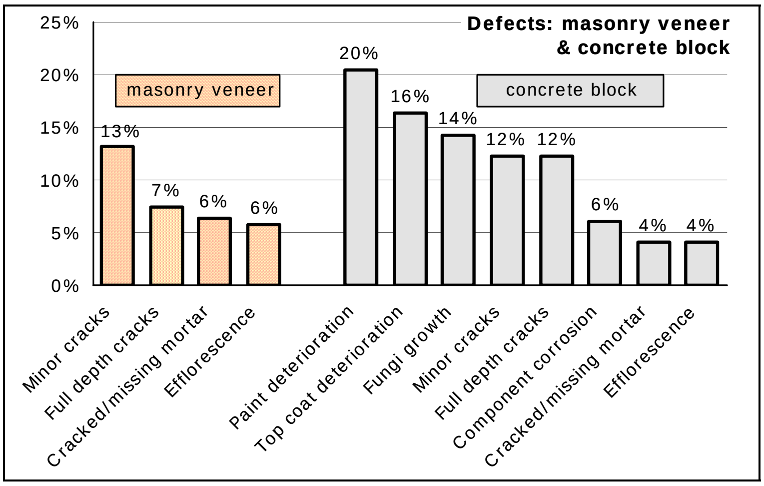
As expected, the most common defect, with the most frequency, is paint deterioration. Minor cracks are also common. Corrosion of metal fixings and other components is common, particularly in coastal areas. Decay and rot, while reasonably common, was usually of low frequency – as was borer.

Figure 32: Defect frequency in timber weatherboards



6.2.1.2 Masonry veneer and concrete block

Figure 33: Defects in masonry veneer and concrete block



Masonry veneer was used in more than a third of the sample houses, had an average age of more than 30 years, and the highest average condition rating at 4.3.

The average age of concrete block was 36 years, and its use was less common at 9% - and was used mainly for basement walls.

The most common defects for both of these materials are shown in Figure 33. This shows the percentages of masonry walls that exhibited the defects noted.

The main defects in masonry veneer are related to mortar problems, while those in concrete block tend to be cosmetic defects such as paint or topcoat deterioration and fungi growth.

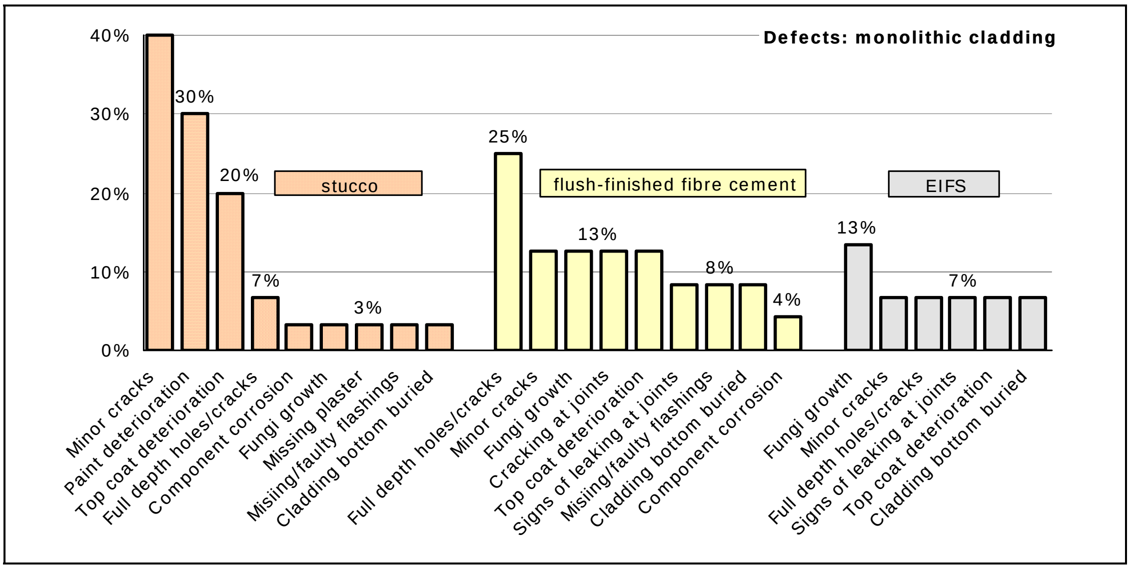
6.2.1.3 Monolithic wall claddings

Monolithic wall claddings comprise stucco, flush-finished fibre-cement sheet and EIFS, and defects found in these claddings are shown in Figure 34.

It should be noted that monolithic claddings were not common in the surveyed houses with the combined total of all three types making up only 12% of claddings (stucco 5%, flush-finished fibre-cement 4% and EIFS 3%).

The apparent condition of EIFS and flush-finished fibre-cement sheet was high, reflecting an average age of 10 years or less. Stucco was used mainly on old houses in the survey, reflected in the average age of 54 years. However, the condition still appeared to be high, at an average of 3.9.

Figure 34: Defects in monolithic claddings

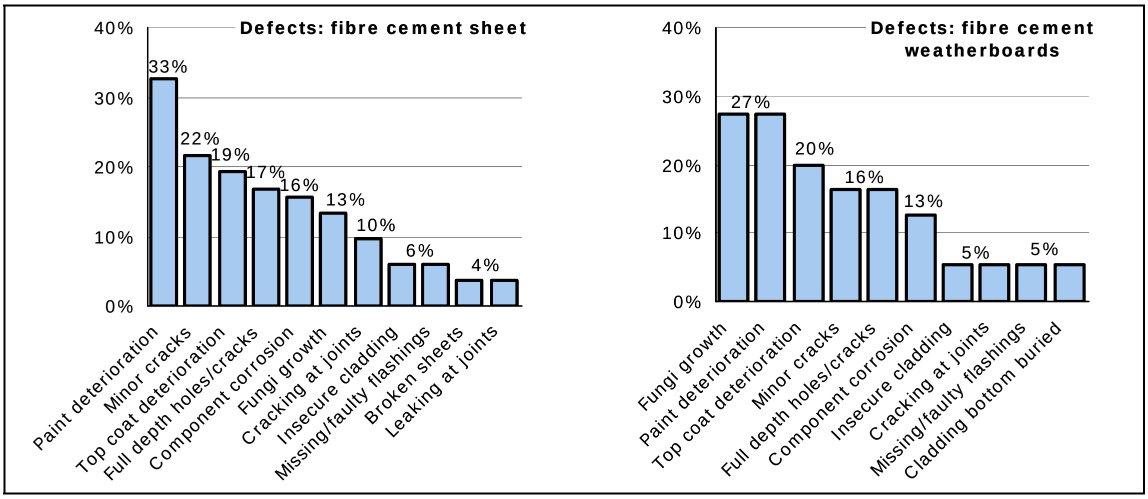


It should also be noted that the condition of monolithic cladding may be difficult to assess, as the surface appearance can conceal underlying faults that are not readily apparent without in-depth investigation. Condition ratings should therefore be treated with some caution.

6.2.1.4 Fibre cement weatherboards and sheet claddings

Fibre cement weatherboards (with an average age of 30 years) and other older-style fibre-cement sheet claddings (with an average age of 40 years) were common on surveyed houses, together comprising a total of 25% of wall claddings. The defects in other fibre-cement claddings are shown in Figure 35.

Figure 35: Defects in fibre-cement weatherboards and sheet



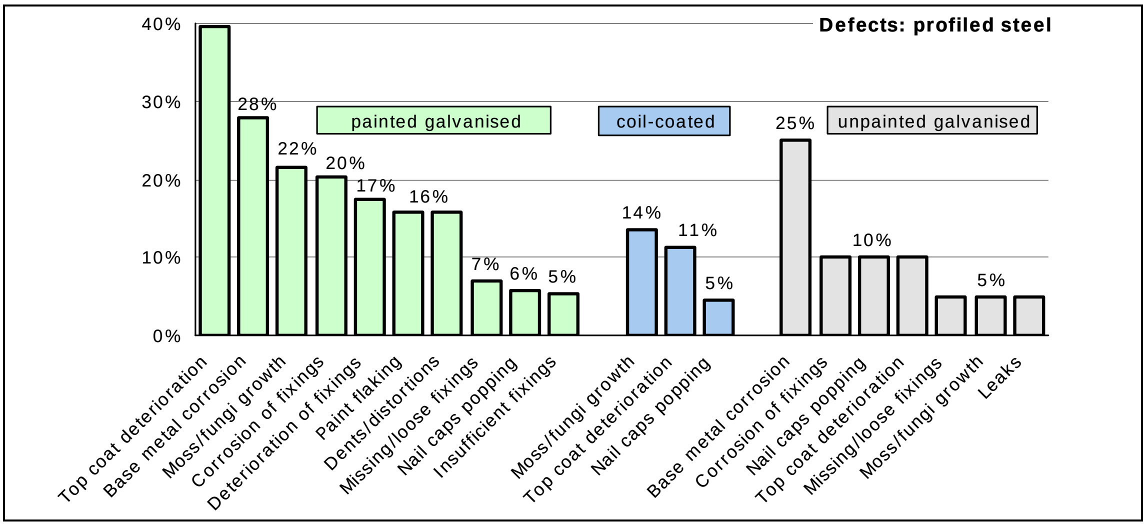
6.2.2 Roof cladding

The worst average condition occurred in painted galvanised profiled steel (3.4), following by membrane and chip-coated metal tiles (both 3.6). The following looks at the most frequent defects found in the common types of roof claddings.

6.2.2.1 Profiled steel roofing

As shown in Figure 29, this is the most common roof cladding – used on more than half of sample houses. The most frequently observed defects are shown in Figure 36.

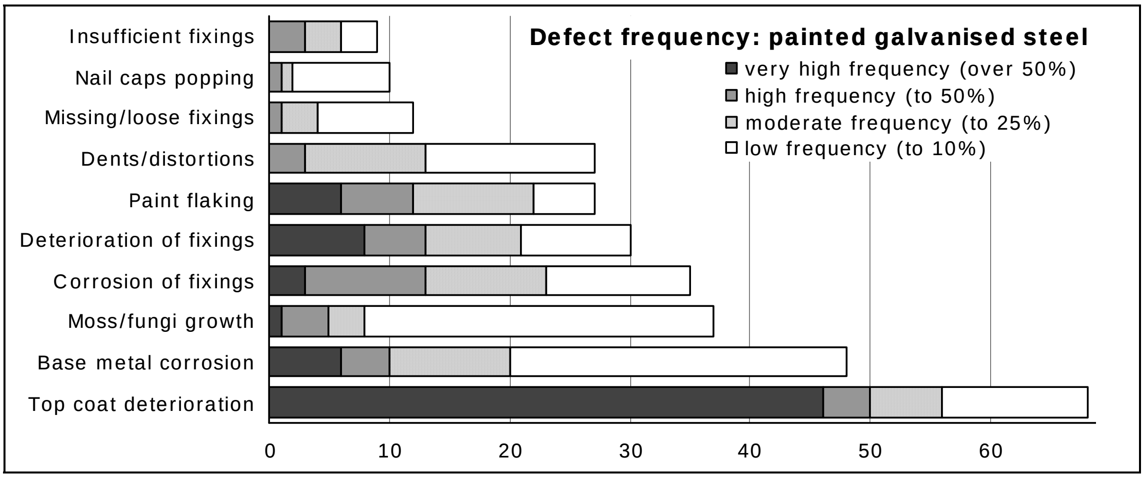
Figure 36: Defects in profiled steel roofing



Coil-coated steel is a recent roofing material, and an average age of 40 years for houses using this shows that it has replaced many older roofs as well as being used for newer houses.

Although its use is decreasing, painted galvanised steel roofing was still the most common roofing (at more than 30%) used on sample houses[2]. The average age of houses using this roofing is more than 70 years. The oldest houses will not have original roofs, and even replacement roofs are likely to be aging by now. 1950s and 1960s houses may still have original roofs, and these can be expected to be in poor condition by now. This is reflected in the types of defects shown in Figure 36, such as corrosion and fixing deterioration. The frequency of defects in painted steel is shown in Figure 37.

Figure 37: Defect frequency in painted galvanised steel

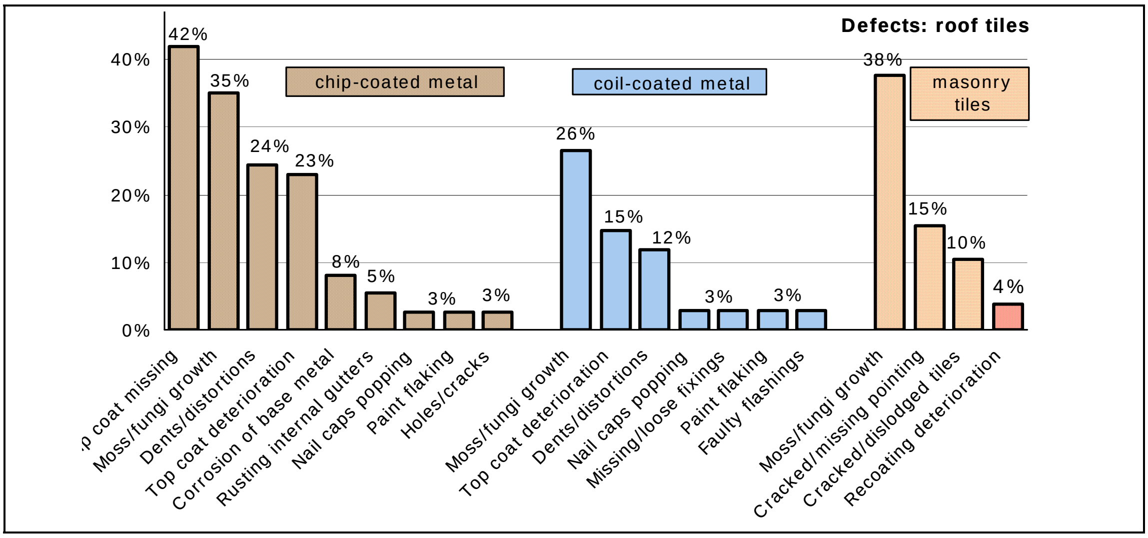


6.2.2.2 Roof tiles

The next most common roof cladding type is masonry tiles (32%) and metal roof tiles (20%). Re-coating of masonry tiles seems to be increasing for older houses, as shown by the average age of house at 47 years, compared with 36 for uncoated tiles. Figure 38 shows the most common defects found in tiles.

[2] *Although 'zincalume' is now a significant portion of the market, inspectors were unable to reliably distinguish it so it could not be separately shown in the barcharts.*

Figure 38: Defects in roof tiles



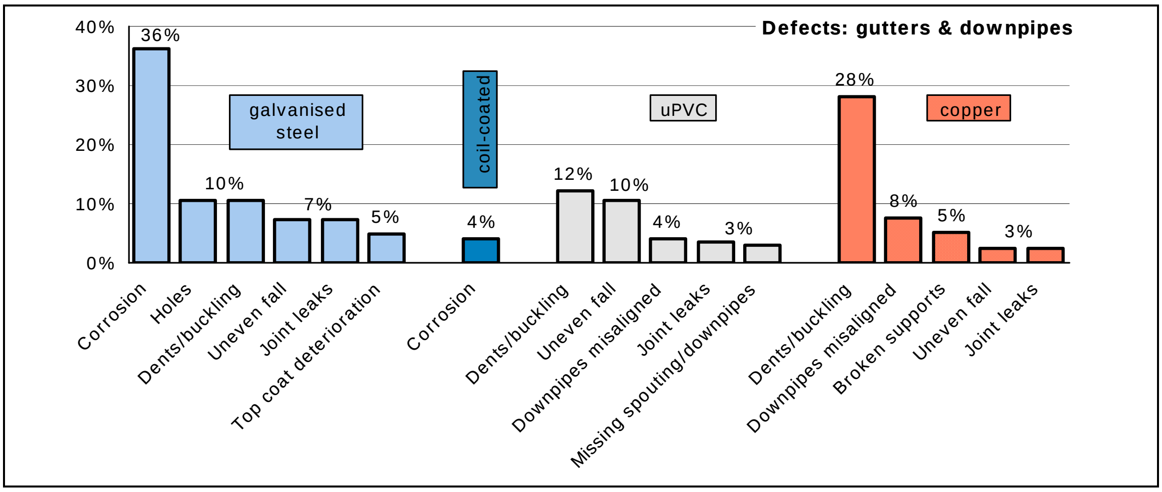
As shown, the most common defects in chip-coated metal tiles are the erosion of the chip coating, moss and fungi growth and dents in the tiles. The latter three defects are also found in coil-coated metal tiles.

For masonry tiles, the only non-cosmetic defects are cracked or missing pointing and cracked or dislodged tiles. Recoating of older masonry tiles is increasing (at almost 10%), but the practice is still too recent to show much in the way of deterioration.

6.2.2.3 Gutters and downpipes

Figure 39 shows the most common defects found in gutters and downpipes.

Figure 39: Defects in gutters and downpipes



As shown, corrosion in the main defect for galvanised steel gutters, while dents are the major problem with copper gutters. Other defects are similar for each type of spouting.

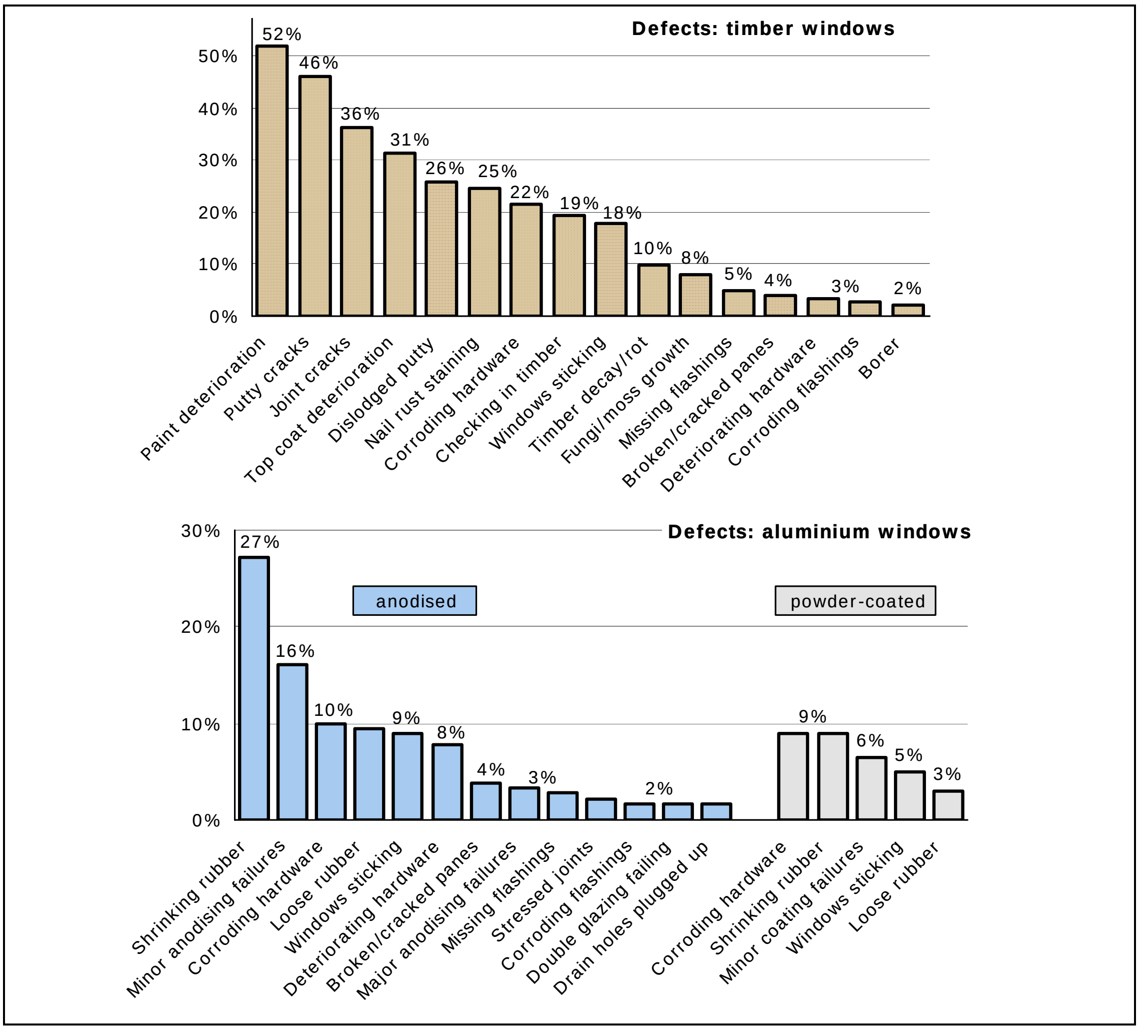
6.2.3 Windows

Although the proportion is decreasing, timber is still the most common window material, with an average condition of 3.4 reflecting an average age of 64 years. Houses with the poorest window condition are those with a mixture of aluminium and timber windows, reflecting the condition of the remaining old timber windows.

Powder coated aluminium windows have the lowest average house age of 23 years and the highest condition at 4.4, followed by anodised windows at 35 years with a rating of 4.0. Actual ages of aluminium windows will be less than the house ages, as many older houses have replaced deteriorating timber windows with aluminium.

The most frequent defects for each window type are shown in Figure 40.

Figure 40: Defects in windows



As expected, the most common defects in timber windows were related to regular painting tasks or to the results of the lack of regular repainting. There were 10% or less of the more significant defects such as borer, decay and missing flashings.

For aluminium windows, the main defects were shrinking and loose rubber glazing seals, minor anodising failures, corroding hardware and windows sticking.

6.3 Traditional materials

As shown, the traditional materials are generally in the worst condition when averaged over all of those houses using them. This is not surprising, as they have been used in houses over a long time. Given the general trend of worsening condition with time, they can be expected to produce lower average condition ratings.

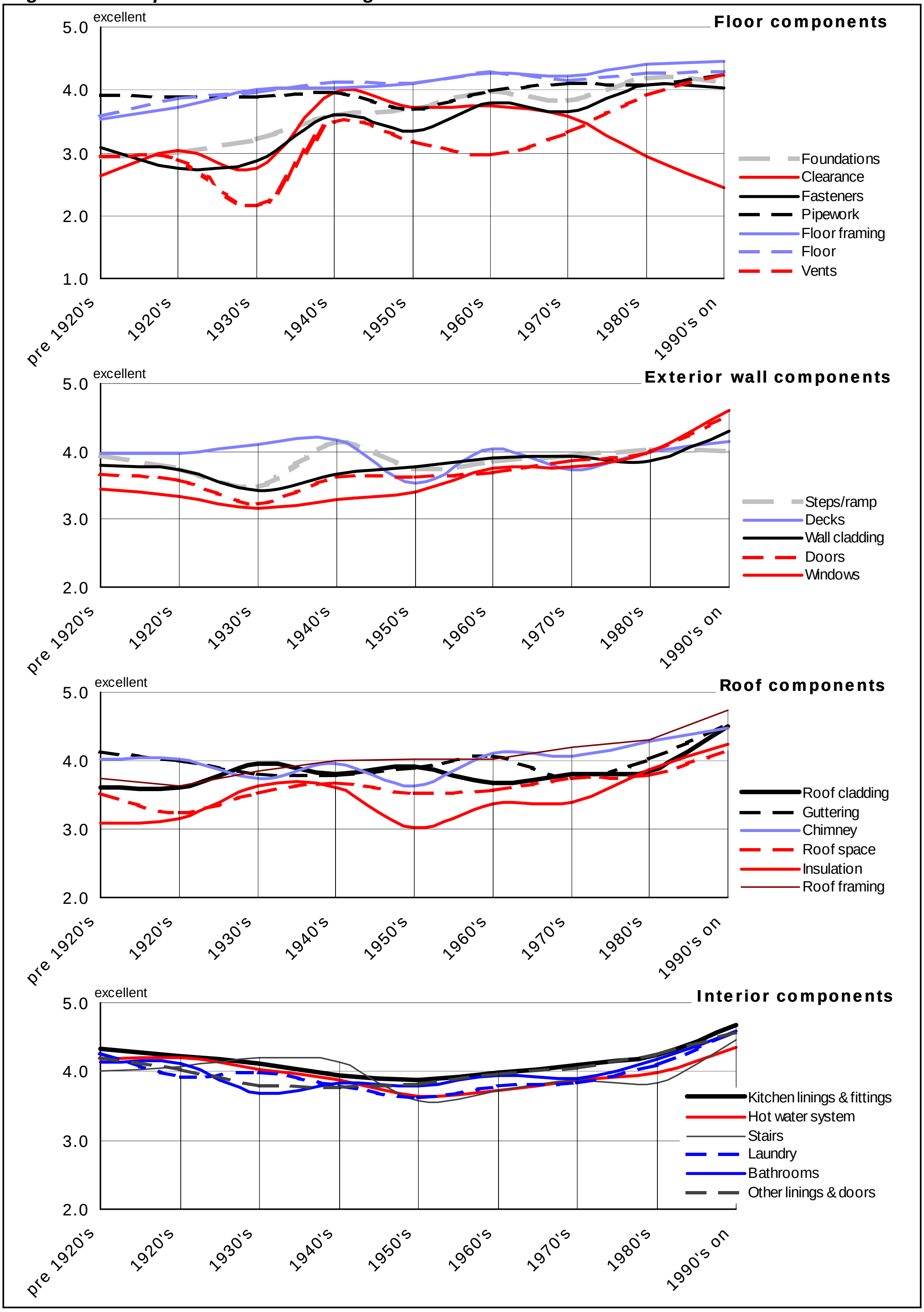
It is also not surprising that more "permanent" materials such as clay and concrete brick are out-performing timber weatherboards in terms of appearance and durability, and concrete tile is out-performing steel as roof claddings. This is in line with the findings of the 1994 and 1999 survey.

Full tables, giving the frequency of defects for all common cladding materials and windows, are provided in Appendix 16.1.4.

7. BASIC BUILDING ELEMENTS

House components have been grouped into the four basic elements of floor, walls, roof and interior linings and Figure 41 shows these component groups over the age cohorts.

Figure 41: Component condition for age



The overall average condition over all components was discussed in Section 4.2 (Average component conditions), and Figure 21 showed how average condition decreased with the ages of the houses until the 1950s group – where the decline levelled out and then improved for the oldest age groups. However, this overall trend is not necessarily indicative of the average condition of individual components for each age group – as shown in Figure 41.

7.1.1 Floor element

The collection of components making up this element is the most variable of the groups - with cladding clearance, sub-floor vents and fasteners having varying ratings over age groups, while other components showing gradual deterioration with increasing age.

Ground clearance (the height of the cladding above the adjacent ground or paving level) is rated by comparison to current building standards, and can be related to sub-floor ventilation problems. In common with past surveys, ground clearance and sub-floor ventilation are particular problem areas as shown in Figure 17 and Figure 19. Defects in these components often relate more to design inadequacy than to physical condition, and shortcomings are not necessarily associated with older houses. In fact, pre-1930s houses commonly used spaced baseboards at sub-floor levels, which provided more than sufficient ventilation. From the 1930s onwards, solid perimeter foundation walls became more common and vents were limited to “holes” in these – often too small and too few in number. The Floor components graph in Figure 41 shows that this inadequacy has remained right up until the 1970s cohort. In addition to the inadequacy of constructed vents, owners themselves have often contributed to the problem by blocking vents.

Ground clearance continues to show concerning trends, with the average rating decreasing markedly in younger houses (1980s onwards). This is very similar to the results found in 1994 and 1999, and is likely to relate to changes in the way that New Zealanders use their houses, and the increasing attention given to linking the inside and outside of the house, with changes in levels minimised at the expense of good building practice. In particular, the increasing use of concrete slabs in more recent houses has allowed interior floor levels to carry through to outside areas, sometimes with insufficient means of providing adequate separation of cladding materials from adjacent ground levels. The 2005 survey shows that the newest houses have the lowest cladding clearance rating of all age groups.

7.1.2 Walls

If the deck and steps components are excluded, the components making up this element are reasonably consistent with the overall average pattern shown in Figure 21. The 1999 survey showed component conditions stabilising for the oldest houses, but this survey shows the wall components deteriorating with age until the 1930s, and then improving for the oldest houses.

7.1.3 Roof

The condition of components making up the roof element is also reasonably consistent with the overall average pattern shown in Figure 21. In common with the 1999 survey, the ratings of ceiling insulation reflect upgrading activity in older houses, and it is interesting to note that the 1950s cohort has the lowest average insulation rating. The numbers of 1930s and 1940s houses in the sample are small, so high insulation rating should not be taken as indicative of these age groups as a whole (refer Section 9.4.2).

The other component of interest in this element is the roof space. The older houses often displayed general shortcomings in lack of bracing, over-spacing of structural timbers etc; although this may not be a major problem as the native timbers used still appear to be performing adequately despite the structural design being below current standards for radiata pine.

Past surveys reported on the lack of earthquake restraints for header-tanks, and this survey found the same problem. However, the extent and influence of this problem is reducing as the numbers involved are reducing. This survey found that less than 20% of houses had low pressure hot water systems using header-tanks, which is discussed further in Section 10.1.

7.1.4 Interiors

Interior components are also consistent with each other and with the overall average pattern. These components deteriorate with age until around the 1950s cohort, after which there is an improvement over most components for older houses. The condition of all linings is similar, and well above *moderate*, from the oldest houses right up until the most recent ages - those of the 1990s and newer.

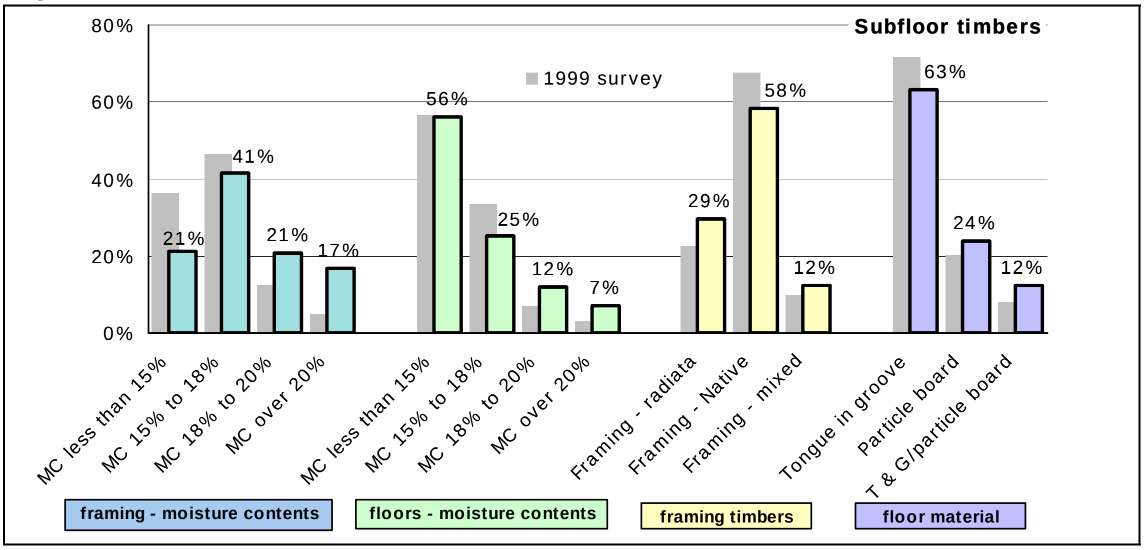
However, it should be noted that one particular component is not included in this assessment - and that is the unrestrained hot water cylinder (discussed in Section 10.2). As with the header-tank discussed above, the message in regard to the need for adequate restraint against earthquake movement is not being reflected in the results from surveyed houses.

The mechanical ventilation of kitchens and bathrooms was not given separate ratings, so is not included in Figure 41. Ventilation shortcomings are considered separately in Section 7.6.

7.2 Sub-floor area

In common with the 1999 survey, inspectors identified many recurring problems related to sub-floor spaces, so these are considered as a separate group of components. Figure 42 gives the characteristics associated with sub-floor timbers, and compares these to the 1999 survey.

Figure 42: Characteristics of sub-floor timbers



As shown, characteristics are similar to those found in the 1999 survey. However, there is a higher proportion of framing and flooring over 18% despite better sub-floor ventilation as shown in Figure 17 and Figure 19 – so other factors may be influencing this. Materials have changed in line with the increasing proportion of newer houses included in the 2005 survey – with a decrease in the proportion of native sub-floor timbers and tongue-in-groove flooring, and an associated increase in radiata pine sub-floor framing and particleboard flooring.

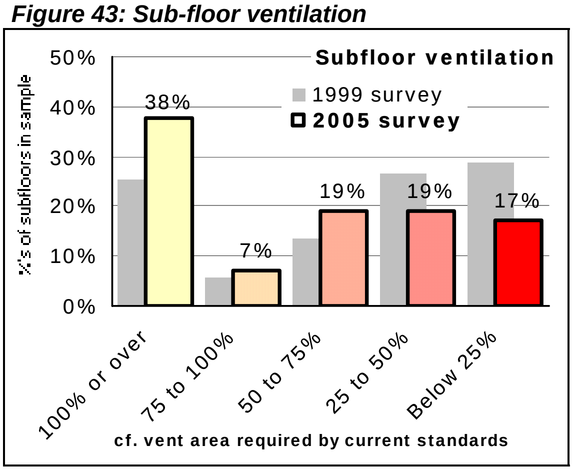
7.2.1 Sub-floor dampness

As discussed earlier, sub-floor dampness was identified as a particular problem area, and Figure 42 included the ranges of moisture contents recorded in sub-floor timbers, showing:

- **Sub-floor framing**: 38% with moisture contents at 18% or more and 17% at more than 20%
- **Floors**: 19% with moisture contents recorded at 18% or more and 7% at more than 20%

Sub-floor framing with moisture contents of 20% is over the threshold recommended to avoid problems such as corroding fasteners, mould growth or, in extreme cases, decay of some framing timbers. The threshold for borer attack has in the past been considered to be around 18%, but timber scientists are now finding that the level may be lower – of concern as almost 60% of houses have native sub-floor timbers.

Figure 43: Sub-floor ventilation



Sub-floor ventilation was also identified as a particular problem in past surveys and Figure 43 shows the 2005 results in comparison with those for the 1999 survey.

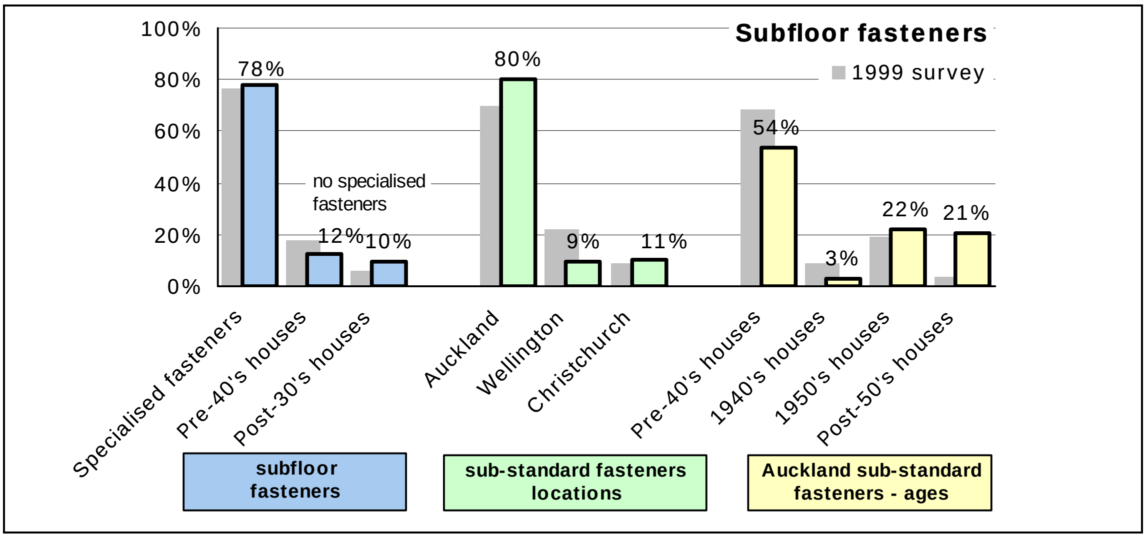
As shown in Figure 43, the 2005 survey shows an improvement over the 1999 results, with almost 40% having adequate ventilation in contrast to around 25% in 1999. However, this still leaves the majority substandard.

More than a third of sub-floors have less than half of the ventilation area required by current building standards, while 17% of sub-floors have less than a quarter.

7.2.2 Sub-floor fasteners

Another common problem identified in the 1999 survey related to the lack of appropriate sub-floor fasteners, with many houses having no specialised fasteners between concrete piles and framing timbers. These included more recent post-1940s houses, as well as older houses, and was particularly apparent in houses in the Auckland region. Figure 44 gives the same analysis, comparing 2005 results with those from the 1999 study.

Figure 44: Sub-floor fasteners



As shown, results in 2005 are similar to those in 1999, with the following features noted:

- More than 20% of houses have no specialised fasteners
- Of these, almost half are in 1940s and newer houses
- 80% of the houses without specialised fasteners are in the Auckland region
- Of this Auckland subset, more than 20% are in 1950s houses and more than 20% are in newer houses built since the 1950s.

7.2.3 Sub-floor defects

The following charts present the most common defects found in accessible sub-floor areas, divided into moisture-related and other defects. The 1999 results are provided to allow comparison between the two surveys.

Figure 45: Non-moisture-related sub-floor defects

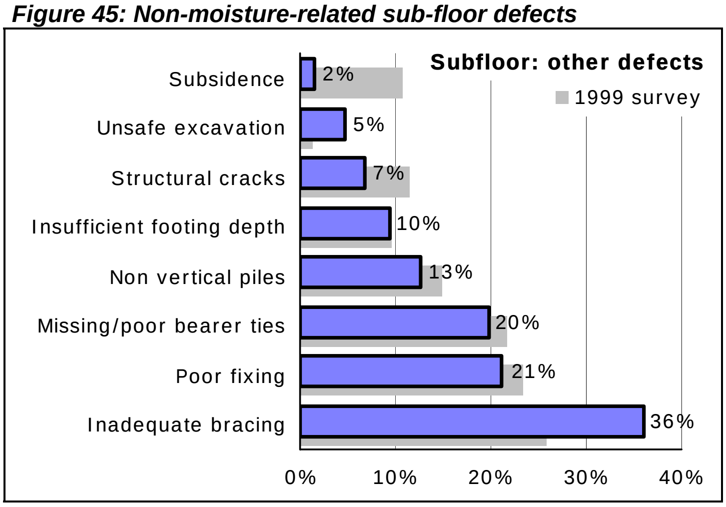


Figure 45 gives defects, (unrelated to moisture) found in sub-floor areas, and compares these to 1999 defects.

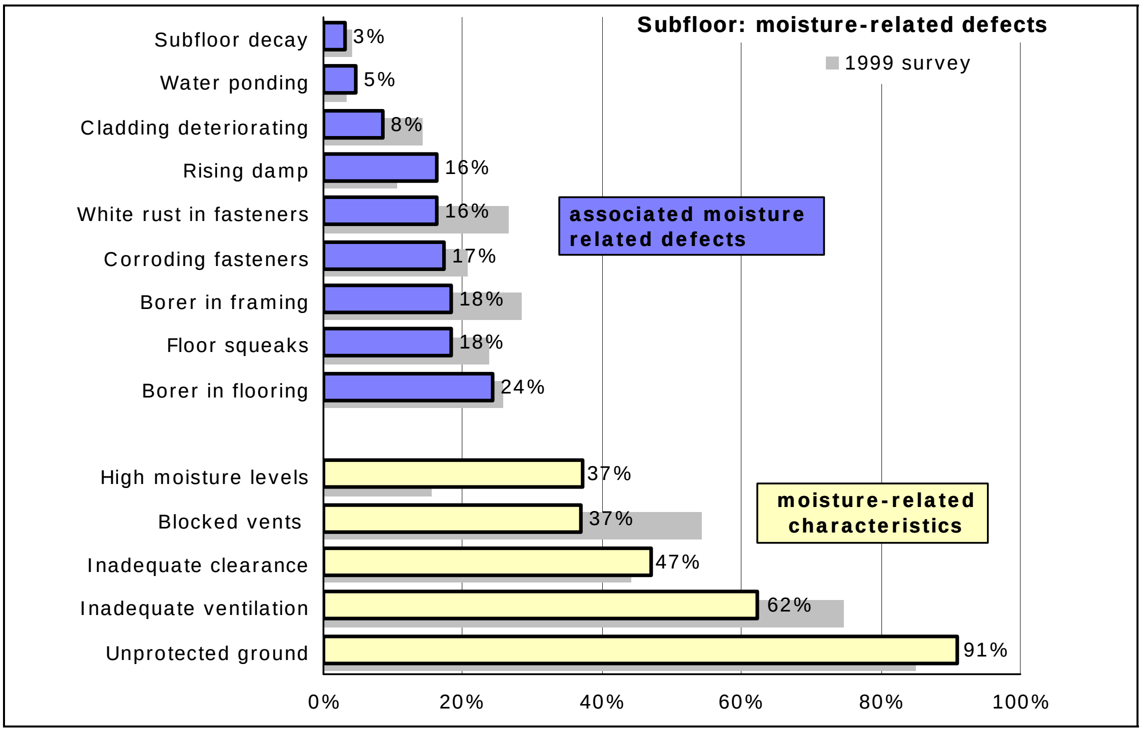
The percentages shown reflect the portion of accessible sub-floors that exhibit the particular defect, which means that any particular sub-floor may have more than one defect.

In line with the 1999 survey, the most common structural defects found in the survey were associated with fixings (as discussed earlier) and lack of adequate bracing.

The main differences from 1999 are in the decreased incidence of subsidence and in the increased incidence of unsafe excavation and inadequate bracing (although this is still a small percentage).

Figure 46 gives moisture-related characteristics, along with associated moisture-related defects. The percentages shown reflect the portion of accessible sub-floors that exhibit the particular defect.

Figure 46: Moisture related problems



As shown, results are generally similar to those found in 1999. As in the 1999 study, the proportion of houses with inadequate sub-floor ventilation is considerably higher than the proportions of moisture-associated defects. No direct correlation was able to be established between inadequate ventilation and high moisture levels in sub-floor timbers. However, moisture-related defects are likely to increase over time, if sub-floor ventilation remains inadequate and moisture levels remain high.

7.3 Roof space area

Insulation is considered separately as part of energy-related issues in Section 9.2, so the following covers building and structural aspects only - of the 88% of roof spaces that were able to be accessed.

The most common defects identified by the inspectors were similar to those identified in the 1999 survey, such as unrestrained header-tanks (however less than 20% of accessible roof spaces contained operating header-tanks), lack of bracing, missing or deteriorating roof underlays and borer infestation (it should be noted that no problems of high moisture contents in roof space timbers were noted from the readings taken). Defects found in the roof space during inspections are shown in Figure 47.

Figure 47: Roof space defects

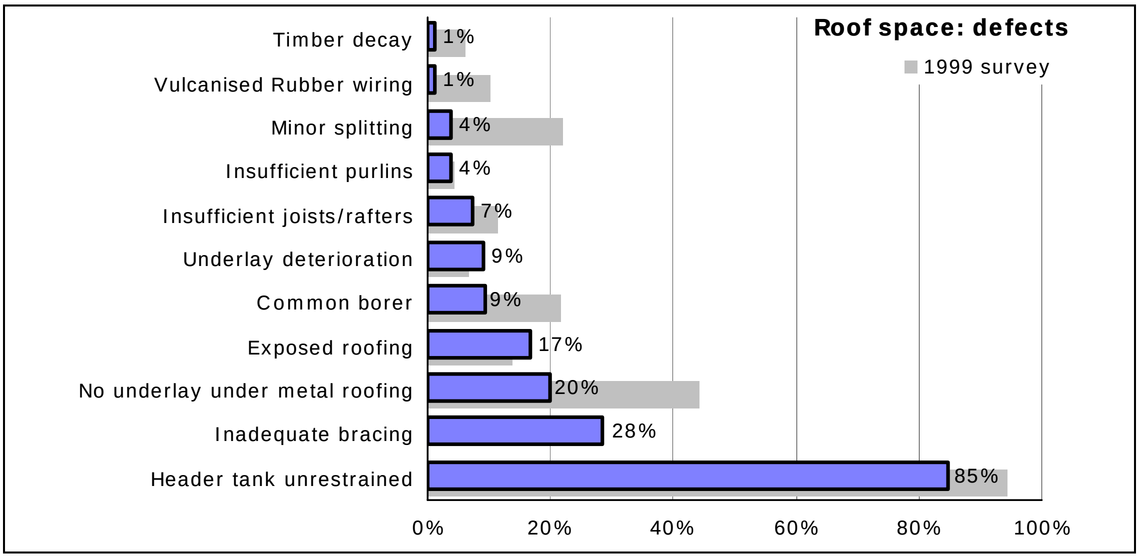


Figure 47 shows that the proportion of houses with old rubber insulated wiring has decreased from 10% in 1999 to only 1% in 2005 (part of which is attributable to the change in age distribution within the sample).

The number of water systems with header-tanks is decreasing as aging cylinders are replaced with valve-vented or high pressure cylinders. Less than 20% of the sample houses now have header-tanks, which is discussed further in Section 10.1. For the remaining operable header-tanks, 85% do not have adequate restraints against earthquake movement.

7.4 Attached decks

In past surveys decks were included within the steps and ramp component, although this meant that many details and defects were not adequately covered. Due to the growing incidence of decks attached to houses, decks were added as a new separate component in this survey.

7.4.1 Numbers and types of decks

Figure 48 shows the numbers, types and characteristic of decks in the sample houses.

Figure 48: Numbers and types of attached decks

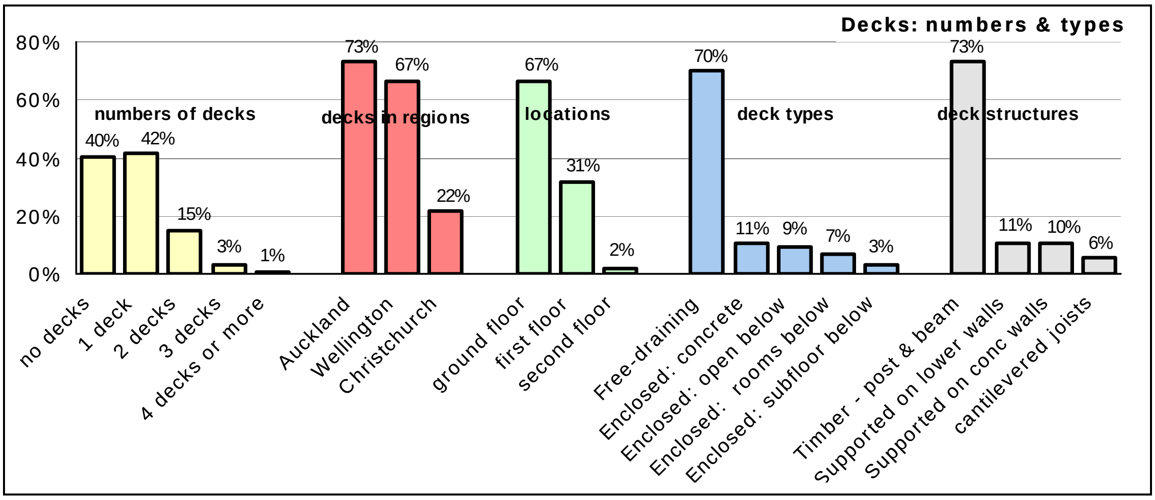


Figure 48 shows the following characteristics for attached decks:

- Over 60% of sample houses have at least one attached deck, almost 20% have 2 or more decks
- Most decks are in Auckland and Wellington houses, with more than 70% of Auckland houses having at least one deck. Christchurch houses have the fewest decks at just over 20%, due to the higher proportion of flat sites.
- Two-thirds of decks are at ground level, while the others are at first floor or above
- 70% of decks are free-draining, with spaced timer decking slats, more than 10% are concrete over sub-floor space below, almost 10% are enclosed decks with open space below, and 10% are enclosed decks over enclosed sub-floor or rooms below
- Almost three-quarters of decks are of post and beam construction, 6% are on cantilevered joists, 10% are supported on timber-framed walls and 10% are supported on concrete walls

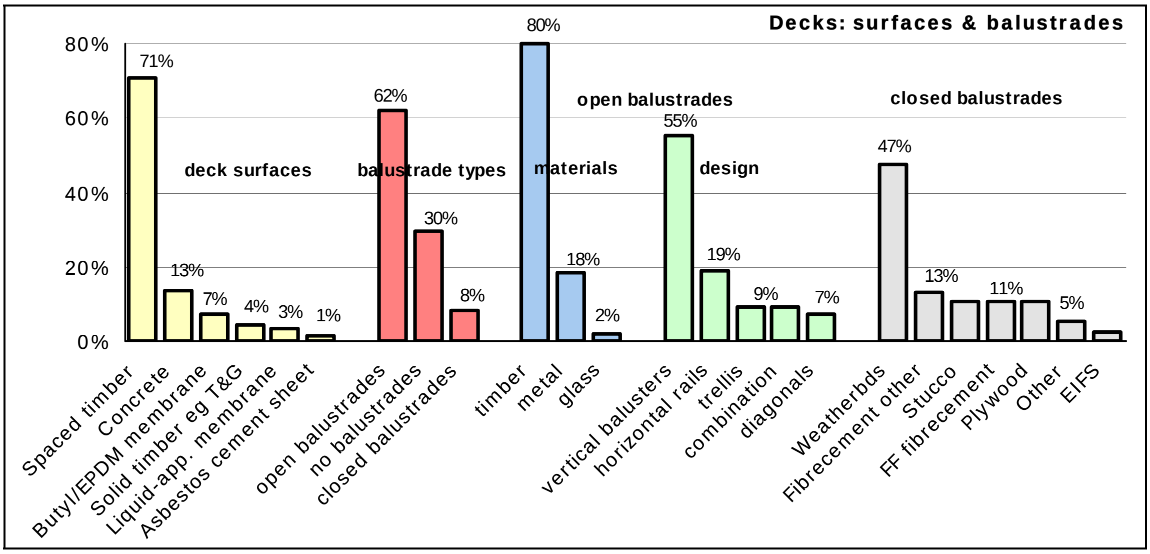
7.4.2 Deck materials

Figure 49 shows materials used for deck surfaces and balustrades. As shown, most deck surfaces are spaced timber deck slats – in line with the proportion of free-draining decks shown above. Figure 49 shows the following characteristics for deck barriers:

- More than 60% had open balustrades (handrails with spaced rails or balusters), 30% of decks had no balustrades, and less than 10% had closed balustrades (framed and clad).
- For open balustrades:
    - 80% were timber, 18% were metal and 2% were glass.
    - 55% had vertical balusters, nearly 20% had horizontal rails, almost 10% were trellis – and the remainder were diagonals or a combination layout.

- For closed balustrades, weatherboard cladding was most common (47%), with about 25% being monolithic cladding (stucco, flush-finished fibre-cement or EIFS), and the remainder plywood or fibre-cement sheet.

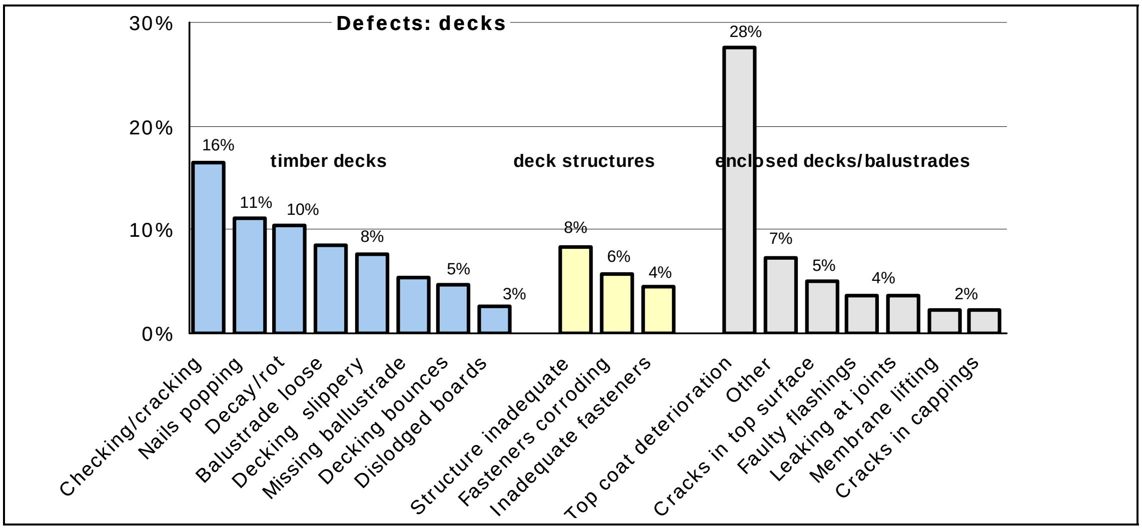
Figure 49: Deck surfaces and balustrades



7.4.3 Defects in attached decks

Defects found in decks are shown in Figure 50, and are separated into the structure and deck types.

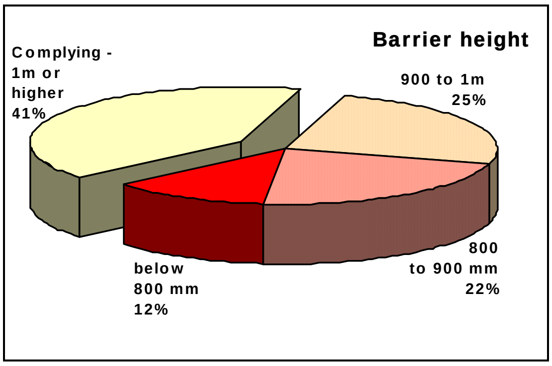
Figure 50: Defects in attached decks



As shown, the most common defects in timber spaced decks are checking or cracking, nail popping, decay, loose balustrades and slippery surfaces. In enclosed decks, the most common defect is the deterioration of the topcoat (mostly associated with older painted concrete decks and largely cosmetic). 8% of deck structures are not up to current standards and 10% have corroding or inadequate fasteners.

7.4.4 Deck barrier compliance

Figure 51: Deck barrier heights



Balustrades were assessed for various characteristics in order to establish compliance with Clause F4[7] of the Building Code.

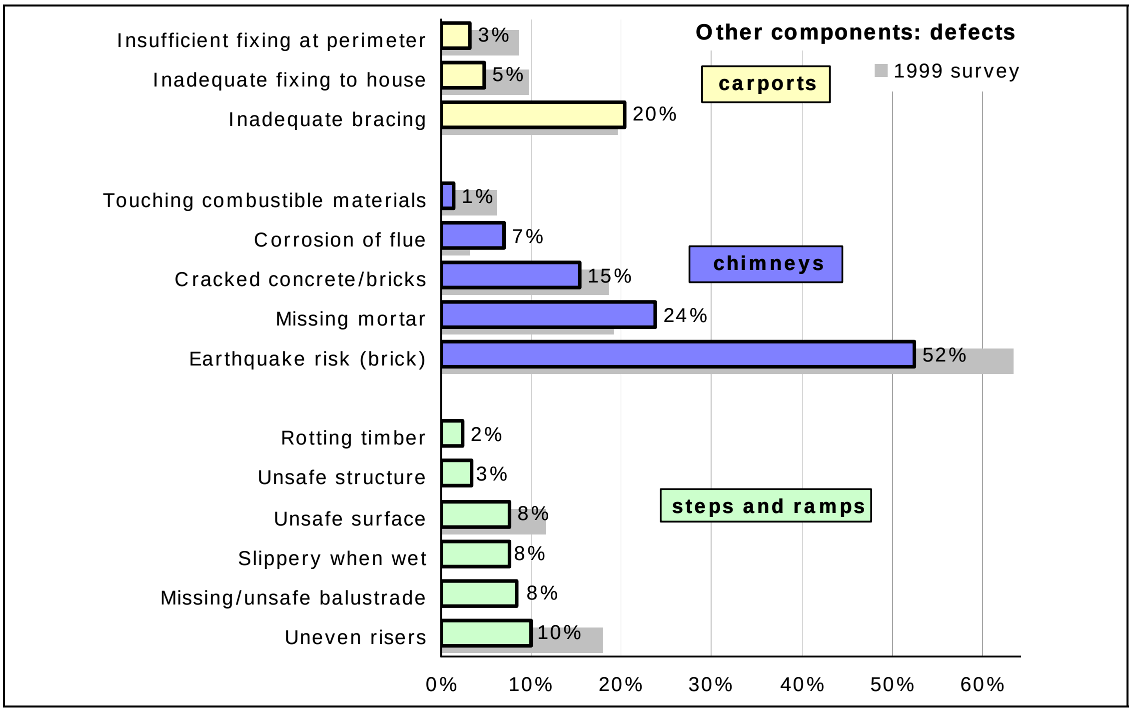
It was found that 78% of barriers were non-compliant due to missing barriers, barriers that were too low or barriers with openings that were too large. This included many barriers with horizontal rails and decks more than 1000 mm high with no barrier.

As shown in Figure 51, almost 60% of barriers are less than 1000 mm high, and around one third are less than 900 mm high.

7.5 Defects in other components

Figure 52 covers the common defects identified in carports, chimneys and steps or ramps.

Figure 52: Defects in other components

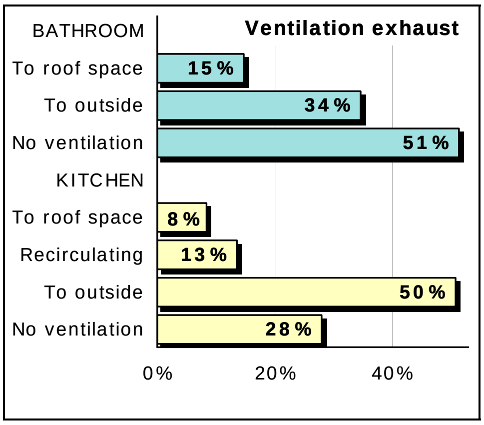


As shown, defects are generally similar to those found in 1999. The main defect in carports remains the lack of adequate bracing. In common with the 1999 survey, the most frequent defect in chimneys is generally associated with unreinforced brick chimneys in older houses. The decrease since the 1999 survey reflects the increase in the number of newer houses in the sample, together with the removal of chimneys in a number of the older houses – rather than an improvement in chimney condition.

These chimneys were in line with building practices of the time (and are often still in good condition), they do not meet current earthquake standards and are likely to be unsafe in a major earthquake. Many of the oldest also use lime-based mortar that has a tendency to crumble with age, reflected by the high percentage of cases (24%) where chimneys were missing mortar, so creating potential fire hazards. The incidence of cracked concrete or bricks in newer chimneys, with cement-based mortars, is also high (at 15%), providing a potential fire hazard if full-depth cracks are within the house envelope.

7.6 Interior ventilation

Figure 53: Kitchen and bathroom venting



The physical repercussions of poor interior ventilation (such as mildew and lining damage) are included within condition ratings, but characteristics are not included. Inspectors noted types of mechanical ventilation provided in kitchens and bathrooms, together with to where the exhaust air was directed.

Figure 53 shows that most bathrooms have inadequate ventilation – with only one third venting to the outside, and 15% venting into the roof space.

Half the kitchens vent cooking fumes to outside, but 20% either exhaust into the roof space, or simply recirculate the air, suggesting that more emphasis may be placed on extracting odours, rather than on extracting moisture.

These defects in ventilation are concerning, as kitchens and bathrooms produce considerable water vapour that, if not adequately vented, can cause subsequent damage to materials and finishes.

8. COSTS

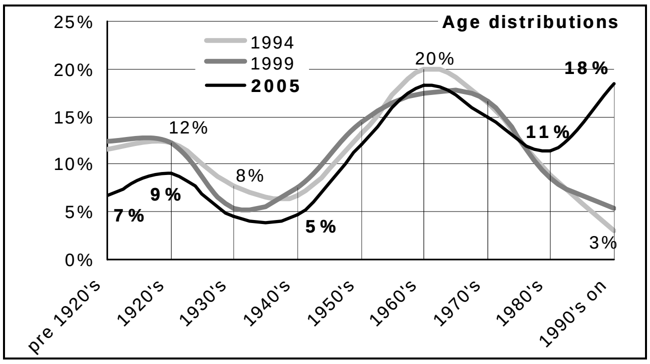
In common with past surveys, the estimated cost of putting a house into good order has been used as one measure of its condition. The cost of outstanding maintenance has been calculated based on the assessed component condition ratings, which allow repair estimates for all components of each house. These component costs are aggregated to provide an estimate for the whole house. All house repair costs can then be averaged over the survey sample to give the results presented in this report.

The 1999 estimates were based on the 1994 base unit rates, updated to 1999 dollars using the movement in the cost of house construction[4]. Due to the time interval since the 1994 estimates, the 2005 base unit costs have been re-estimated as shown by Table 15 in Appendix 16.1.6. These are the costs to bring each component from its assessed condition to an "as new" condition. The costs are based on a standard house of 140 m^2, which is the average floor area of New Zealand houses according to QV information. The comparative 1994 and 1999 figures have been simply updated to 2005 equivalents, based on movements in the cost of house construction.

8.1 Outstanding maintenance and repair costs

As pointed out previously, the average component condition rating weights all components equally, whereas some component defects cost a great deal more to remedy than others.

Figure 54: 1994/1999/2005 age distributions

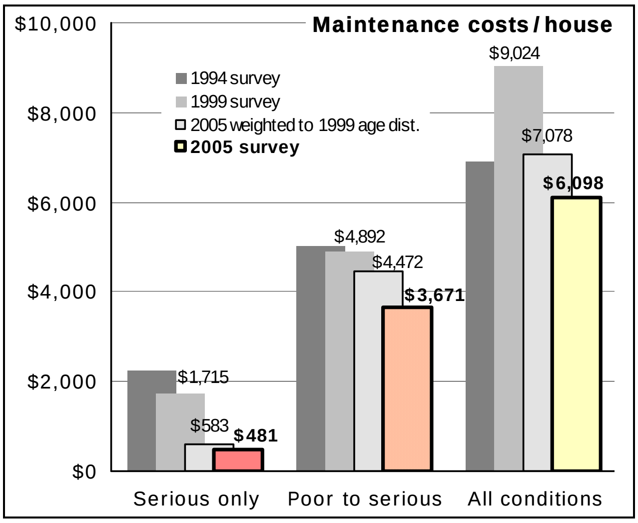


An example of this is the cost of remedying inadequate sub-floor ventilation in continuous concrete perimeter foundation walls (between $1,000 and $10,000 for a standard house depending on condition), compared to the cost of remedying a hot water cylinder (at between $90 and $900).

These cost differences have the effect of weighting components according to their estimated costs of repair, and is reflected in the average cost per house.

The costs of repairing different types of components affects average total maintenance costs depending on the age distribution of houses within samples. The age distributions for the three surveys are shown in Figure 54, and the variations need to be considered when assessing average maintenance costs for each survey as shown in Figure 55. Figure 61 provides average maintenance costs for each age group.

Figure 55: Maintenance costs per house



What is initially noticeable is the apparent decrease in repair costs for the 2005 survey. A high proportion of the costs in 1994 and 1999 were for modifying sub-floor vents to conform to current Building Code standards[3].

While this remains similar in 2005, the number of houses with poor to serious sub-floor ventilation has decreased markedly, from 75% in 1999 to 43% in 2005. This decrease is partly related to the increased numbers of newer houses in 2005, and helps to explain some of the cost differences.

Figure 55 also includes costs where 2005 house ages are weighted to match the age distribution of 1999, removing the effect of the increase in newer houses and allowing a better comparison. The costs for this weighted average shows the difference between the 2005 and 1999 costs reducing to around $2,000, which is more in line with that expected from the increase in the overall average component condition between the two surveys (as shown in Figure 16). Table 14 in Appendix

[3] *Results are considered to be statistically significant – refer Appendix 16.1.7 for analysis.*

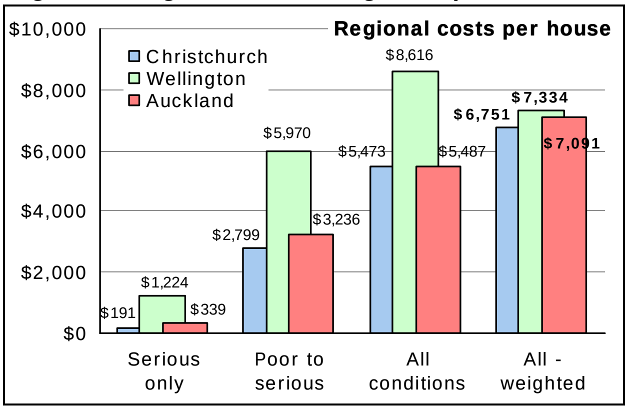
16.1.5 provides a full breakdown of costs by components, with 1994 and 1999 updated costs provided. Figure 55 shows the following:

- **All conditions:** the average house requires about \$6,100 *(1999: \$9,000)* to bring it to "as new" condition. This includes maintenance of all components rated as *moderate* and, although the unit rates of repair are lowest for this rating, the number of components involved is very high and therefore overall average costs are also high. With weighted averages, 2005 costs are closer to 1999 costs.
- **More Urgent Conditions:** A more realistic aim is to repair those components in the *poor* to *serious* range. These are therefore considered separately, indicating costs of remedying those more urgent needs. The average cost of attending to both of these categories amounts to approximately \$3,700 per house on average *(1999: \$4,900)* as shown in Figure 55. With weighted averages, 2005 costs are similar to 1999 at \$4,470 per house.
- **Most Urgent Conditions Only:** The minimum repairs necessary to any house are to defects in serious condition, as these need immediate attention. In this survey, the number of components rated as *serious* was low (even though the costs of repair are higher) - and this is reflected in the average cost of only \$480 per house *(1999: \$1,700)* to remedy only the most urgent items.

8.1.1 Costs by regions

Figure 56 gives the breakdown of the costs into the three regions. In the 1999 survey, Wellington houses had the highest outstanding maintenance costs, with Auckland and Christchurch being similar.

Figure 56: Regional outstanding costs per house

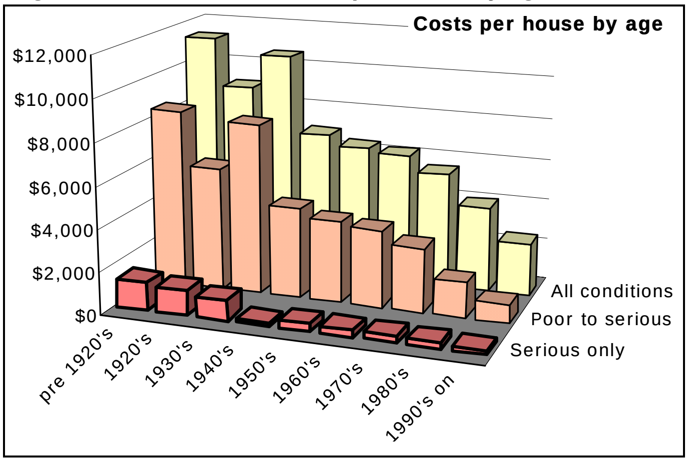


The 2005 results give the same relationship, except that the difference is greater, with Wellington houses being more than 50% higher than the other two regions (compared to a difference of less than 15% in 1999).

However, age groups within each region have changed since 1999, with more new houses being included in the Auckland and Christchurch samples. Figure 56 shows that when costs of houses in each region are recalculated using the 1999 age distribution, regional costs for all conditions are very similar – with Wellington slightly higher (and similar to regional costs shown in the 1999 study). A similar effect for weighted averages can be expected for serious and poor to serious conditions.

8.2 Costs for age

Figure 57: Maintenance costs per house by age



Costs for house age are shown in Figure 57. As expected, and in line with 1994 and 1999 results, average costs of outstanding maintenance show a general rise with house age, except that there is a peak for the 1930s group.

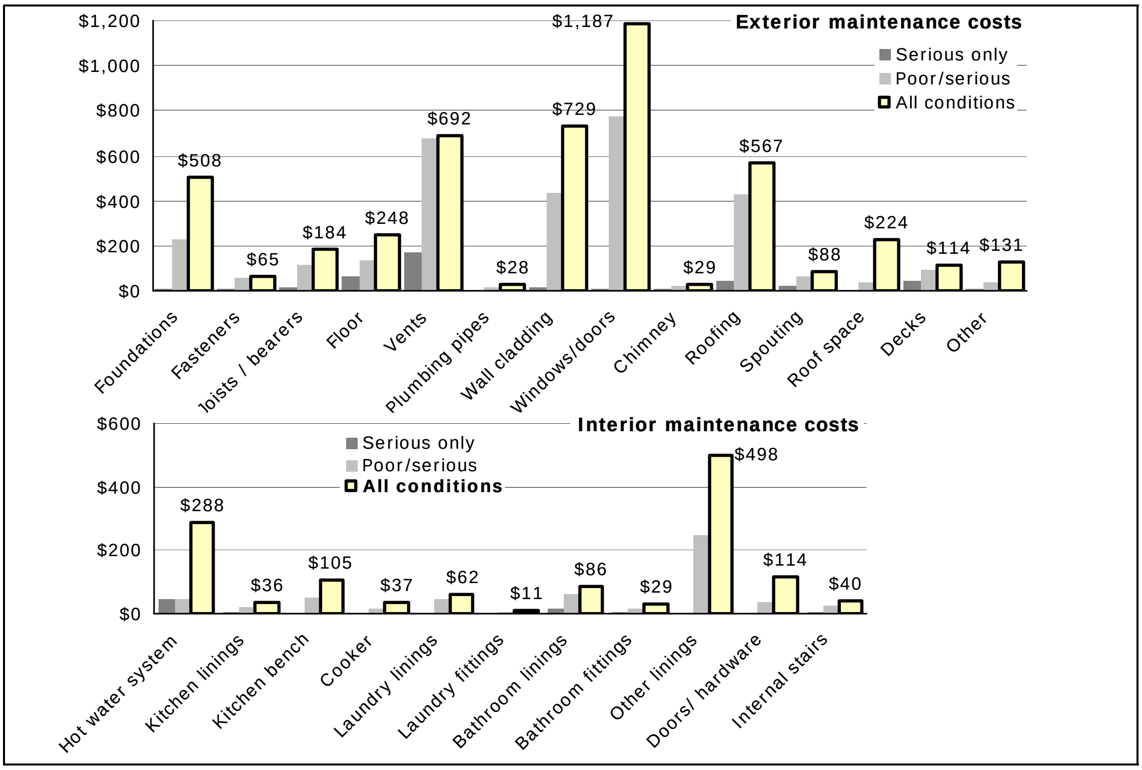
If we refer back to Figure 21, it can be seen that this cohort had one of the lowest average condition rating, so it may be expected to attract a high cost of outstanding maintenance.

However, in order to explain the level of rise, the component conditions for age, as shown in Figure 41, need to be considered with costs of repairing particular components. This shows that 1930s houses include high cost repair items (such as vents, clearance, windows and wall claddings) that have lower average conditions than other age groups. There are also more of these expensive components in *serious* to *poor* condition. The combination of these influences helps to explain the level of rise in this cohort.

8.3 Costs by components

Figure 58 breaks overall average costs into individual component costs, which are derived by dividing the aggregated costs for each component (according to condition) by the total number of houses in the sample.

Figure 58: Component repair costs

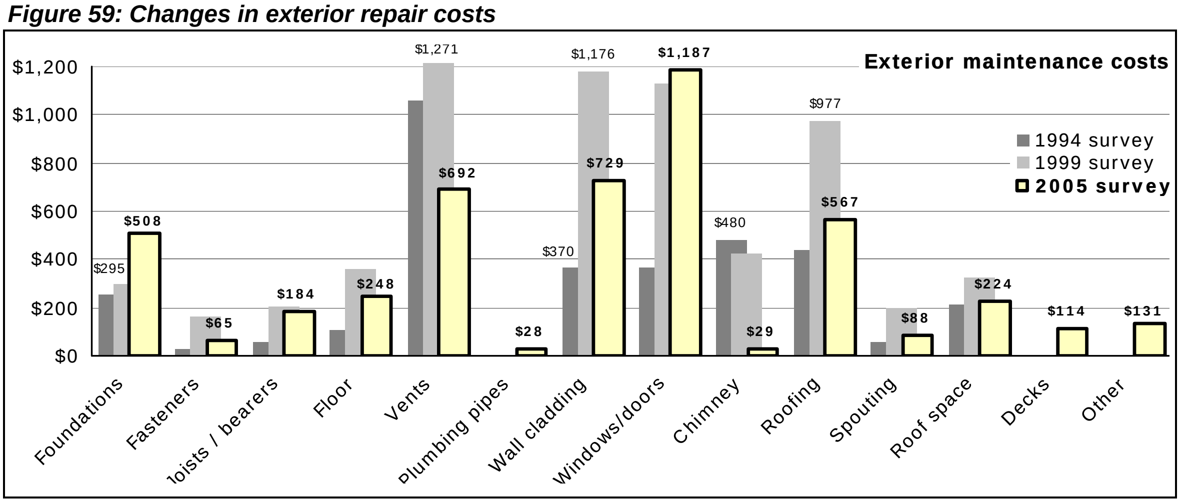


As shown, the highest costs are to remedy defects in foundations, sub-floor ventilation, windows, doors and roof cladding. While average component conditions for these are not particularly lower than those for other components, the costs involved in their repair are high – as shown in Figure 58.

The costs of repair of interior components for *all conditions* show that the hot water system and other linings are the highest items. For electric hot water storage systems (as used in more than 75% of sample houses - refer Section 10.1), repair costs are primarily associated with unreliable thermostats and lack of cylinder earthquake restraints - explaining why costs for *poor* and *serious* conditions are minor compared to *all conditions*, as these defects alone would not attract a *poor* or *serious* rating. For other linings, costs are high as this component covers the majority of linings throughout the house.

8.3.1 Exterior components

Figure 59: Changes in exterior repair costs

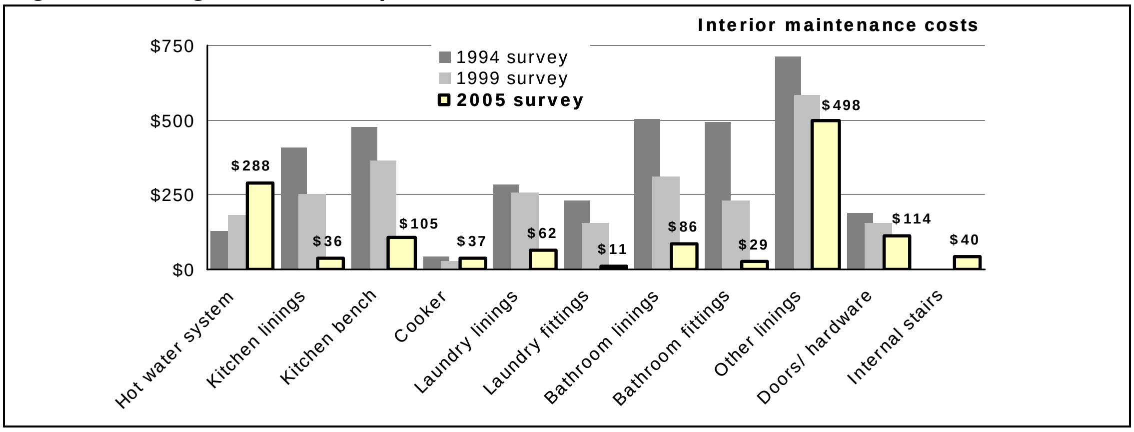


While high costs in 2005 are associated with the same components as those in the 1994 and 1999 surveys, Figure 59 shows differences in the levels for these. For sub-floor ventilation, chimney, wall and roof cladding, this may be explained by the change in the age distribution of houses since 1999. As shown in Figure 54, the number of 1990s and newer houses has increased from around 5% of the 1999 sample to 18% of the 2005 – which effectively dilutes the influence of older houses with suspended timber floors and weatherboard walls (reinforced by the decreases in proportions shown in Figure 29). At the same time, Figure 17 shows that the condition of cladding materials in 2005 appears to have improved, which adds another influence to the decrease in costs for wall and roof claddings. However, Figure 30 shows that timber or part-timber windows remain in relatively poor condition, with 11% of these rated as *poor*.

If base costs used in 1999 were simply updated to 2005 equivalents, the base cost for *poor* condition windows would be around $2,400, compared to the re-estimated 2005 costs (averaged between aluminium and timber windows) of $6,800, while the *serious* and *moderate* condition costs remain similar. This higher cost, when applied to *poor* condition windows, is sufficient to counteract the decreasing use of timber windows as a proportion of the sample – leaving window costs similar to 1999.

8.3.2 Interior components

Figure 60: Changes in interior repair costs



For interior components, Figure 60 shows that costs over all components (except the hot water system) have steadily decreased over the three surveys. This is in line with the overall increase in condition ratings for interior components, from 3.7 in 1994, to 3.8 in 1999, and then to 4.2 in 2005. As in 1994 and 1999, the interior component with the highest average maintenance cost is the interior linings of living areas and bedrooms also in line with improved condition (from 3.6 in 1994 to 3.7 in 1999, to 4.0 in 2005).

In common with 1999, the largest changes are in kitchens and bathrooms and Table 6 shows these.

Table 6: Kitchen and bathroom costs

(costs updated to 2005 equivalents)		***Linings***			***Fittings***	
	1994	*1999*	*2005*	*1994*	*1999*	*2005*
KITCHENS						
Average Condition	3.7	3.9	4.2	3.7	3.9	4.2
% Serious or Poor	*24%*	*7%*	*3%*	*22%*	*9%*	*4%*
Average repair costs	**$409**	**$253**	**$36**	**$520**	**$387**	**$142**
BATHROOMS						
Average Condition	3.5	3.8	4.1	3.5	4.0	4.1
% Serious or Poor	*27%*	*11%*	*6%*	*28%*	*9%*	*4%*
Average repair costs	**$504**	**$313**	**$86**	**$491**	**$230**	**$29**

In each successive survey, average ratings have increased, and the proportions in *poor* to *serious* condition (needing the highest repair costs) have decreased –resulting in decreased costs of repair.

8.4 Costs by ages of houses

Section 8.2 discussed how the distribution of house age groups within a sample affects total repair costs for the sample, as many high cost components are associated with houses of a certain age.

Figure 54 showed the varying age distributions to allow this effect to be considered when assessing costs. An analysis of the effect of house ages on the surveys is shown in Figure 61.

Figure 61: Maintenance costs by age groups

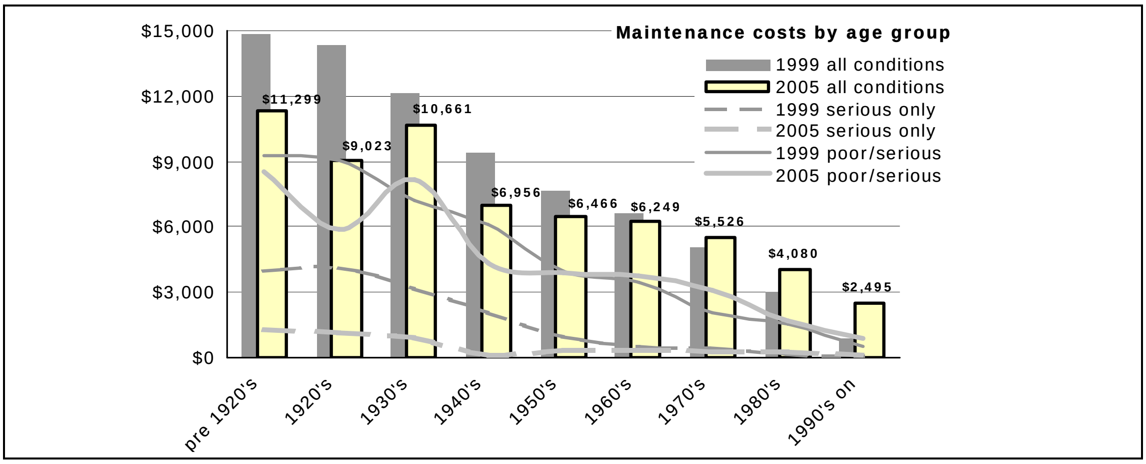


Figure 61 shows large contributions made by older houses to the overall average costs, and the decreasing influence of these in the 2005 survey in contrast to 1999. It is interesting to note that 1999 and 2005 costs are similar for 1960s houses, with 2005 costs higher for newer decades and lower for older decades.

8.5 Costs of delays in maintenance

Table 7: Additional costs of delay

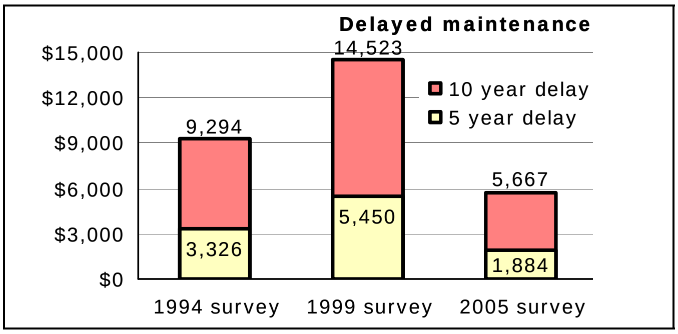
Components	2005 costs	5 year delay	10 year delay
Foundations	508	16	111
Floor framing	268	35	82
Sub-floor vents	692	610	614
Floor	267	41	41
Plumbing pipes	30	12	12
Wall claddings	729	290	881
Doors and windows	1,187	662	1,685
Roofing	567	30	193
Spouting/downpipe	88	34	34
Roof space	253	6	6
Other (decks, steps etc)		57	119
Hot water systems	288	41	270
Kitchen linings	36	-	82
Kitchen fittings	143	35	427
Laundry linings	62	-	123
Laundry fittings	11	4	35
Bathroom linings	86	-	195
Bathroom fittings	29	10	87
Other linings	498	-	106
Interior doors/hardware	114	-	552
Internal stairs	62	-	9
Totals		**$1,884**	**$5,667**

At the time of the 1999 study, results on average condition ratings and average outstanding costs were insufficiently different from the 1994 survey to warrant additional analysis. Instead additional costs were assumed to be of similar scale to 1994, and the same percentage increases were applied to 1999 costs.

Base costs have been reassessed for this survey, so costs of delaying maintenance have also been reassessed using these new base costs. This has been done by estimating cost effects of delays in remedying defects for each component condition rating. Delays of five and ten years were considered, with the probable worsening of condition that would be involved after those time periods.

In order to compare these with the estimates for past surveys, the 1994 and 1999 costs have been updated based on average cost increases, and the results are shown in Figure 62.

Figure 62: 1994/1999/2005 costs of delay



As shown in Figure 62, costs of delay have decreased compared to past surveys.

This is due to factors already discussed above, such as increasing numbers of newer houses, changes in materials used in sample houses and increases in average component ratings. However, despite the decreases, costs of delays in maintenance are still substantial.

9. INSULATION

Inspectors gathered detail on the coverage, thickness, material and associated defects, where possible, of thermal insulation – along with the presence and orientation of double-glazed windows

9.1 Overall results

Figure 63: Wall, ceiling and floor insulation

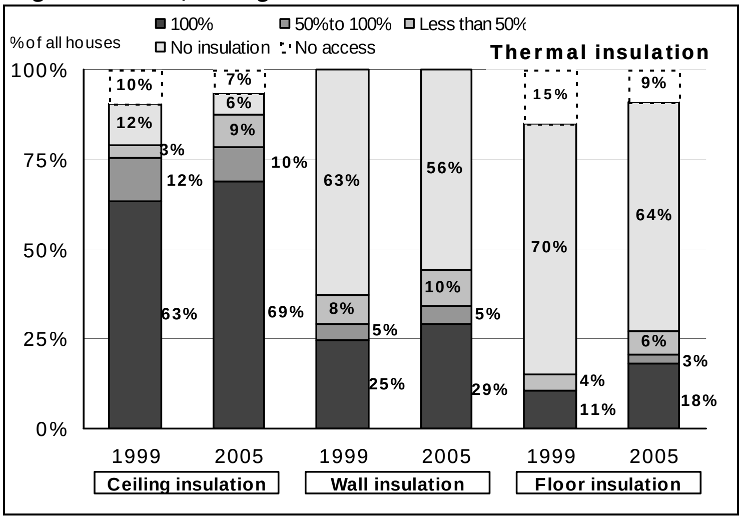


Figure 63 shows proportions of houses with ceiling, wall and floor insulation - with estimated coverage, without regard to thickness, of insulation material in accessible spaces.

Results are similar to those for the 1999 survey, with the small increases reflecting the changed age distribution of the sample.

While proportions with no insulation have reduced, this does not reflect additional work to existing houses, but rather the increasing numbers of newer houses in the survey sample.

The ceiling space is the most common zone to be insulated, being the simplest and least expensive space to retrofit, while giving highest benefits, and this is reflected in the high levels of ceiling insulation. Very few houses (6%) were without any ceiling insulation, and 69% had fully insulated ceilings.

However wall insulation is difficult and expensive to install in existing walls, with the high proportions of houses with no wall insulation reflecting the low level of retrofit in walls of houses built prior to mandatory requirements. Only 29% of houses have all walls insulated (with many of these being foil only), and only 15% had some walls insulated (usually walls of recent additions).

Floor insulation was even less common with 64% of floors being completely uninsulated. While floors are not the largest contributor to heat losses, the current fashion of polished floors in lieu of carpet makes the lack of floor insulation more important. Only the more recent houses tended to have draped foil, and most of these (being of the era which used particleboard flooring) had carpet and underlay as well.

9.2 Ceiling insulation

During the survey inspectors gathered detail on the coverage, thickness, material and associated defects for ceiling insulation. Defects affected the overall rating of the ceiling space, but are considered separately, in order to provide more information on the state of ceiling insulation in the surveyed houses.

9.2.1 Ceiling insulation thickness

Figure 64 shows the thickness of ceiling insulation noted by the inspectors, and compares this to the thickness noted in the 1999 survey.

Figure 64: Ceiling insulation thickness

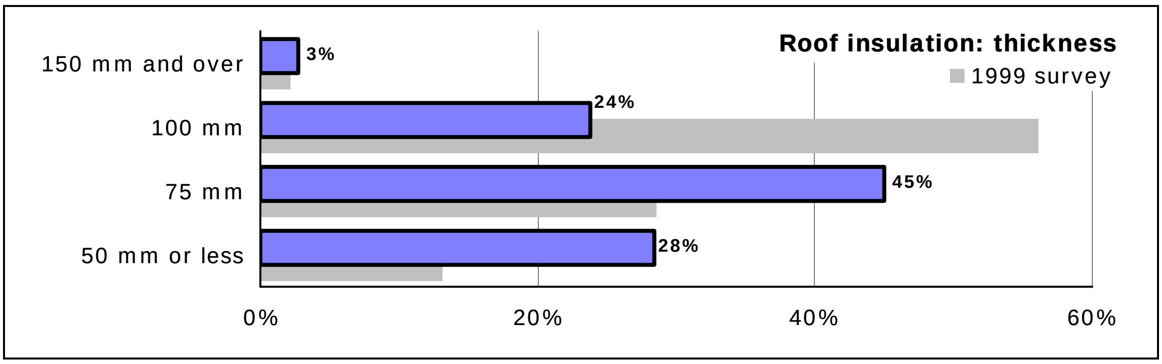
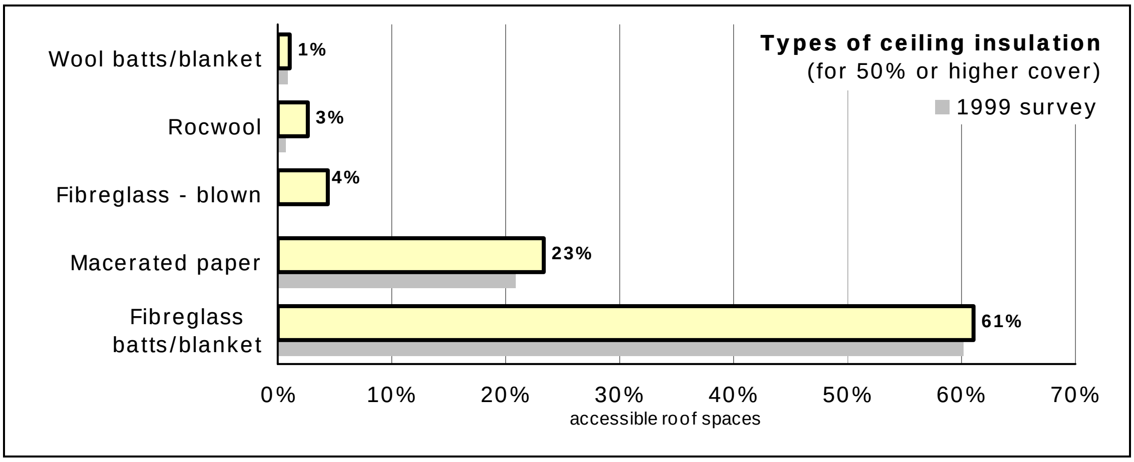


Figure 64 indicates a notable decrease in thickness between the 1999 and 2005 surveys. However, this may be attributed to more detailed data gathering in the 2005 survey, including more emphasis being placed on the settling of insulation (suggesting data variability more than a real decrease).

9.2.2 Ceiling insulation materials

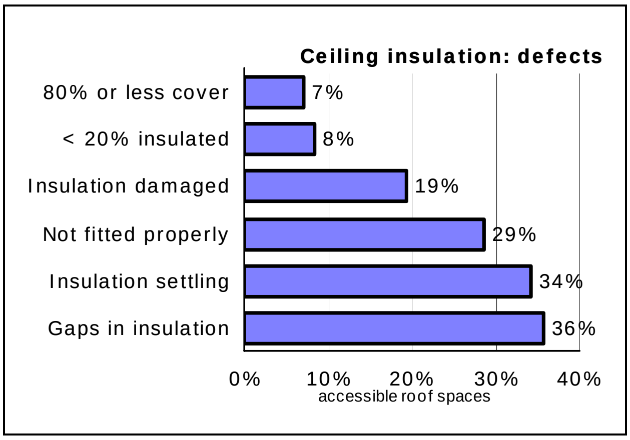
Figure 65 shows the insulation materials found in the sample houses. It should be noted that polyester, polystyrene, foil and blown wool are not included, as these were less than 0.5% of the sample. Figure 65 shows that fibreglass and macerated paper account for more than 90% of the materials used.

Figure 65: Ceiling insulation materials



9.2.3 Ceiling insulation defects

Figure 66: Ceiling insulation defects

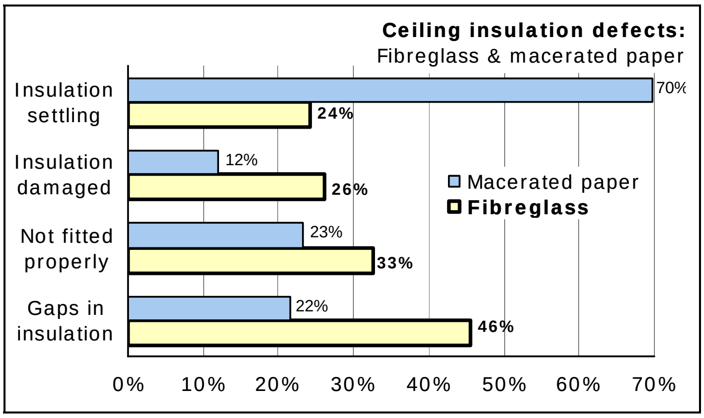


During the survey inspectors gathered details of defects in ceiling insulation. These affected the overall rating of the ceiling space, but are considered separately to allow more focus.

Figure 66 shows the incidence of defects in ceiling insulation in accessible roof spaces. As shown, major defects are settling, gaps, lack of proper installation and damage (e.g. removal of batts by tradespeople without replacement).

As shown in Figure 65, fibreglass and macerated paper account over 90% of the materials used. A further analysis of defects for these two materials is given in Figure 67.

Figure 67: Defects – fibreglass and macerated paper



The main points to note in Figure 67 is the degree of settling noted for macerated paper ceiling insulation in contrast to that for fibreglass.

It is also interesting to note 46% of fibreglass insulation had gaps – either from not being fitted properly or from damage after installation.

Due to being blown in, macerated paper showed fewer gaps, but this good cover is more than counteracted by settling and/or inadequate initial thickness.

9.2.4 Ceiling insulation for house ages

Figure 68: Insulation by decade

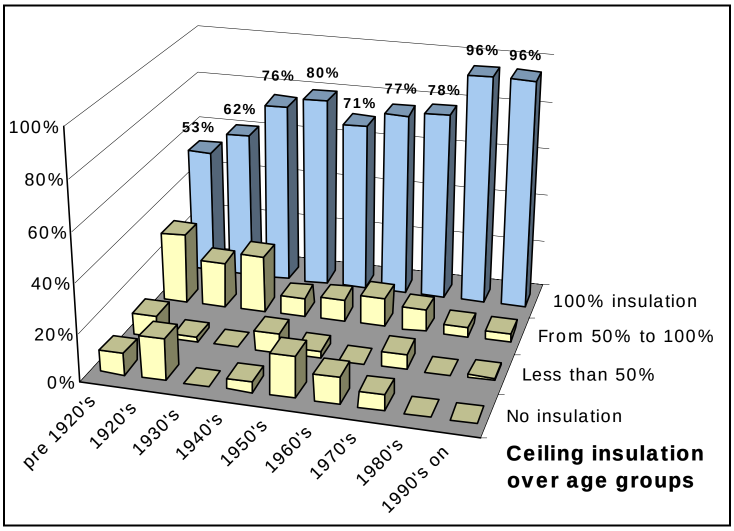


Figure 68 shows the percentages ceiling insulation cover according to the ages of the sample houses.

The numbers of 1930s and 1940s houses in the sample are small, so should not be taken as indicative of these age groups as a whole.

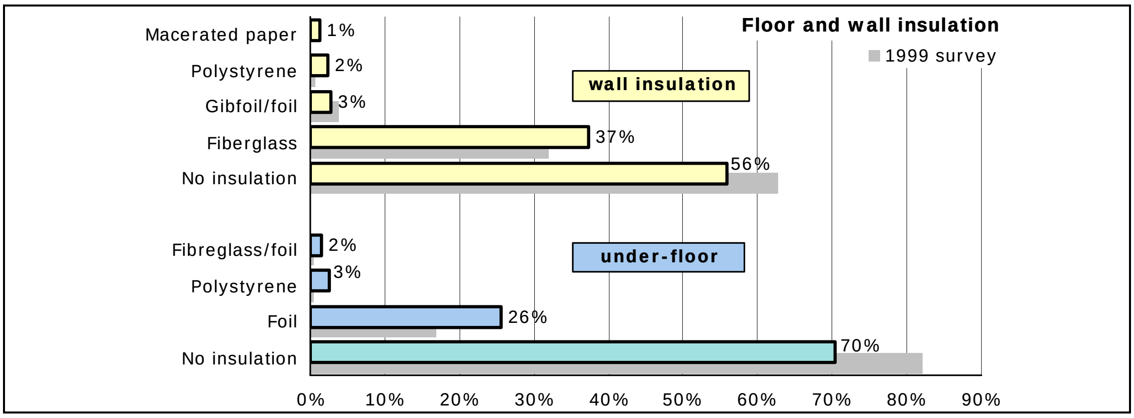
As expected, the lowest levels are found in older houses, although these still have over 50% fully insulated, while newer houses climb steadily from more than 70% fully insulated for the 1950s cohort to 96% for 1990s on.

It is interesting to note the lack of ceiling insulation cover for newer houses, with 4% of these (4 houses) showing gaps in cover.

9.3 Wall and floor insulation

Figure 69 shows the types and frequencies of wall and floor insulation noted in accessible spaces during inspections, and compares these to the results from the 1999 survey.

Figure 69: Wall and floor insulation



It should be noted that percentages given for floor insulation are based on the number of houses with accessible sub-floor spaces (i.e. excluding concrete slabs on ground). As shown, the most common materials are similar to those found in 1999, with fibreglass for walls and foil for under-floor insulation.

9.4 Ceiling insulation and requirements

Age cohorts have been grouped according to introduction dates of relevant standards, in order to explore the relationship of insulation and legal requirements. The information supplied by QV included ages of houses by the decade in which they were built, so there is some overlap when grouping.

9.4.1 History

In 1977 the Standards New Zealand introduced a national standard on house insulation[6], which became effective in 1978, and remained the relevant standard for almost 20 years. A new standard was published in 1996[8], although it did not replace the former as minimum requirements until recently. This study measures the level of ceiling insulation found against both standards.

9.4.2 Age grouping

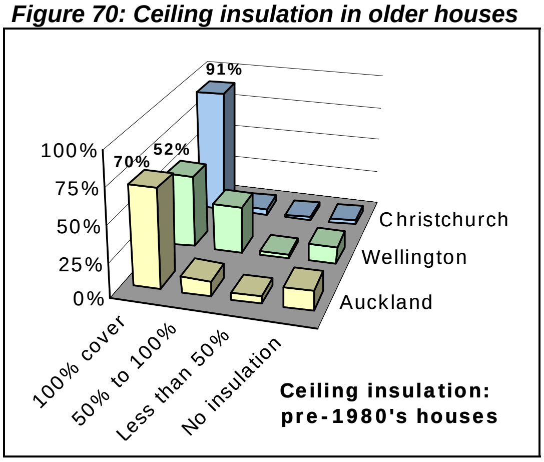
Analyses have been carried out on ceiling insulation only (because of the more accurate information collected) in order to assess the influence of mandatory requirements. In the 1999 survey, 1970s Christchurch houses were considered separately, as local body standards applied to that group. However, analysis revealed little difference in ceiling insulation from that of houses in the other regions – so this analysis has not been repeated for the 2005 survey.

1980s and 1990s houses from all regions can be grouped and analysed against the requirements of NZS 4218P: 1977, while the 2000s houses may be compared to NZS 4218: 1996. From this we are able to see what compliance rates appear to be, and also to gain an idea of the degree to which minimum requirements are exceeded.

9.4.3 Pre-mandatory national Standards

Figure 70 shows the extent of ceiling insulation in houses built prior to the 1980s. This has been broken into the three regions in order to assess any influences of differing climatic conditions. As shown earlier, more than 60% of the houses built prior to enforceable standards have ceiling insulation installed.

Figure 70: Ceiling insulation in older houses



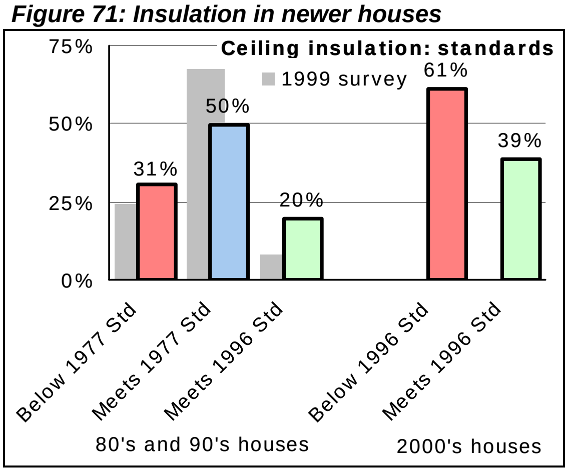
In contrast with the 1999 survey, the split into the regions in 2005 shows the expected result of a general increase in the use of insulation with increasing severity of winter temperatures.

More than 90% of older Christchurch houses were fully insulated in the ceiling, compared to only around 50% in Wellington houses. However when houses with more than half cover are considered, 85% of Wellington houses were at least 50% insulated as compared to 80% of Auckland houses.

Auckland had the highest percentage of older houses with no insulation at 14%, followed by Wellington at 12% and Christchurch at only 3%.

9.4.4 Post-mandatory national Standards

Figure 71: Insulation in newer houses

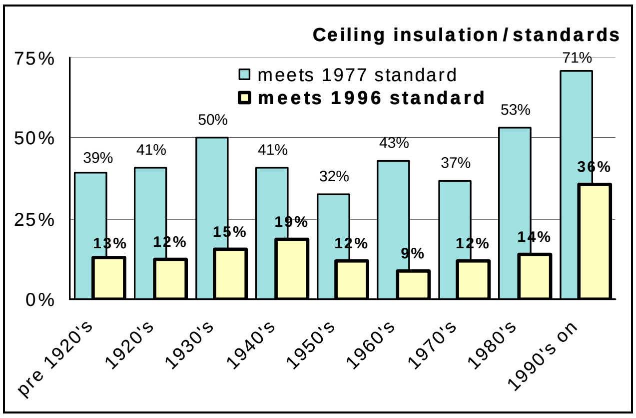


The 1977 standard[6] was enforced from 1978 throughout the country, so the ceiling insulation in those light timber frame houses built during the 1980s and 1990s can be expected to achieve an R-value of 1.9 or more.

The next analysis includes more detail on the type and thickness of the ceiling insulation, to allow an assessment of compliance with the 1977 standard, or to the 1996 standard[8] (which is now part of the Building Code Clause H1[6] requirements) for houses built from 2000 onwards.

Figure 71 shows the level of ceiling insulation in accessible roof spaces of houses built in the 1980s and 1990s, measuring this against the 1977 standard, and shows 2000s houses against the requirements of the 1996 standard – indicating how many houses failed to meet applicable standards.

Figure 72: Insulation and age groups



9.4.5 All ages and standards

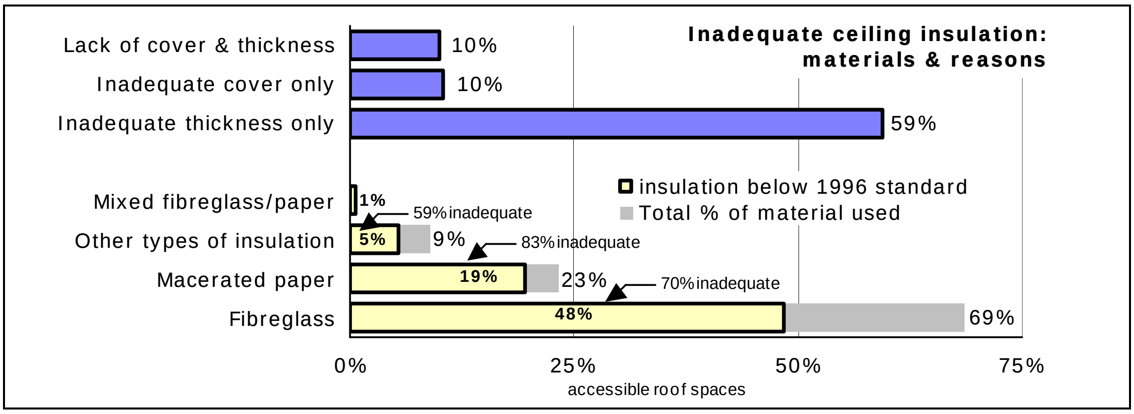
Because standards (using R-values) provide a convenient gauge of the cover and thickness of insulation, these have been used to measure the effectiveness of ceiling insulation over all age groups. Results are shown in Figure 72.

Note the percentages of pre-war houses that meet either the 1977 or the 1996 standard for ceiling insulation (important as few will have the opportunity to install wall insulation). However, 1950s houses show the lowest levels, and these also lack wall insulation.

9.4.6 Reasons for lack of effectiveness

Reasons for inadequate ceiling insulation vary, and may be the lack of cover, insufficient thickness, or a combination of both. Figure 73 shows the reasons for the sample houses, with associated materials.

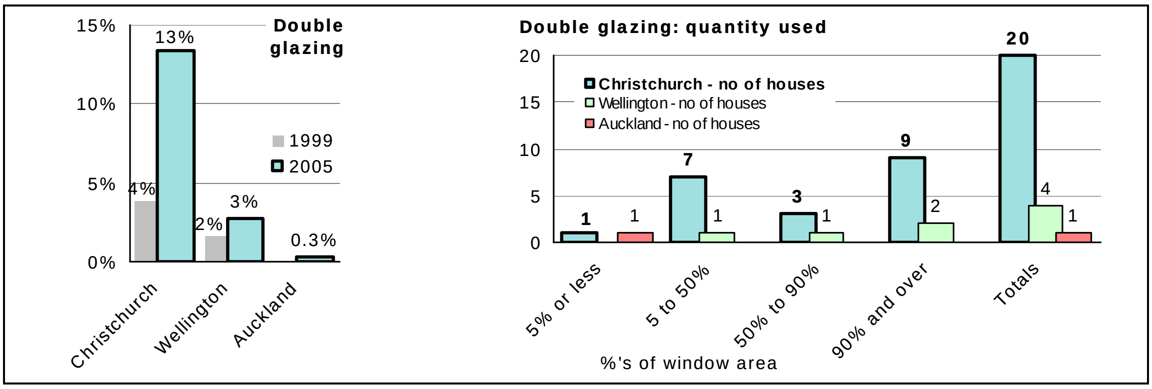
Figure 73: Inadequate insulation: materials/reasons



9.5 Double glazing

In the 1999 survey, very few houses were identified as using any double-glazed windows, and this was followed up in the 2005 survey to identify any increase. Figure 74 shows the growth in double-glazing since 1999, over the three regions, along with the amount used in those houses with some double-glazing. As shown, the greatest increase has been in the Christchurch region, where double-glazing has increased from less than 5% in the 1999 survey to 13% in this survey.

Figure 74: Double glazing quantities



9.6 Conclusions

The main features on insulation are:

- *Only 6% of surveyed houses have no ceiling insulation, and almost 70% have full cover. However, nearly 30% of insulated ceilings have insulation that is only 50 mm thick or less.*
- *Around 55% of houses have no wall insulation, and more than 70% have some walls insulated.*
- *Around 65% of houses have uninsulated floors and less than 20% are fully insulated.*
- *Fibreglass ceiling insulation (used in 60% of accessible roof spaces) suffers mostly from gaps, damage and improper fitting, while 70% of macerated paper (used in 23% of accessible roof spaces) suffers from settling problems or inadequate initial levels.*
- *30% of 1980s and 1990s ceilings do not currently meet the 1977 standard, and 60% of 2000s ceilings do not meet the 1996 standard.*
- *Houses built in the 1950s appear to have the lowest effective levels of ceiling insulation.*
- *In almost 60% of accessible ceilings with inadequate insulation, this is due to insufficient thickness. 83% of macerated paper ceiling insulation does not meet current requirements, while 70% of fibreglass ceiling insulation does not meet current requirements. However it should be noted that some of these houses would have met the insulation requirements in place at the time of installation.*
- *Double-glazing has increased in the Christchurch region from less than 5% in 1999 to 13% in this survey. Houses in the Auckland and Wellington regions had very low levels.*

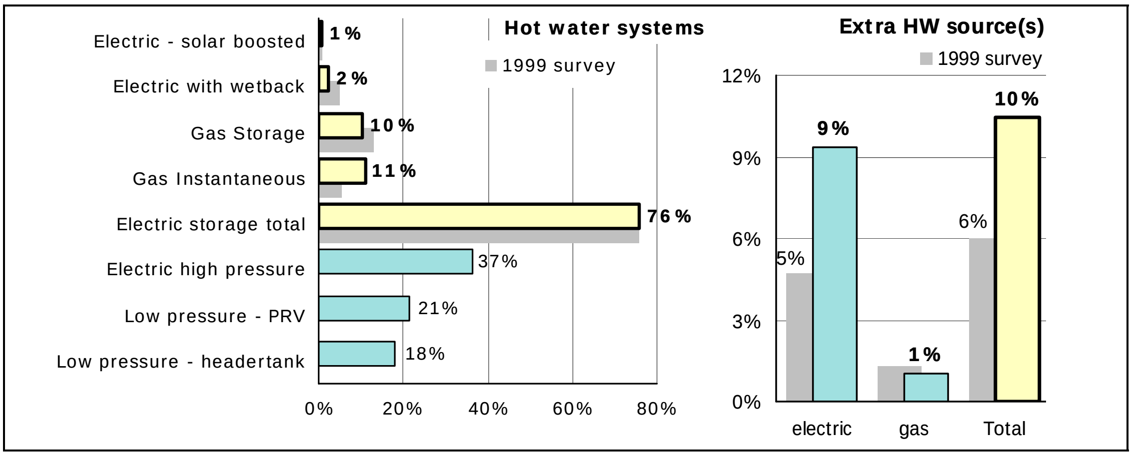
10. HOT WATER SYSTEMS

In 1999, inspectors collected information on the types, sizes, ages, and thermostat settings of hot water cylinders in the houses surveyed. For the 2005 survey, inspectors also measured the hot water temperature at the tap nearest to the cylinder. As well as being able to generally assess energy efficiency and storage capacity of the hot water systems, we can now more reliably assess hot water safety by checking actual water temperatures as well as the setting of the cylinder thermostat.

10.1 Types of hot water systems

Inspectors identified the type of system used in each house. No solely solar or wetback heated systems, or electric instantaneous water heaters were identified. Figure 75 indicates hot water systems used in 2005 sample houses, and compares these with findings of the 1999 survey. It also identifies the numbers of houses that now have more than one hot water source.

Figure 75: Types of hot water systems

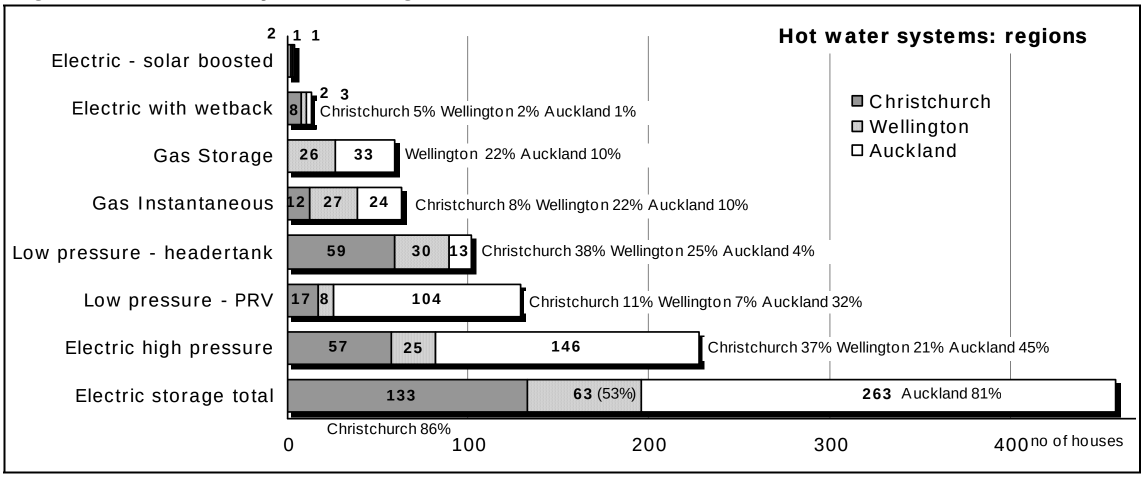


As shown, electric storage heating remains the most common form of water heating, with three-quarters of houses using this. However, high-pressure cylinders are now most common, with fewer than 20% of houses having the traditional (and formerly most common) system of low-pressure cylinders with header-tanks. Gas instantaneous water heaters have increased from 5% in 1999 to 11% in 2005. The percentage of houses with more than one heating source has almost doubled since the last survey.

10.1.1 Water heating in regions

Figure 76 shows the types of systems used in each region, with second systems included in the numbers.

Figure 76: Hot water systems in regions



In all regions, electric storage remains the most common means of supplying hot water to households, although Wellington houses are the lowest users at only 53%, in contrast to more than 80% in the other two regions.

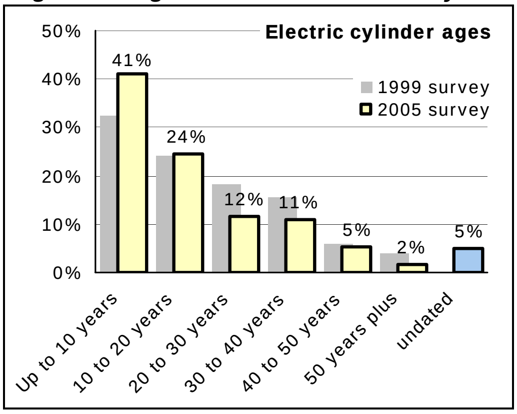
Wellington has the lowest proportion of high-pressure systems at just over 20%, while Auckland has the highest at 45%. Christchurch has the highest proportion of traditional header-tank low-pressure systems at 38%, while Auckland has the lowest at only 4%. Christchurch has the greatest use of wetbacks at 5%, although this is less than the 10% noted in the 1999 survey (probably due to the increase in newer houses since the last survey). Solar-boosted systems are rare, with only 4 of the houses inspected having these.

Wellington houses are the largest users of gas water heating, with almost 45% of houses using gas. In Auckland and Wellington gas water heating is split evenly between storage and instantaneous heating. It is interesting to see that gas instantaneous water heating is starting to be used in Christchurch, with 8% of the sample houses using bottled gas for this.

10.2 Electric storage heaters

10.2.1 Ages of cylinders

Figure 77: Ages of electric hot water cylinders



Inspectors were asked to note ages of storage cylinders where visible. The oldest gas cylinder noted in the survey was 25 years old, but electric cylinders had a much wider age range.

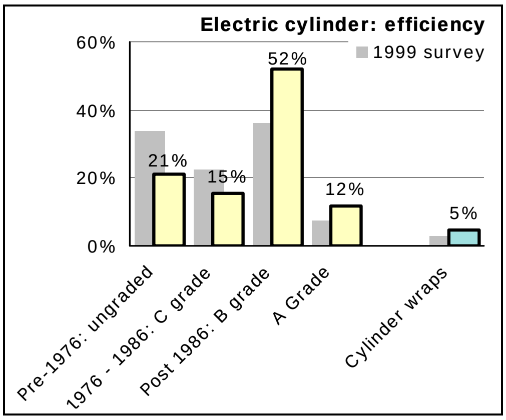
The pattern of ages in Figure 77 is similar to that in 1999, except for the increase in cylinders less than 10 years old (due to the increase in houses built over the past 10 years in this survey).

The large proportion of very old electric cylinders is notable. Thirty years is considered a reasonable life for a low-pressure electric cylinder, yet the survey found 20% of cylinders (1999 25%) over that age.

10.2.2 Energy efficiency of cylinders

The dominance of electric storage systems makes the efficiency of these particularly important to the national energy use for water heating, so the efficiencies of electric cylinders in the survey were further explored. 25 cylinders (6%) were inaccessible for inspection, so these are not included.

Figure 78: Cylinder grades and wraps



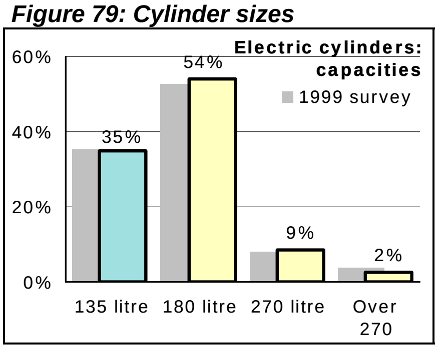
As shown in Figure 78, the proportion of old ungraded cylinders is still high at more than 20%, although this has decreased from the 32% noted in 1999. However, it is likely that the unknown category of cylinders is also in this older group as these inaccessible cylinders were found in houses ranging from 30 to 100 years old. This would increase ungraded cylinders to a potential 27%.

There has been an increase in the more efficient B and A grade cylinders – which are now about 65% of the total.

Only 5% of cylinders used wraps, indicating that sub-standard cylinders are using more energy than necessary, and that energy efficiency can be improved for these.

10.2.3 Storage capacities of cylinders

Figure 79: Cylinder sizes



For many years the standard size cylinder used in New Zealand houses was 135 litres (or its predecessor 30 gallons). It is now commonly accepted by the plumbing industry that this size is inadequate for present day demands. The range of cylinder sizes is given in Figure 79, with comparison to 1999 sizes.

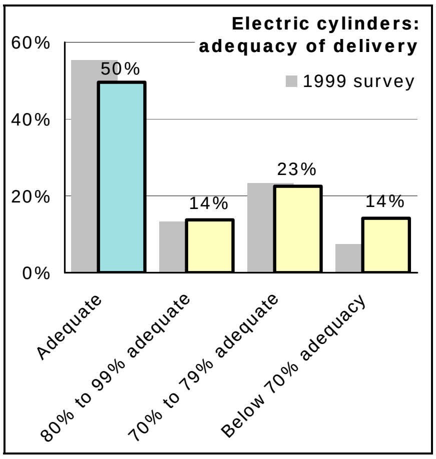
As can be seen, sizes are very similar to 1999 with the most common existing size at 180 litres, although more than a third are still 135 litre cylinders. Just over 10% of electric storage cylinders have capacities over 180 litres.

However, there are also increasing numbers of houses with second hot water systems as shown in Figure 75. A second cylinder can often be a method of overcoming distribution problems as well as capacity problems in an existing house, where practical reasons may preclude replacement of the existing cylinder.

10.2.4 Delivery capabilities

In 1999 the number of bedrooms in a house was used as the basis for estimating potential demands on a hot water cylinder, and the same method has been used for this survey.

Figure 80: Electric cylinder delivery capacities



The potential number of people in a house is calculated as being the number of bedrooms plus one. The requirements per person are assessed at around 45 litres per day, which is a conservative average daily figure taking no account of particular family circumstances that can result in a much higher peak demand for hot water (e.g. everyone wanting to shower at the same time).

Only houses with single hot water heaters are included in this analysis, as it is assumed that the second source will allow sufficient total capacity.

For these houses, delivery needs for the potential household size are estimated, and then assessed against the actual capacity of the cylinder in the house. Figure 80 shows the results for the 2005 houses, and compares these to the 1999 results.

From Figure 80, it can be seen that only half of the houses surveyed are considered adequate for their delivery demands. Results are similar to those from the 1999 survey. However, we would have expected adequacy to improve with more newer houses included in the sample, so it is concerning that delivery adequacies instead appear to be worse than in 1999.

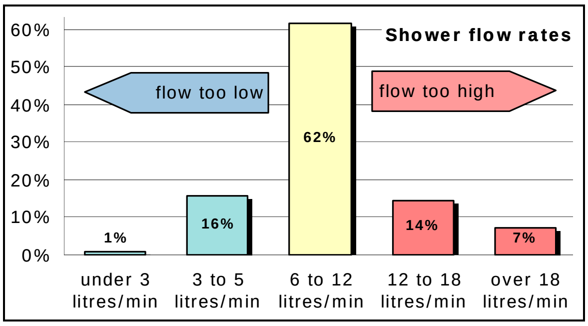
One of the consequences of undersized cylinders is that storage temperatures are often increased in order to improve the effective capacities of the storage systems, which (without the protection of tempering valves) can lead to dangerously high temperatures at the hot water taps (and also waste energy).

10.3 Delivered water

10.3.1 Shower flow rates

New information was collected in the 2005 survey on the measured flow rates of shower, in order to get a picture of both their efficiency and performance.

Figure 81: Shower flow rates



A minimum of 6 litres per minute is considered necessary to deliver an adequate shower flow, while a flow more than 12 litres per minute will use more energy and water than necessary. The measured flow rates are grouped according to these measures and the results are shown in Figure 81.

More than 20% of showers in the survey were energy-wasteful[4], with 7% measured at a very wasteful flow rate over 18 litres per minute.

Surprising, 17% of shower flows were **below** 6 litres per minute. These showers are unlikely to perform adequately – particularly the more than 1% that measured less than 3 litres per minute.

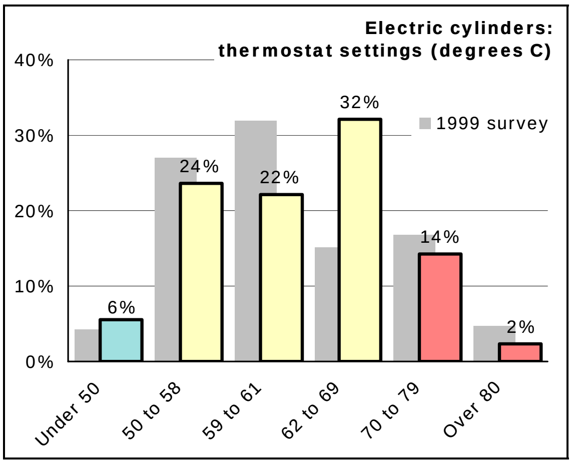
10.3.2 Hot water: electric cylinder thermostat settings

The New Zealand Building Code[7] requires that hot water be delivered at a safe temperature (55°C maximum at present), and stored at a minimum of 60°C to avoid bacterial contamination.

However, many New Zealand homes have their hot water at dangerously high temperatures in order to counteract the effect of undersized hot water cylinders.

[4] *However, it should be noted that people with high pressure hot water may not use all of the available pressure when showering.*

Figure 82: Electric cylinders: thermostat settings

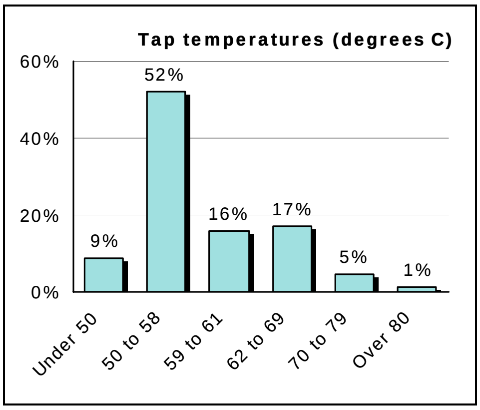


Many houses had undersized cylinders, so we may expect to see many cylinder thermostats set to high temperatures. Inspectors were asked to note settings, and the results shown in Figure 82 indicate 10% fewer cylinders set to around 60°C than in the 1999 survey.

The lowest temperature setting found was 35°C, while the highest setting was 90°C. About 30% were set at **below** a safe storage temperature, while almost half were set **above** a safe delivery temperature, with about 15% of these over 70°C. The numbers set at temperatures in excess of 70°C decreased from more than 20% in 1999 to about 15% in 2005, with 2% set at over 80°C.

10.3.3 Measured water temperatures

Figure 83: Temperatures at hot water taps



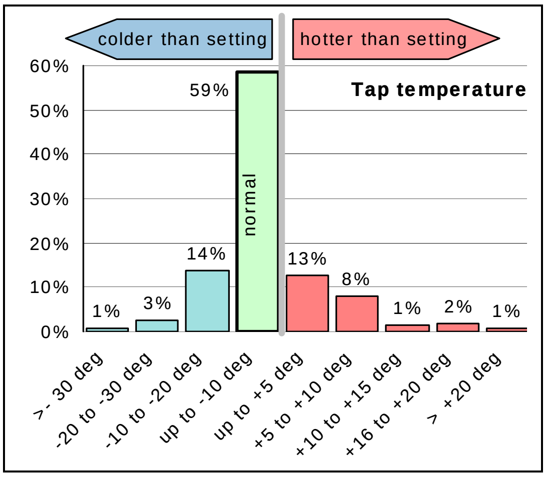
The most important measure of water safety is not the setting of a thermostat, but the actual water temperature of hot water at the tap.

Because of concerns regarding the reliability of thermostats, the 2005 survey inspectors measured the hot water temperature at the outlet closest to the water heater. The results, for both gas and electric water heating systems, are given in Figure 83.

It is interesting to compare Figure 83 with the range of settings shown in Figure 82, in particular the more than 60% of temperatures of 58°C or below (compared to 30% in Figure 82) – indicating many unreliable thermostat settings.

10.3.4 Unreliable thermostats

Figure 84: Thermostat settings and tap temperatures



Some thermostats on gas water heaters do not use precise degree settings, but those that do, along with temperatures set for electric cylinder thermostats, have been compared to actual tap temperatures – and the results are shown in Figure 84.

As shown in Figure 84, less than 60% of the thermostats reasonably reflect actual temperatures produced at the hot water tap.

In terms of safety, the most worrying cases are the 25% where the temperature of the delivered hot water is **higher** than the thermostat setting (with some as high as 20°C or more above the setting).

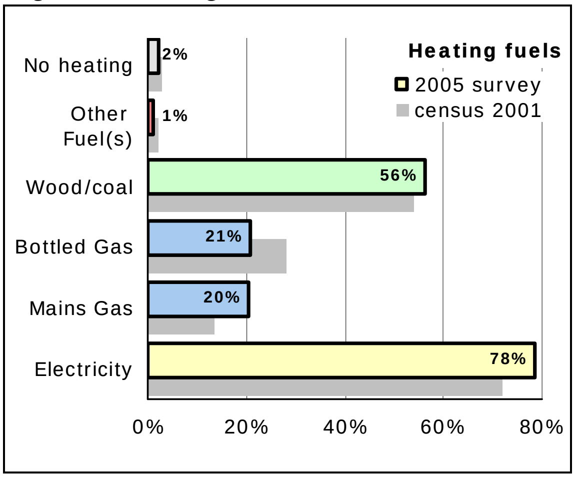
10.4 Conclusions

The results of the survey indicate that:

- *44% of houses now have electric cylinders 10 years old or less, but 20% of houses still have electric cylinders more than 30 years old. Only about 20% of houses now have header-tanks and of these, 85% are unrestrained against earthquake movement.*
- *About 10% of houses now have more than one water heater.*
- *About 35% of houses have old (ungraded) cylinders or C grade cylinders which waste energy.*
- *More than one third of houses still have 135 litre capacity cylinders. Only 50% of the electric cylinders are adequately sized for the potential demands for hot water delivery, despite the increase in reasonably new cylinders.*
- *Most gas storage cylinders are adequately sized, as heating time is much faster than electricity.*
- *Almost 60% of hot water cylinders have inadequate earthquake restraints and of these, more than 40% post-date the 1993 Building Code requirement for adequate restraints.*
- *More than 20% of showers are energy wasteful with flow rates over12 litres/minute and 7% are over 18 litres/minute.*
- *17% of showers have flow rates that are too low to deliver an adequate shower – with 16% below 6 litres/minute and more than 1% at less than 3 litres/minute.*
- *About a third of electric cylinder thermostats were set below the 60^{0}C required by the Building Code in order to avoid the risk of contamination.*
- *More than half of electric cylinder thermostats were set above the 60^{0}C needed to minimise the risk of scalding.*
- *Measured hot water temperatures at taps showed that nearly 40% of hot water systems delivered water at temperatures well above the 55^{0}C required by the Building Code.*
- *More than 30% of thermostats were unreliable, delivering hot water at temperatures outside of an expected range – with 25% delivering hot water at higher temperatures than the thermostat setting.*

11. HEATERS

Figure 85: Heating fuels

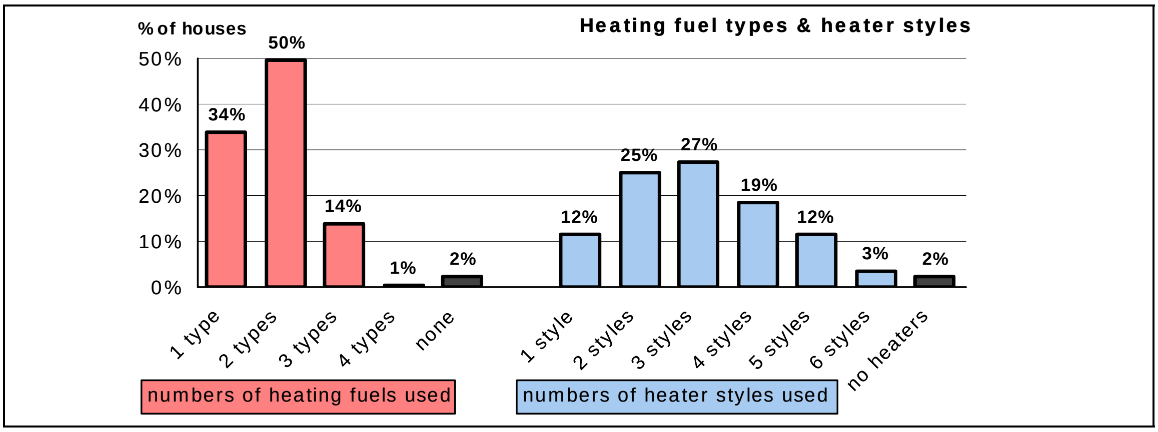


In common with the 1999 survey, information on heating was collected for each house in the survey. Inspectors were asked to identify the numbers and types of heaters and/or heating systems, together with associated equipment such as dehumidifiers and ventilation systems. In addition, this survey noted the power requirements for electric heaters. From this data, it is hoped to form an impression of how New Zealand houses are heated.

Figure 85 shows the heating fuels used in sample houses, compared with data from the 2001 census.

Many houses in the survey used more than one heating fuel and had more than one style of heater – as shown in Figure 86.

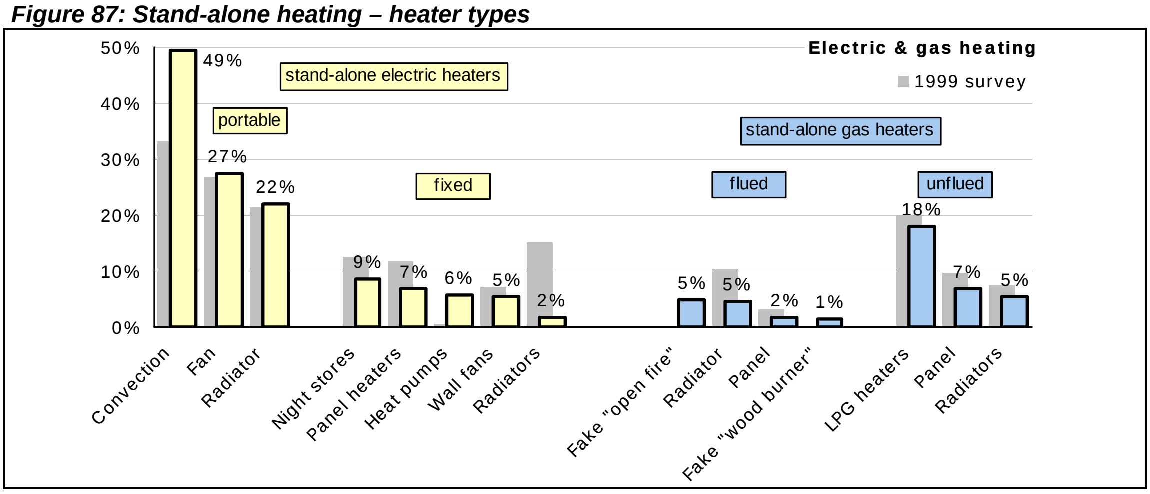
Figure 86: Numbers of fuel and heater types used



11.1 Types of heating

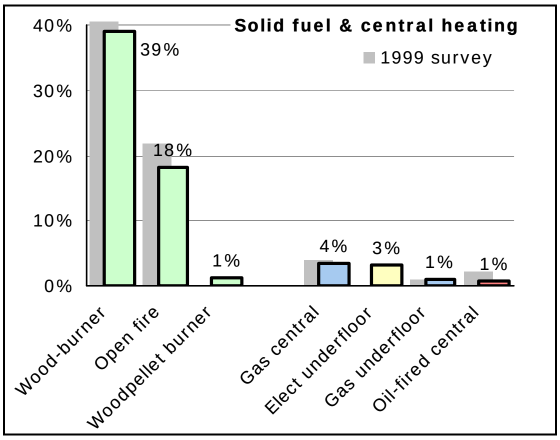
The following considers the types of heating found in the sample houses. Figure 87 shows percentages of sample houses that use various styles of heaters, comparing these with the 1999 survey.

Figure 87: Stand-alone heating – heater types



As shown, the most frequently used heater styles are portable electric convection heaters (oil columns), followed by electric fans then radiators. There were very few heat pumps noted in the 1999 survey, but this has risen to 6% in the 2005 survey. For gas heating, portable LPG heaters are still common at 18%.

Figure 88: Solid fuel and central heating



Gas flame-effect fake open fires were not noted at all in the last survey, whereas this time their use is up to 5%, the same level as for gas radiators, which have fallen slightly to 5% for both flued and unflued types.

Figure 88 shows the levels of solid fuel and central heating systems used in the sample houses. As shown, wood burners and open fires are still common, with the appearance of a few wood pellet burners.

Only about 5% of houses have central heating, with 4% being gas-fired systems. 4% of houses have some under-floor heating, most covering limited areas of the house such as bathrooms.

11.1.1 Regional differences

Figure 89: Heating types for the regions

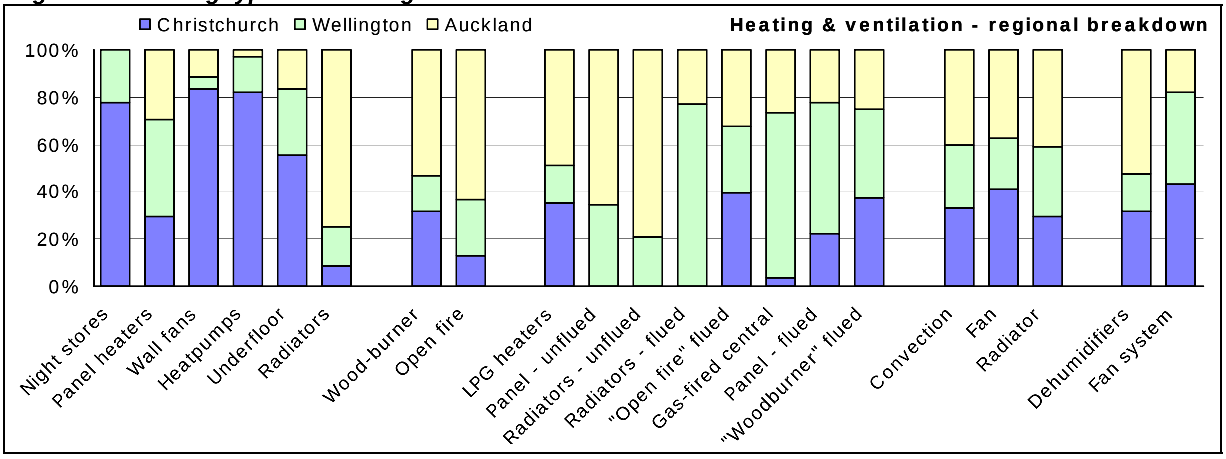


Figure 89 shows heating types split between the three regions. As shown, there are marked differences between the regions for some types of heating. Gas heating is not common in Christchurch as reticulated gas is not available, although some bottled gas is now being used. Night stores are common in Christchurch, whereas these were not observed in Auckland. Unflued gas panels and radiators are more common in Auckland than in Wellington.

11.1.2 Numbers of heaters

Figure 90 indicates percentages of houses that contain each type of electric and gas heaters.

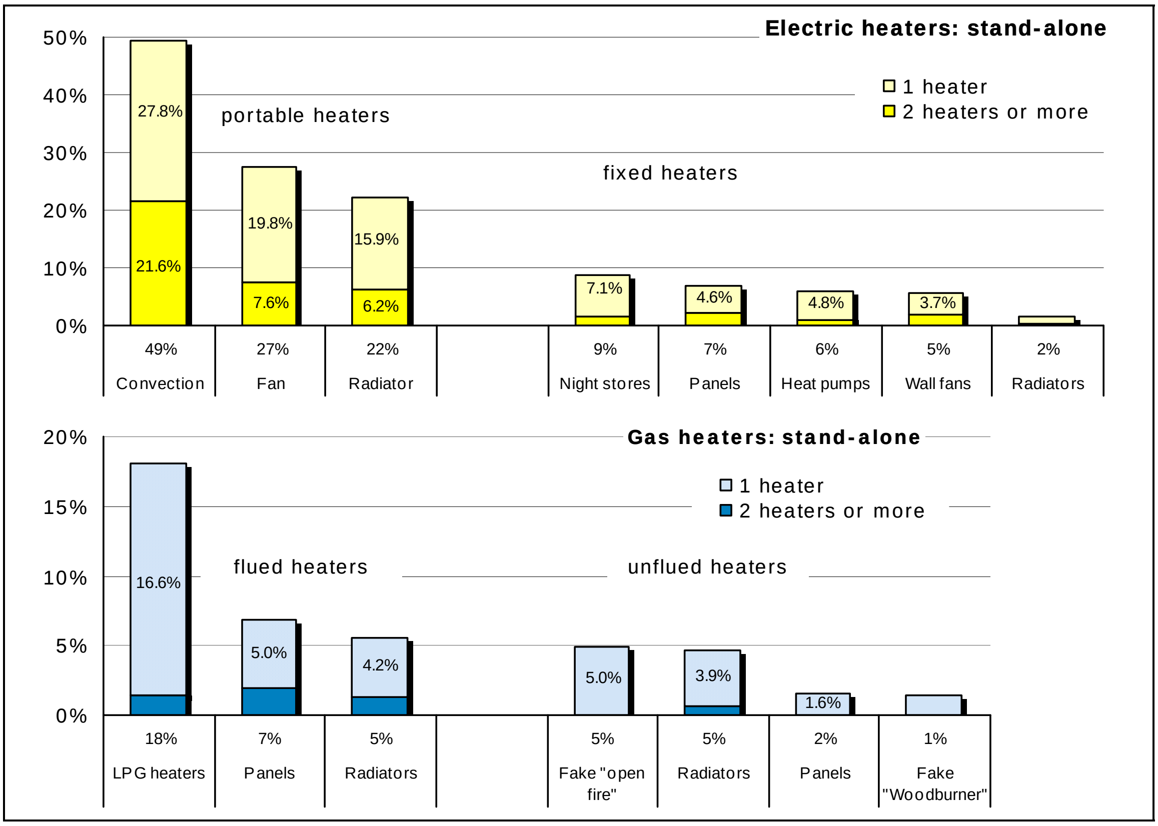


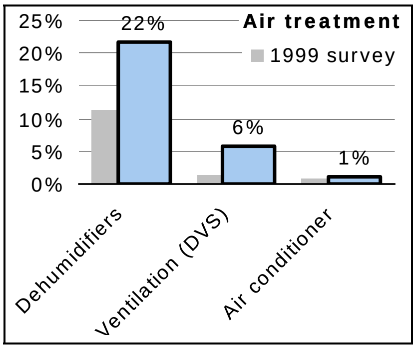
Figure 90: Numbers of stand-alone heaters

11.2 Air treatment systems

The 1999 survey noted almost no air conditioners or continuous ceiling ventilation systems (such as the 'DVS'), but noted that more than 10% of houses had dehumidifiers. Figure 91 shows the results for the 2005 survey.

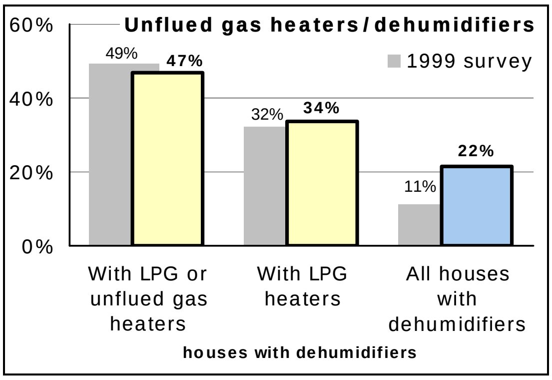
Dehumidifier use has doubled from 11% in 1999 to 22% in 2005. Home ventilation systems (heated or unheated air supply from ceiling spaces) have increased markedly from 1% in 1999 to about 5% in 2005.

Figure 91: Air treatment systems



11.3 Possible moisture problems

Figure 92: Dehumidifiers/unflued gas heaters



As shown in Figure 87, 17% of the houses surveyed had portable LPG heaters and 12% had unflued natural gas heaters (totalling 30% with unflued gas heaters), both of which produce large quantities of water vapour. The use of dehumidifiers has doubled to 22% since 1999.

The 1999 study showed that the use of dehumidifiers increased markedly when unflued gas heater or LPG heaters were also used in the house, and Figure 92 shows this analysis repeated for the 2005 survey.

For the 2005 survey, Figure 92 shows that houses with unflued gas heaters or LPG heaters are more likely to have dehumidifiers. If either are used 47% of these houses will also have at least one dehumidifier. If LPG heaters are used, 34% of houses will also have dehumidifiers.

11.4 Conclusions

The main features of the survey on heating in sample houses were that:

- *A third of houses used only one heating fuel (either wood or electricity), half used 2 types of heating fuels and 15% used 3 or more. Most houses used a variety of different kinds of heaters – with about 60% using 3 or more different types.*
- *More houses had portable electric heaters than any other type. Of these, convection heaters ("oil columns") are the most common type of heater at about 50%. Portable electric fan heaters and radiators together make up another 50%.*
- *There were no heat pumps in the last survey, whereas 7% now have these.*
- *Very few houses (5%) have central heating, and only 1% have air conditioners.*
- *The most common type of fixed heater found were wood burners. Almost 40% of houses had a wood burner, and half of these houses relied on this as the sole form of heating. Wood-pellet burners have appeared, but only at 1%.*
- *18% of houses still had open fires, a slight decrease from the last survey.*
- *LPG heaters (18% of houses had at least one) have decreased slightly since the last survey.*
- *Houses with dehumidifiers have doubled, from 11% in 1999 to 22% in 2005.*
- *Home ventilation systems have increased since the last survey, from only 1% in 1999 to about 6% in 2005.*
- *Houses with unflued gas heaters (reticulated or LPG) have more than twice the rate of dehumidifier use as houses without this form of heating.*

12. OTHER FEATURES AND ATTRIBUTES

During inspections of rated components, information on additional features was gathered by the BRANZ inspectors. These results add to our understanding of New Zealand housing. In some cases, only simple quantities are available as the items have not been assessed in terms of condition. If aggregated results indicate growing trends, then such items may be further assessed in future surveys. Other information is more subjective, and may be a result of the inspectors overall assessments of a particular attribute e.g. the feeling of dampness. This section presents the findings on these other features and attributes.

12.1 Security measures

In 1999, inspectors were asked to indicate whether the following items were present:

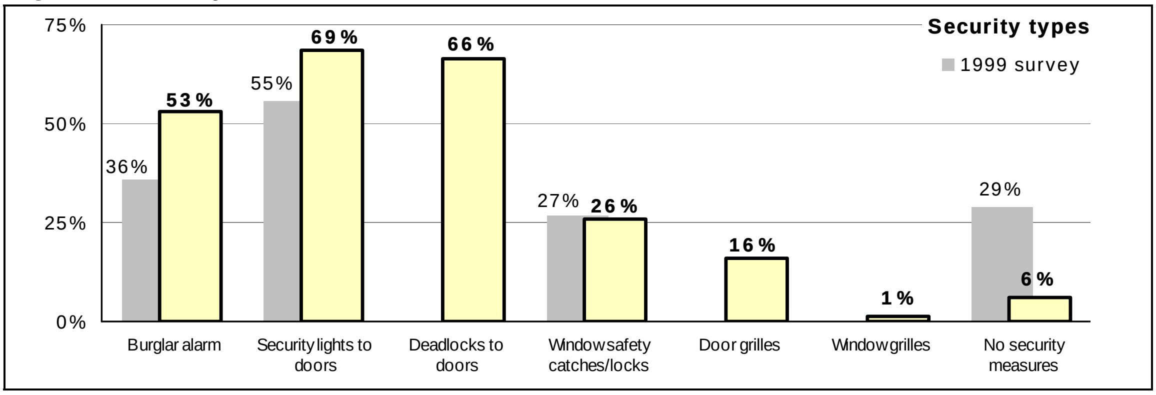
- ***Burglar alarm***
- ***Security lights** to entry points*
- ***Safety catches** to vulnerable windows*

From this information it appeared that most houses had some specific security measures so the 2005 survey collected more detailed information on the frequency and types of security items and added:

- ***Door deadlocks***
- ***Door grilles***
- ***Window locks***
- ***Window grilles***

Figure 93 shows security measures in the 2005 houses, comparing these where possible to 1999 results.

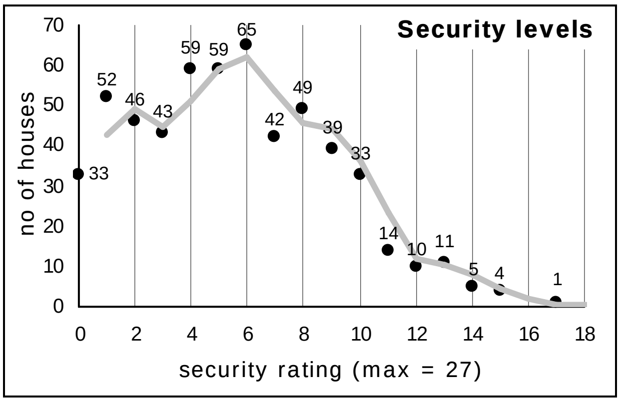
Figure 93: Security measures



As shown, houses without any specific security measures have decreased substantially – from 29% in 1999 to 6% in 2005. Each type of measure noted in 1999 has increased markedly, with the largest increase in the number of houses with at least some safety catches or locks to windows.

12.1.1 Levels of security

Figure 94: Levels of security



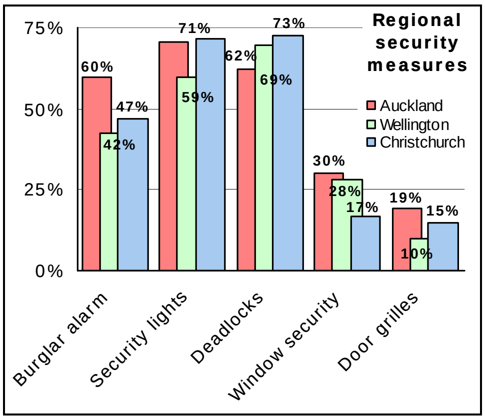
As noted above, inspectors noted the frequency of each security item in the 2005 survey. For example, secure deadlocks on exterior doors would be classified as to whether these were on all doors, most doors, the main door only, or on no doors at all.

This has allowed ratings to be derived that can be aggregated to give an overall security rating of between 0 (no measures) and 27 (maximum). The method used to derive the rating scale is provided in Appendix 12.1.1.

The spread of ratings is shown in Figure 94, where it can be seen that the most secure house in the survey scored 17 out of 27. Figure 94 indicates that, while the number of houses with some degree of security measures is high, most houses have a very low level of these measures. About 30% of houses had ratings of less than 4 and almost 80% had ratings of 8 or less - with an average security level of 5.5 out of the maximum possible score of 27.

12.1.2 Regional patterns

Figure 95: Regional use of security measures

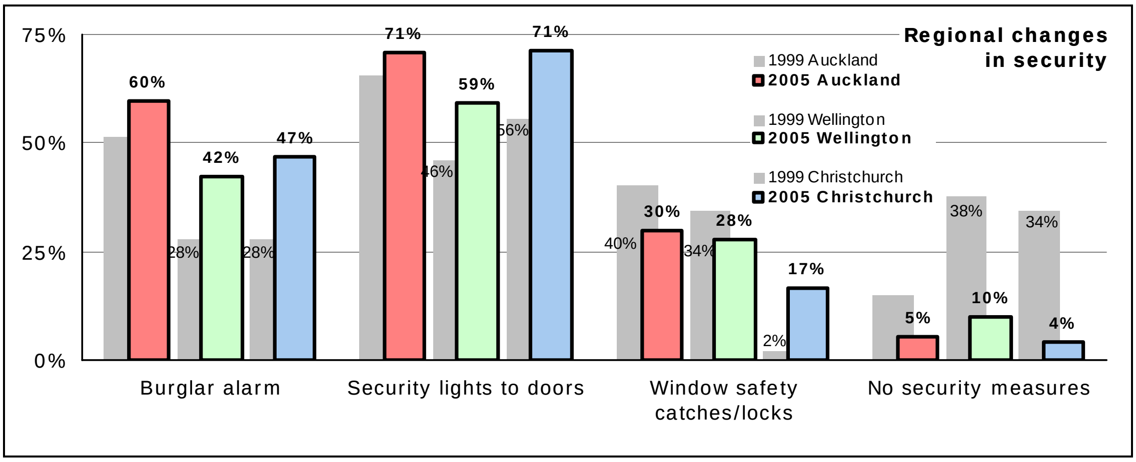


For all the security measures surveyed in 2005, Figure 95 provides the levels of use in each region.

It is interesting to note how the different regions use varying levels of different types of security measure, with Wellington having the lowest levels of burglar alarms, lights and grilles. Auckland has the highest level of alarms, but the lowest level of deadlocks.

Because of the difference in data collected, Figure 96 takes applicable totals to provide a comparison to the findings of the last survey – for the type and detail of measures noted in the 1999 survey.

Figure 96: Regional use of security measures

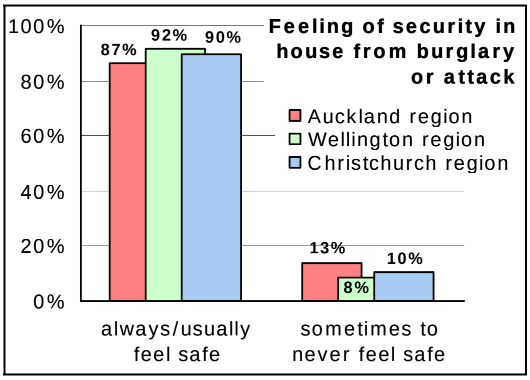


It is interesting to note the changes in the regions since the last survey. In the 1999 survey, Auckland had the highest level of security measures, particularly for burglar alarms. Since 1999, Auckland has had the least change, with security measures (as noted in 1999) increasing by about 10%.

Wellington and Christchurch regions show larger increases since 1999 and appear to be catching up with Auckland. In particular, Christchurch has had a very large increase in window security, rising from only 2% in 1999 to 17% in this survey while the other two regions have decreased. In these two regions, the number of houses with no security measures has decreased by about 30%. It appears that the regions are now much more similar in the use of security measures than they were in the 1999 survey.

12.1.3 Perceptions of security

Figure 97: Regional perceptions of security

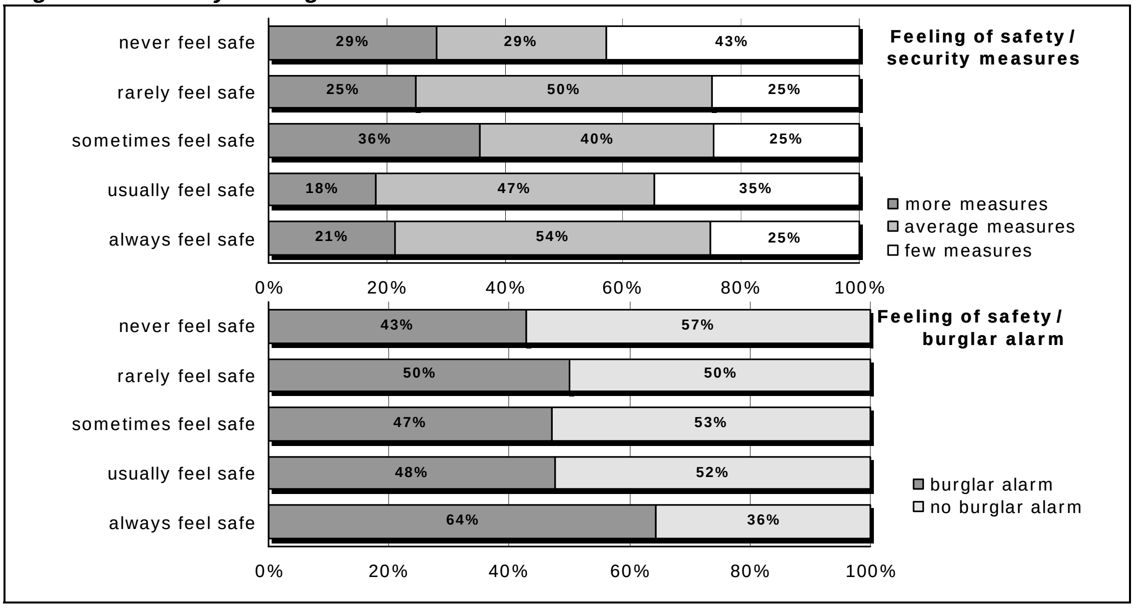


In the CRESA telephone survey, owners were asked to classify their feeling of security within their house from burglary or attack into always, usually, sometimes, rarely or never.

Figure 97 shows these responses, broken into the 3 regions. This indicates that regional responses are similar – with slightly fewer Auckland owners feeling safe, followed by Christchurch then Wellington owners.

The next analysis compares the owners' responses with the security measures provided in the house, and the results are shown in Figure 98.

Figure 98: Security: feeling and measures



As shown, there appears to be a correlation between security measures and the owners feeling of security only at the extremes. More than 40% of those who never feel safe from burglary or attack have very few security measures – in contrast to the 25% who always feel safe who have more security measures than average. The lower chart also shows this in regard to a house having a burglar alarm.

12.1.4 Conclusions

The main features on security are:

- *The proportion of houses without any security measures has fallen from more than 70% in 1999 to around 5% in the 2005 survey.*
- *However, the average extent of these security measures for houses is low.*
- *More than 50% of houses have burglar alarms, with Auckland at 60%, Christchurch at 47% and Wellington at 42%.*
- *In the 1999 survey, Auckland houses had substantially more security measures than the other two regions. This has changed markedly with the 2005 survey houses now having similar overall levels of security in all three regions.*
- *In the 1999 survey, almost twice as many Auckland houses had burglar alarms than the other two regions. This has changed markedly with burglar alarms in the other two regions rising more rapidly and closing the gap.*
- *In the 1999 survey, over a third of Auckland and Wellington houses had safety catches to vulnerable windows, while very few were noted in Christchurch houses. While the proportion of these has dropped in Auckland and Wellington, Christchurch has risen substantially – from only 2% to 17% of houses using window safety catches or locks.*
- *The homeowner's feeling of security from burglary or attack within their houses is similar for all regions.*
- *There appears to be little relationship between the level of security measures and the feeling of security except at the extremes - where more than 40% of those who never feel safe from burglary or attack have very few security measures – in contrast to the 25% who always feel safe who have more security measures than average.*

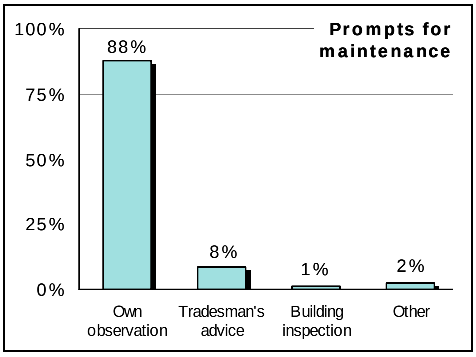
12.2 Maintenance information

In the last survey inspectors asked owners were asked questions about their sources of information on maintenance of their houses. Pursuing this was not always appropriate, so inspectors used their own judgement according to the circumstances. For the 2005 survey, questions on information were shifted to the telephone survey in order improve the response rate.

12.2.1 Prompts for maintenance

Figure 99 indicates how those homeowners who had carried out maintenance within the past 12 months knew whether their houses needed some maintenance.

Figure 99: Prompts for maintenance



The telephone survey restricted this question to those owners who had carried out maintenance within the past 12 months, so the results cannot be directly compared to those in 1999 (where this restriction did not apply).

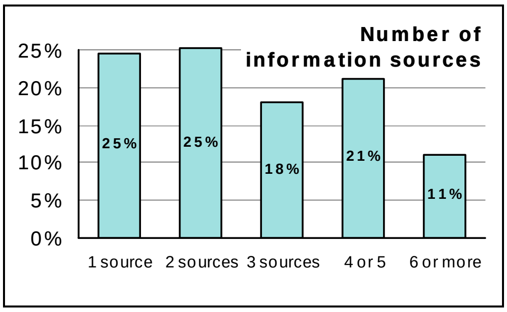
We can however still make some broad comparisons. As in 1999, most people are prompted by the surface appearance of the component such as peeling paint, which in the 2005 survey includes signs of failure such as leaking.

Less than 10% of owners sought professional advice (either from tradespeople or building inspectors).

As in 1999, it seems that a condition, or its effects must be visible before the condition is remedied.

12.2.2 Information on maintenance

Figure 100: Number of information sources



Homeowners were asked where they get their home maintenance information from.

As this question allowed for multiple sources the first analysis in Figure 100 considered the number of sources that owners used.

It is interesting to see that 50% of owners relied only on 1 or 2 sources of information on home maintenance.

Figure 101: Information sources

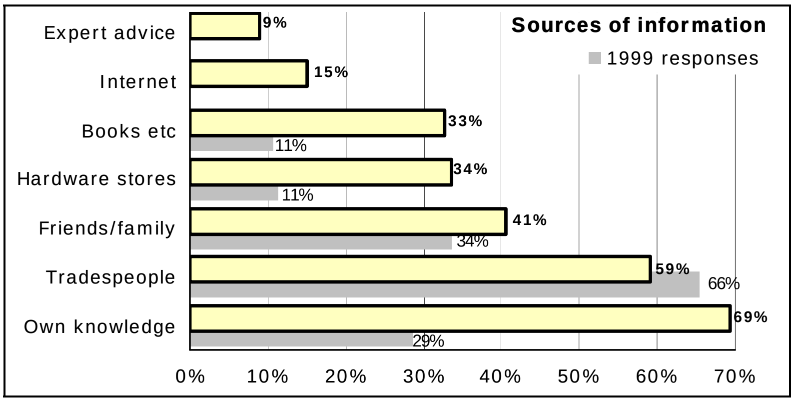


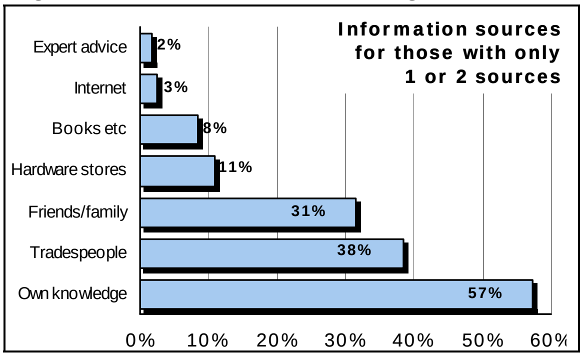
Figure 101 shows all information sources used by owners.

While it appears that an owner's own knowledge or expertise as a source has grown a great deal since 1999, it is worth pointing out that this was not listed as a separate source in the 1999 survey, but was instead included under "other sources".

This is likely to have decreased responses at that stage, as some owners may only have considered only those sources quoted by an inspector. In the 2005 survey, the owners own knowledge is the main source of information.

Tradespeople remain a major source of information, being the second most quoted source. More than a third of owners also use hardware stores as a source. This puts a great deal of responsibility onto the building trade to ensure that owners receive sound advice. The other two significant sources of information were friends or family and books or other publications. The Internet now appears as an information source.

Figure 102: Sources for those using limited numbers



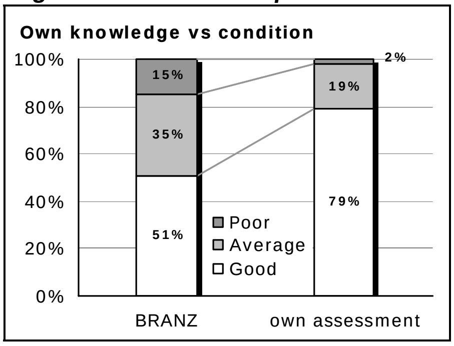
As half the owners used only 2 sources of information or less, we can expect these limited sources to exert a relatively greater influence on maintenance decisions made by those owners.

The analysis has therefore been repeated for these owners, and is shown in Figure 102.

This shows some change from Figure 101 as, although the order remains the same, the use of expert advice, the Internet and publication has decreased to less than 10%.

The owner's own expertise remains the main source, with tradespeople and friends or family being the other two most common sources. The houses of those who claimed their own expertise as a source of information were therefore compared to the condition as assessed by the inspectors, and also to the owner's assessment of condition, and the results are given in Figure 103.

Figure 103: Owner's expertise/condition



As shown, owner's confidence in their own expertise is not always backed up by experts' assessments of their houses. Almost 80% of owners who rely on their own expertise for information believe their house is in good condition, compared to just over 50% of inspectors.

Although just over half had houses assessed as *well maintained*, 15% were assessed by BRANZ as *poorly maintained* (compared to only 2% assessed by owners).

The same analysis undertaken in the 1999 study produced very similar results.

If owners' reliance on their own expertise were well founded, we might expect that assessments of house condition would align with BRANZ assessments more closely than assessments from those owners who do not rely on their own expertise. However, there is little difference between the two group – with the latter generally assessing their houses as in slightly worse condition than those owners covered in Figure 103.

12.2.3 Conclusions

Homeowners appear to approach the need for home maintenance in a fairly ad-hoc manner, and seek most of their information from a limited number of sources, mainly based on word of mouth.

The main features of the survey on maintenance information are:

- *Most owners rely on surface visual prompts that maintenance is required.*
- *The main source of information is the owners' own expertise, followed by tradespeople, friends and family, hardware stores and publications.*
- *Very few owners used expert advice for information.*
- *Almost 80% of owners rely on their own expertise for information but, of those who do, 15% live in houses that BRANZ assessed as being poorly maintained.*
- *Of those owners who rely on their own expertise, almost 80% believed their house to be in good condition, and only 2% believed it to be in poor condition.*

12.3 Dampness

The inspectors were asked to assess the dampness of the interior of the house on a subjective basis. Their assessment fell into one of the following categories:

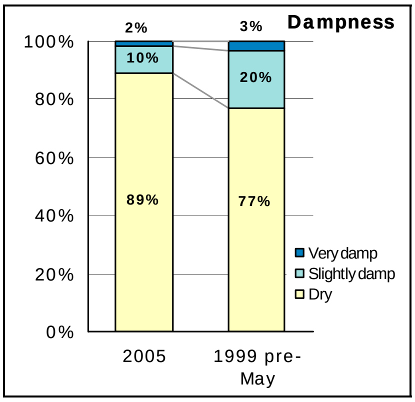
- ***Feels very damp, smells musty***
- ***Feels slightly damp***
- ***Feels dry***

The aim of this assessment is to gain some appreciation of the proportion of New Zealand houses that suffer from moisture problems. While it is known that many houses have conditions that can lead to problems of high moisture levels, we do not know whether those problems have necessarily developed to any notable degree.

12.3.1 Overall dampness levels

In 1999, inspectors assessed a high proportion (30%) of houses as having a damp "feel". However the 1999 inspections extended through the winter months, whereas all of the 2005 inspections were completed by the end of April.

Figure 104: Dampness levels



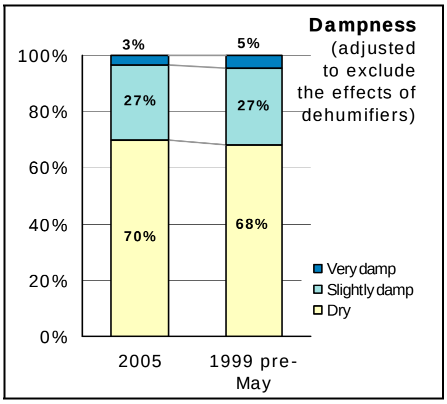
In the 1999 study, notable differences were apparent between the "summer" and "winter" houses, with 70% more houses assessed as damp in winter than in summer. The 2005 study cannot consider winter houses, so no comparison with 1999 findings is possible.

However, it is possible to compare "summer" houses, by excluding the 1999 houses that were inspected from May onwards – and the results are shown in Figure 104.

As shown, while the proportion of very damp houses is similar, those that are slightly damp appear to have decreased from 20% in 1999 to 10% in 2005. However as shown in Figure 91, the use of dehumidifiers has doubled since 1999 - to more than 20%.

12.3.2 Relationship to dehumidifiers

Figure 105: Dampness and dehumidifiers



Dehumidifiers obviously decrease the moisture problem significantly without altering the original causes. As the growth in their use has doubled since the last survey, it would seem reasonable to conclude that problems of dampness have not actually decreased as much as implied by Figure 104.

Using the same method as in the 1999 study, an adjusted sample was constructed to try to exclude the influence of dehumidifiers by increasing the dampness classification for those houses with dehumidifiers.

This adjusted sample has then been compared to the adjusted pre-May 1999 sample and the results are shown in Figure 105.

Figure 105 shows a different picture to Figure 104, with both 1999 and 2005 adjusted results indicating that around 30% of houses may have dampness problems when the effect of dehumidifiers are excluded.

The concern remains that as increasing numbers of dehumidifiers are purchased to cope with dampness causes may increasingly be ignored and possibly worsen. Such devices may well cure the symptoms, but they cannot cure the causes. Monitoring of this subject is needed in future surveys.

12.3.3 Conclusions

While initial survey results appeared to indicate a decrease in dampness problems, further analyses to adjust for the seasonal nature of the house inspection, and then for the effect of dehumidifiers, appear to indicate that there is little change since the 1999 survey.

The main features of the survey on dampness are:

- *12% of houses were initially assessed as damp or smelt musty.*
- *No conclusions can be drawn as to the number of houses that may experience dampness during winter months, as all inspections were completed before May.*
- *More than 20% of houses have at least one dehumidifier. Without these, it is estimated that 30% of houses would be damp.*
- *As concluded in the 1999 study, there are concerns that, as dehumidifier use increases, causes of moisture problems may be ignored.*

12.4 Fire safety

Inspectors were asked to count smoke alarms (and other equipment), check that alarms were operational, and give locations. In the 1999 survey, inspectors also inquired as to the owners' monitoring of equipment but for this survey, monitoring habits were covered as part of the telephone interview.

12.4.1 Use of smoke alarms

Figure 106: Use of smoke alarms

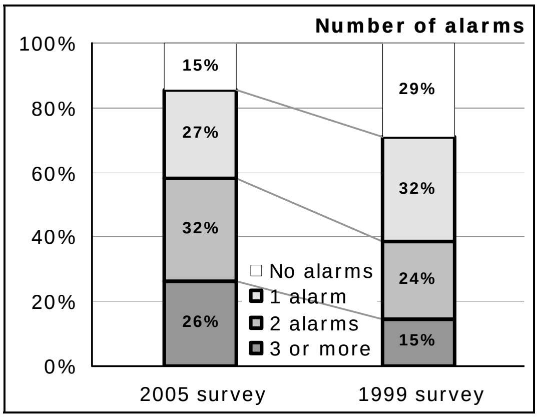


Figure 106 shows the results for smoke alarm numbers.

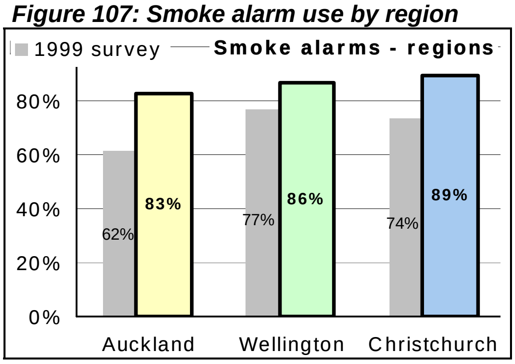
The number of houses with one or more smoke alarms continues to grow, with fewer than 15% (1999:30%) houses without any alarms.

As shown, the numbers of houses with more than one detector has also increased, with more than a quarter now having 3 or more alarms.

Almost 90% of alarms are stand-alone battery-operated, with less than 10% that are mains connected.

Very few houses have inter-connected alarms.

Figure 107: Smoke alarm use by region



12.4.2 Regional use of smoke alarms

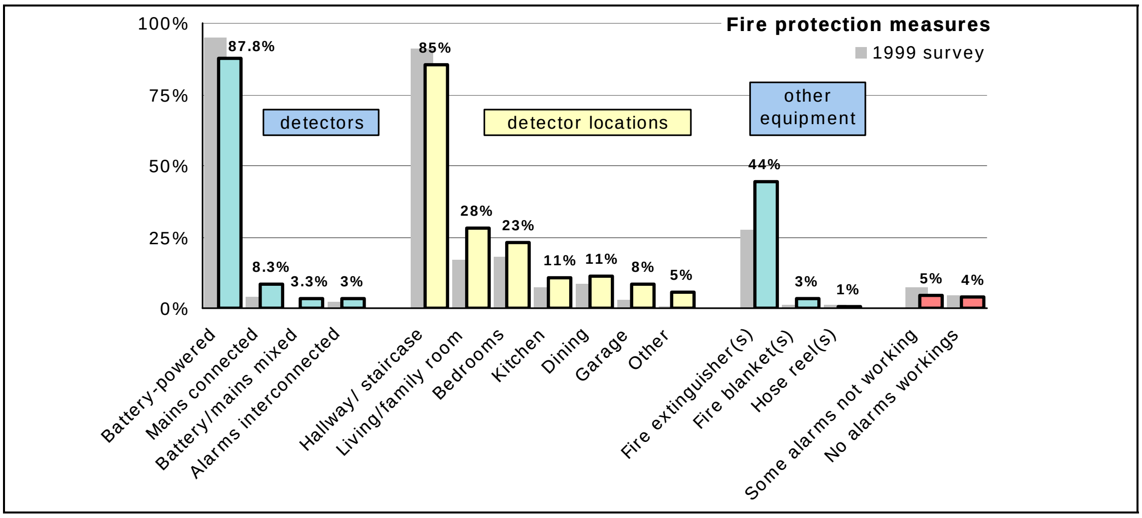
Figure 107 gives the use in the three regions, and shows increases since the 1999 survey.

In the 1999 survey, Wellington had the highest use of smoke alarms, followed closely by Christchurch, with Auckland well below the other two regions.

However, the 2005 results show that Auckland has had the greatest increase in the use of alarms, with all regions all now over 80%.

12.4.3 Locations of alarms

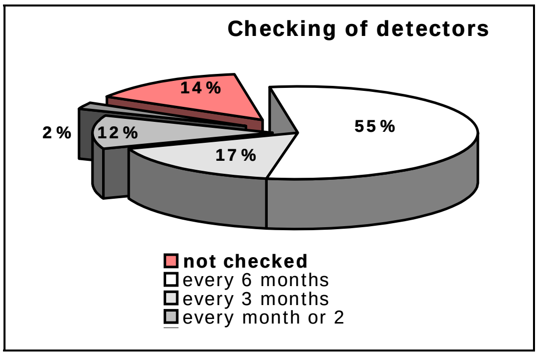
Figure 108: Fire protection details



Inspectors noted locations of the smoke alarms and the results are included in Figure 108. In common with the 1999 survey, the most popular position is the hallway or staircase. The next most frequent locations were the living room or a bedroom. Other locations of note were the kitchen, dining room and garage.

12.4.4 Operation and monitoring of alarms

Figure 109: Monitoring of alarms



As shown in Figure 108, 9% of houses with alarms had some or all alarms not working, and 4% of houses had no alarms working. These results are similar to those of the 1999 survey.

Owners were asked how often alarms were checked and responses are shown in Figure 109. This may explain the high incidence of malfunction, as 14% indicated that alarms were never checked, similar to 1999. The most common response was every 6 months (corresponding with public messages to check at daylight saving time changeovers).

12.4.5 Other equipment

Figure 108 also shows other fire protection equipment found in the survey. Other main devices noted in the survey are fire extinguishers, with 44 houses having at least one (usually small disposable domestic models). This is a marked increase from the 1999 survey results of 27%. In common with the 1999 findings, very few houses had fire blankets or hose reels.

12.4.6 Conclusions

It appears that messages on fire safety in the home continue to produce results, as around 85% of New Zealand houses now have some form of fire protection device.

The main features of the survey on fire safety are that:

- *Houses with one or more smoke alarms have increased from 70% in 1999 to more than 80%.*
- *More than 88% of these are stand-alone battery-operated units, with only 8% mains connected, and 3% inter-connected.*
- *Almost 10% of houses with alarms have at least one detector that is not working (more than half of these have no alarms working).*
- *14% of owners never check their alarms.*
- *The most popular position for alarms is the hallway, followed by living areas and bedrooms.*
- *About 45% of houses have fire extinguishers, an increase from 27% in 1999.*

13. DISCUSSION

13.1 Condition of houses

13.1.1 Average condition ratings

The average condition of houses in the survey when averaged over all components, and then over all houses in the 2005 survey shows improvement over the 1994 and 1999 surveys. Average condition ratings have moved from 3.5 (mid-way between *moderate* and *good*) in 1994, to 3.6 in 1999 to 4.0 (*good*) in the current survey.

13.1.1.1 Regional differences

Houses in the three regions had similar average conditions, with Wellington at 4.1, Auckland at 4.0 and Christchurch at 3.8. This is a changed order from both past surveys, when the order was Christchurch, Wellington then Auckland houses. In the 2005 survey, Christchurch houses had similar ratings to the 1999 survey, while Auckland and Wellington houses showed improvements.

13.1.1.2 Exterior and interior condition

The distinctions between the exterior and interior average conditions remain similar to those of the 1999 survey – with Christchurch houses having the least difference and Wellington houses having the most. Older houses built prior to 1940 have the largest differences between exterior and interior condition, although that difference is less than shown in the 1999 survey.

13.1.1.3 Condition over different age groups

The 1994 survey found that the average condition continued to deteriorate with age throughout all age groups, whereas the 1999 survey showed a stabilising of condition for the pre-1940s cohorts, with these older houses showing improvement in condition in comparison with those of the 1994 survey. That improvement was evident in the Auckland and Wellington regions but not in Canterbury, where condition continued to deteriorate with age in a similar manner to the 1994 survey.

The 2005 survey shows further improvement in the oldest houses, with the lowest rating of 3.7 now aligned to 1930s and 1950s houses. Houses built prior to 1920s now have similar condition ratings to houses built in the 1960s and 1970s. Older Christchurch houses are now more in line with those in the other two regions.

13.1.2 Defects in components

A more important aspect than overall average condition is the incidence of defect by component. Detailed tables of average component conditions are provided in Appendix 16.1.1, and include percentages of *serious* to *poor* condition for each component, with comparative results for the 1994 and 1999 surveys. Average condition ratings for individual components have improved from, or are similar to, past surveys – except for clearance of cladding above the ground (which has worsened) and sub-floor ventilation (which has improved).

13.1.2.1 Incidence of defects

Components with the lowest average condition ratings are similar to those of past surveys, and these include sub-floor ventilation, cladding clearances, sub-floor fasteners and lack of earthquake restraints for hot water cylinders and header-tanks. About 45% of houses have 1 of these, 25% have 2 of these, and 15% have 3 or 4 of these components in *poor* or *serious* condition.

13.1.2.2 Sub-floor ventilation

More than 40% (1999:75%, 1994:60%) of houses with timber-framed floors have poor or seriously deficient ventilation of sub-floor spaces. As reported in the 1994 and 1999 reports, it is surprising to find this level of serious inadequacy as the current Code requirement for ventilation has been in existence since the 1940s. It seems that few local authorities were using or enforcing these vent requirements. Figure 41 shows that this problem is not limited to older houses, as the inadequacy remains present right up until the 1980s cohort. In addition to the inadequacy of constructed vents, owners themselves have often contributed to the problem by blocking vents.

Despite Code non-compliance, houses will not necessarily have problems in other components as factors such as exposure, soil conditions, wind zone, ground clearance, and alternative air leakage paths will affect the impact. However, there is anecdotal evidence that damp sub-floor conditions can be related to poor health of the occupants of a house.

13.1.2.3 Ground clearance

The provision of adequate clearance from the bottom of the wall cladding to the adjacent ground or paving level is another sub-floor problem, with almost half of the surveyed houses having poor or seriously deficient clearance. The last survey identified a disturbing trend that this average rating was decreasing markedly in younger post-1960s houses due to changes in the way that New Zealanders use their houses, and the increasing attention given to achieving outdoor links where changes in levels are minimised at the expense of good building practice.

The trend appears to be growing – with poor to serious clearance deficiencies increasing from 30% in 1994 to 44% in 1999 to 49% in 2005. This continues to be an area that could do with some attention in terms of educating the building trades. However, it may well be more important to educate landscapers, gardeners, and the owners themselves. The problem may well be that later effects of inadequate clearance, while possibly severe, are too far in the future to engender immediate concern.

13.1.2.4 Header-tank and hot water cylinder restraints

Another area that is similar to the findings of the 1994 and 1999 surveys is the lack of earthquake restraints on header-tanks and hot water cylinders. While fewer houses now have header-tanks, (as older water heating systems are replaced) of the 20% still with these, 85% do not have earthquake restraints.

Almost 60% (1999:60%, *1994:50%*) of houses surveyed had inadequate restraints on cylinders. Restraints were not mandatory for new houses until the introduction of the Building Code in 1993, so it is unlikely that many pre-Code cylinders will have restraints. However, of those with inadequate restraints, about 40% of cylinders post-dated the Code requirements.

13.1.2.5 Ventilation

Most bathrooms rely on window ventilation only – with only one third having mechanical venting to the outside, and 15% venting into the roof space. Half of the kitchens vent cooking fumes to outside, but 20% either exhaust to the roof space, or simply recirculate the air. These defects in ventilation are concerning, as kitchens and bathrooms produce considerable water vapour that, if not adequately vented, can cause mould growth and may lead to subsequent damage to finishes, linings and other materials. Damp houses are also associated with ill-health of occupants.

13.1.2.6 Staircases

While interior stairs were generally found to be in good physical condition, design defects were apparent in many. As well as many non-complying barriers, 20% of staircases were found to be too steep when measured against the current requirements of the Building Code.

13.2 Costs of repair

Figure 55 shows the estimated costs of repairs of *poor* or *serious* defects at about $3,700 (1999:$4,900). This is the estimated cost needed to remedy those defects that need urgent repair for health and safety reasons or to prevent other consequential damage to the house[5]. This represents about 2% of the average valuation of houses (excluding land) in this survey.

However, data collected by CRESA in their telephone survey of owners indicates that an average of less than $1,300 (0.6%) per year is currently spent on house maintenance. This indicates that, although the estimated costs of repairs has decreased since the last survey, it is still three times the average annual maintenance – implying that many houses are not being adequately maintained and their physical condition is likely to be deteriorating.

13.2.1 Expensive components

As shown in Figure 58, the components which are the most expensive to repair or remedy are the foundations at $510, sub-floor vents at $690, wall cladding at $730, windows at $1,190 and roofing at $570. The necessity of remedying inadequate ventilation by retrofitting additional vents is debateable as the potential hazard depends on the specific circumstances of each house. Figure 46 indicates common defects that may be associated with high sub-floor moisture levels, and this shows that two of these (borer and corrosion of fasteners) have a high incidence in the surveyed houses.

It may be unreasonable to include the full costs of vent installation in the outstanding maintenance costs but poor ventilation remains a problem, as research indicates that an average 100 square metre house has an evaporation of 40 litres/day of water vapour. If sub-floor moisture is not extracted, it will be absorbed by the floor timbers and will increase the likelihood of fastener corrosion and timber decay.

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[5] *Results are considered to be statistically significant – refer Appendix 16.1.7 for analysis.*

Figure 42 also shows that 38% of sub-floor framing is over 18% moisture content and, if untreated, is in danger of borer infestation. Section 12.3.3 concluded that the interiors of about 30% of the surveyed houses are potentially damp.

13.2.2 Cost implications of delay

Section 8.5 sets out the likely extra costs involved in delaying maintenance. Delays in repairing defects lead to the condition of the particular component worsening, so costing more to remedy. A delay of 5 years is estimated to add an extra $2,000 per house on average to the eventual repair cost (and a delay of 10 years $5,600) in addition to the existing outstanding maintenance costs. This does not include consequential damage to other components from defects such as inadequate sub-floor ventilation, poor flashings, missing spouting etc. (as this is too complex to reliably estimate).

The most critical components for repair are windows, spouting, claddings, and interior bathroom, kitchen and laundry fittings (such as tubs, showers, bench tops and taps) as they can deteriorate quickly after reaching a *moderate* condition (rating of 3), causing damage to other components if not repaired quickly.

13.3 Other attributes

13.3.1 Sample characteristics

The telephone survey conducted by CRESA was able to provide data which can be compared to the total population, and which provides us with some key characteristics of the owners of houses in the survey sample. As shown in Table 2 and Figure 1, the sample is largely representative of the total population in terms of household size, and mortgage status. 63% of owners had owned their house for more than seven years. Almost 60% had a family income of more than $50,000, suggesting that the sample is likely to be biased towards those with higher incomes than the national average. This is reinforced by house size, with the average house area of the surveyed sample being about 5% above that derived from the total QV random sample.

This indicates that some self-selection bias had taken place between the original random sample and the surveyed sample. It is possible that owners with houses in poor condition were less likely to offer their houses for inspection, whereas those with better houses (and higher valuations and incomes) were more likely to allow inspection. A similar bias was shown in the 1999 survey, which suggests that these surveys may under-estimate the extent of deterioration. However the difference is not major, and the sample may be taken as broadly representative of the localities and regions from which the sample houses were taken.

13.3.2 Households related to conditions

In common with the 1999 survey, one of the aims of this study was to explore the probability that particular households will own the best or the worst houses. Figure 25 to Figure 28 show the household characteristics associated with the upper and lower decile of houses in the survey.

In common with the 1999 study, the conclusion is that there appears to be no one single group which is over-represented in the worst houses, with the strongest variances being: lower numbers of higher income households, higher numbers of mortgages and (the strongest variance) higher numbers of families in their house for more than 7 years.

In the group of best houses group we find higher numbers of high-income households and (the strongest variance) higher numbers of families in their house for less than 5 years.

13.3.3 Attached decks

Due to the increasing incidence of decks attached to houses, these were added as a new component in the 2005 survey. It was found that more than 60% of houses had decks, with Auckland houses having the most at more than 70% and Christchurch the fewest at just over 20%. Two-thirds of decks were at ground floor level, almost 75% were supported on post and beam timber construction, and 70% were free-draining spaced timber decking. About 15% were enclosed decks (either over open space or rooms below) and just over 5% were supported on cantilevered joists.

Most (almost 90%) of deck barriers were open timber (with balusters or rails), with just over 10% closed balustrades (framed and clad). Of the latter, nearly half were clad in timber weatherboards, a quarter in monolithic cladding, and the remainder in non-flush-finished fibre-cement or plywood sheet. Most decks were in good condition with the average rating at 3.9, although 7% were in serious or poor condition (from defects such as decay and loose or missing barriers).

13.3.4 Insulation

In common with the 1999 survey, details on coverage, material, thickness and defects of floor and ceiling insulation were gathered by the inspectors. The presence of wall insulation was also noted, although it was impossible to provide accurate details. Double-glazing was also noted (with relevant orientations).

For ceilings, only 6% of houses had no insulation and almost 70% have full cover. However, nearly 30% is only 50 mm or less in thickness. The most common materials are fibreglass (65%) and macerated paper (23%). 70% of macerated paper insulation suffered from settling problems or inadequate thickness, and almost all ceilings using this material had inadequate levels of insulation when measured against either the 1977 or 1996 standard. Houses built during the 1950s had the lowest effective levels of ceiling insulation.

About 55% of houses had no wall insulation and 70% of houses had no floor insulation. In the 1999 survey, very few houses had any double glazed windows. However, this has now increased in the Christchurch region – to about 13% of houses (although 40% of these houses had less than half their windows double glazed).

13.3.5 Hot water systems

In common with the 1999 survey, the 2005 survey collected information on the types, sizes, ages, and thermostat settings of hot water cylinders in the houses surveyed. In addition, the hot water temperature at the tap was measured, along with the shower flow rate. From this information, the energy efficiency, storage capacity and safety of hot water systems was assessed.

Electric storage water heating is the most common at about 80% (only 1% solar boosted and 2% with wetbacks), with gas storage and instantaneous being about 10% each. The number of houses with extra water heaters is growing – from about 6% in 1999 to more than 10% in this survey.

The age of electric cylinders is reducing as older systems are replaced (with a corresponding decrease in header-tanks). About 45% of cylinders are now 10 years old or less, and only about 10% of houses still have header-tanks). However, 35% of houses still have old inefficient ungraded or C grade cylinders. The sizes of cylinders are unchanged from the 1999 survey (at about 35% at 135 litres, and 55% at 180 litres), and only half are estimated to be adequately sized for the potential hot water demand in the house.

More than 20% of showers are energy wasteful with flow rates over 12 litres/minute (7% are over 18 litres/minute). However, 17% have inadequate flow rates of less than 6 litres/minute.

About a third of electric cylinder thermostats were set below the 60^0C required by the Building Code in order to avoid the risk of contamination, and more than half were set above the 60^0C needed to minimise the risk of scalding. Measured hot water temperatures at taps showed that nearly 40% of hot water systems delivered water at temperatures well above the 55^0C required by the Building Code. More than 30% of thermostats were unreliable, delivering hot water at temperatures outside of the expected range – with almost 20% delivering hot water at a higher temperature than the thermostat setting.

13.3.6 Heating

In common with the 1999 survey, the number and types of heaters and/or heating systems were identified, together with associated equipment such as dehumidifiers and ventilation systems.

The most common form of heating is by portable electric heaters, with only 5% of houses having a central heating system. Almost half the houses with portable electric heaters had electric “oil column” convection heaters, and half had fan or bar heaters (27% and 22%). “Flame effect” gas fires are appearing, with more than 5% of the houses having this type of heater. The most common fixed heaters were wood burners, with almost 40% of the houses having a wood burner. Almost 20% of houses still have open fires.

17% of houses have LPG heaters, and houses with dehumidifiers have doubled from 11% in 1999 to 22% in 2005. 34% of houses with LPG heaters have at least one dehumidifier, compared to 22% for houses without this form of heating. The use of ceiling ventilation systems has increased from about 2% in 1999 to 5% in 2005.

13.3.7 Security measures

Security was a new item covered by the 1999 survey and in the 2005 survey additional detailed information was gathered on the frequency and types of security measures in sample houses. Security measures are continuing to increase, with houses with no specific measures dropping from almost 30% in 1999 to just over 5% in 2005. However the extent or coverage of the measures is usually low (for instance, a secure deadlock may be on one door only).

The use of burglar alarms has risen from about 35% in 1999 to more than 50% in this survey (with Auckland at 60%, Christchurch at 47% and Wellington at 42%). In the 1999 survey, Auckland houses had substantially more security measures than the other two regions. This has changed markedly with the 2005 survey houses now having similar overall levels of security in all three regions. In the 1999 survey, almost twice as many Auckland houses had burglar alarms than the other two regions. This has changed markedly with burglar alarms in the other two regions rising more rapidly and closing the gap.

In the 1999 survey, over a third of Auckland and Wellington houses had safety catches to vulnerable windows, while very few were noted in Christchurch houses. While the proportion of these has dropped in Auckland and Wellington, Christchurch has risen substantially – from only 2% to 17% of houses using window safety catches or locks.

The telephone interview asked homeowners to characterise their feeling of security from burglary or attack within their houses – this feeling is similar for all regions. There appears to be little relationship between the level of security measures and the feeling of security except at the extremes - where more than 40% of those who never feel safe from burglary or attack have very few security measures – in contrast to the 25% who always feel safe who have more security measures than average.

13.3.8 Maintenance information

Information on maintenance information was gathered by the telephone interview. In common with the 1999 survey, the 2005 survey found that homeowners appear to approach the need for home maintenance in a fairly ad-hoc manner, and seek most of their information from a limited number of sources, mainly based on word of mouth.

Most owners rely on surface visual prompts that maintenance is required, with the main source of information being the owners' own expertise, followed by tradespeople, friends and family, hardware stores and publications (the result of this is to put a great deal of responsibility for ensuring that owners get sound information onto the building trade and trade outlets, as their influence on owners' decisions is obviously high). Very few owners used expert advice (such as building inspections) for information. The Internet is now used by about 15% of homeowners for maintenance information.

Almost 80% of owners rely on their own expertise for information but, of those who do, 15% live in houses that BRANZ assessed as being poorly maintained. At the same time, of those owners who rely on their own expertise, almost 80% believed their house to be in good condition, and only 2% believed it to be in poor condition.

13.3.9 Interior dampness

The aim of the assessment of the feeling of dampness was to gain some appreciation of the proportion of New Zealand houses that suffer from interior moisture problems. While it is known that many houses have conditions that can lead to high moisture levels, we do not know whether problems have necessarily resulted to any notable degree.

For the 2005 survey, 12% of houses were initially assessed as having a damp interior or smelt musty. However, no conclusions can be drawn as to the number of houses that may experience dampness during winter months, as all inspections in this survey were completed before May (the 1999 survey was able to consider houses surveyed during winter months, when 40% were assessed as damp).

More than 20% of houses have at least one dehumidifier. Without these, it is estimated that 30% of houses would be damp. As concluded in the 1999 study, there are concerns that, as dehumidifier use increases, causes of moisture problems may be ignored.

13.3.10 Fire safety

The inspectors were asked to count smoke alarms (and other equipment), give locations and to check that alarms were operational. Owners' monitoring habits were assessed as part of the telephone interview.

From this information, it appears that messages on fire safety in the home are continuing to bear results as most New Zealand houses now have some form of fire protection device. Houses with one or more smoke alarms have increased from 70% in 1999 to more than 80% (the most popular location being hallways). More than 88% of these are stand-alone battery-operated units, with only 8% mains connected, and 3% inter-connected. However, almost 10% of houses with alarms have at least one detector that is not working (more than half of these have no alarms working), and 14% of owners have never checked their alarms.

14. CONCLUSIONS

14.1 What is the average physical condition?

The average composite condition over the approximately 40 components inspected and rated for the survey was 4.0 on the condition scale, or *good*. The condition deteriorated with the age of the house from between *good* and *excellent* (4.5) for the newest age group to between *moderate* and *good* (3.7) for houses built in the 1930s to 1950s. Deterioration in average condition is fairly steady for about 50 years at which age the condition appears to level out, and then improve for the oldest age groups. (This is in contrast with the 1999 findings where deterioration tended to level out and remain constant for houses built prior to the 1940s.) The difference between exterior and interior average condition also changes with age; with increasing discrepancy for older houses between the better interior condition and the worse exterior condition.

In the 1999 survey, houses in Auckland were generally in the worst condition, followed by those in Wellington, with Canterbury houses on average in the best condition. This has changed for houses in the 2005 survey, with Wellington houses now showing the highest average condition and Christchurch houses the lowest. However the range is small – a difference of only 0.3 between the three regions.

In the 1999 survey, Christchurch houses did not follow the same pattern over age groups as the other two regions; instead condition continued to deteriorate with age to well under the moderate level for the oldest houses, whereas the oldest houses in Auckland and Wellington remained well above that level.

14.2 Has the condition changed since the last survey?

The average condition of houses in the survey, when taken over all age cohorts, shows an improvement over both past surveys. There was a slight improvement in the 1999 survey over the 1994 survey, but this was less than 3%, and could not be regarded as significant. However the change is more distinct this time – with an apparent improvement on the 1999 survey of about 10%.

This apparent improvement is partly due to the increased numbers of newer houses in the 2005 sample. The 1999 sample under-represented houses built from 1990 onwards, so regional sample sizes and chosen localities within regions were adjusted to better align with the underlying age distribution of houses. This has lead to a disproportionate increase in the newest age group of houses when compared with the 1999 sample – and a corresponding increase in the number of houses with high condition ratings.

The other reason for the improvement is more “real” – and appears to relate to the notable improvements in the condition of older houses – particularly those built before the 1950s. While the 1999 study indicated a stabilisation of condition, this survey shows a notable improvement as the consequence of renovation of the older housing stock. As older houses have become more popular over the past decades (as illustrated by the increase in building valuations of this group), many are being repaired, modernised, and upgraded to the extent that their condition becomes comparable to that of a much newer house (houses built before 1920 now have a similar condition to houses built in the 1960s). These houses now more than counteract the effect of those that continue to deteriorate, and the net result is that the average condition stabilises at about the 1930s to 1950s age groups and then improves.

In the 1999 survey, this effect was evident in older houses in Auckland and Wellington, but not in Christchurch – where the average condition continued to decrease with age in the same manner as observed in the 1994 survey. However, the 2005 Christchurch sample houses are now more in line with the other two regions – so reinforcing the overall pattern. In the 1999 survey, an increasing disparity between exterior and interior condition was observed for the older houses. This pattern remains in the 2005 survey, but appears to have decreased to about half of that shown by the 1999 study.

The 1999 study also indicated that the disparity between the best and worst houses increased with the age of the house. This “polarising” effect is a result of selective renovation, and the effect is also apparent for 2005 surveyed houses – with the difference in condition rating increasing from 1.6 for the houses built in the 1990s and 2000s to about 2 for the oldest houses. However, when this is compared with the disparities noted in the 1999 study, it is apparent that this “polarising” effect in 2005 is about half of the 1999 houses. This implies that, while the condition of the best old houses is improving, so is that of the worst old house. It will be interesting to see whether the effect continues to decrease in the future.

14.3 What are the common maintenance problems?

The 2005 survey showed similar common problems to those observed in 1999. The exterior or envelope components with the main problems in order of defect severity were: inadequate sub-floor ventilation (or blocked existing vents), inadequate clearance from the ground level to wall cladding, inadequate ceiling insulation, missing or corroding sub-floor fasteners, and poor maintenance and deterioration of timber windows, header-tanks venting from bathrooms and kitchens into roof spaces. Other defects included deterioration of wall and roof claddings, and inadequate bracing, high moisture levels, borer and decay in sub-floor timbers. In the interior, the main problems were unrestrained hot water cylinders and header-tanks and defects in the ventilation of kitchen and bathrooms - with most other components in good condition.

14.4 Have these changed since the last survey?

The problems highlighted in this survey remain much the same as those shown up in the last survey. Sub-floor ventilation, ground clearance, and lack of earthquake restraints remain the major areas of concern with very high percentages of houses being rated as *poor* or serious for these components.

The incidence of inadequate clearance from ground to wall cladding continues to increase, with the average condition decreasing markedly in houses built from the 1980s onwards. The 2005 results show that the newest houses have the greatest inadequacy of all age groups. However, the observed incidence of serious defects in claddings, windows and doors, and roof framing continues to decrease.

Internally, there are also notable decreases in the incidence of serious defects over most components. Hot water cylinders continue to lack of earthquake restraints, even for relatively new cylinders. This survey has also shown that many cylinders lack reliable thermostats. The problem of venting bathrooms continues to be a problem– with only a third venting to the outside, and many venting into the roof space. Half the kitchens vent cooking fumes to outside, but many either exhaust to the roof space, or simply recirculate the air. These defects in ventilation remain similar to those found in past surveys.

14.5 Is the housing stock being adequately maintained?

Responses given by owners in the telephone interviews indicate that current expenditure on maintenance for the houses in the survey is less than $1,300 per house per year. The estimated cost required now for repairing serious or poor conditions is around $3,700. At current rates of expenditure, this will take almost three years to repair; and in the meantime damage will be accumulating, amounting to an extra $1,200. Based on these estimates, while conditions are improving, houses are still not adequately maintained.

14.6 What is the effect of deferred maintenance?

As discussed previously, this report gives a general overview of the condition of houses in the survey. It does not investigate the issue of an appropriate backlog of maintenance work, which may reflect the owner's view on maintenance priorities. This report treats all maintenance items as equal in importance, and further work in this area to recognise and understand the variable nature of components would be worthwhile.

For example, a delay in upgrading a kitchen may well cause no added later cost, whereas the same delay in upgrading roofing, windows or cladding could cause substantial additional costs due to consequential water damage to other components. However, an owner may place the kitchen upgrade higher in priority order either due to ignorance or to the immediate effect on day-to-day living. On the other hand, an owner may be fully aware of potential repercussions of delaying maintenance and still judge that the risk is worth incurring.

In reality, all maintenance work **need** not be done all of the time – as some items may be appropriately deferred with little risk of incurring increased future costs due to consequential damage from the delay. This could be useful in targeting non-technical perceptions that may need correction, which in itself could lead to changes in approach from owners. It is important to have sufficient knowledge of the risks that may be involved in deferring maintenance work.

14.7 Is BRANZ research in the right areas?

For the same components and features as were covered in the 1999 survey, no new unidentified problems in component deterioration or building performance were uncovered in this survey. However, there were three features that were measured in this survey that were not covered in the 1999 survey and these showed formerly unidentified problems. These were associated with attached decks, shower flow rates and the measured temperature of hot water – supporting the Household Energy End-use Project findings[9].

While decks showed up expected defects of slippery surfaces, decay and corroding fasteners, inspections also highlighted a number of safety defects in regard to deck barriers. It was found that almost 80% of barriers do not comply with the current Building Code requirements – due to missing barriers, barriers that were too low, or barriers that included openings that were too large.

Measurement of shower flow rates showed that more than 20% of showers in the survey were energy-wasteful, with 7% measured at a particularly wasteful flow rate of over 18 litres per minute. While this result is not unexpected, many showers had flow rates below the 6 litres per minute level needed to deliver an adequate shower, with some of these below 3 litres/minute.

The temperature of hot water was measured – and the results showed a high level of thermostat problems. When the temperature of delivered hot water was compared with the corresponding thermostat setting, it revealed that less than half the thermostats reasonably reflected the actual water temperature. In almost 20% of cases, the water temperature was above the thermostat setting – sometimes as much as 20^{o}C. While it was generally known that older thermostats can be unreliable, the survey shows that the problem is much more common than thought, and also occurs in newer cylinders.

All problems can be resolved using existing building techniques. Similar problems to those in 1994 and 1999 of owner use were highlighted, including the blocking of vents by plants, gardens and paths, ventilation of kitchen and bathroom moisture into roof spaces, storage of waste materials in sub-floor areas, and ignorance of the importance of restraints to water tanks, and of the benefits of hot water cylinder energy-saving wraps.

14.8 What else can be learned from the database?

The survey information is maintained in a computer database that will continue to provide a valuable resource for analysing component performance, and as a yardstick against which to measure future developments. This report covers only the general aspects that may be learned from the analysis of information in the database - much more detail is available than has been used by this overview, and that detail is stored on the database.

14.9 How does homeowner data relate to physical data?

The data on homeowners allows us to attempt to relate the characteristics of the houses in the survey with the characteristics of their owners, and to therefore to find some of the reasons behind the results of the physical inspections. That data is also maintained in a computer database, and includes information on all of the questions asked of the homeowners. Again, more detail is available than it has been possible to use in this overview, which has attempted only to consider some of the broad general issues regarding owner characteristics and behaviour. The information on both the physical data and the sociological data remains as a library resource available for further analysis – for this survey and for the 1999 survey.

14.10 Are the surveys worth continuing in the future?

The surveys are well worth carrying out, in order to maintain and improve the availability of reliable information on current typical conditions of New Zealand housing. As in 1994 and 1999 surveys, vital data has been obtained on the incidence of defects by component and material, other important characteristics and features, and on the amount of outstanding maintenance. This data expands and adds to the findings of the first two surveys, and future surveys can be expected to do the same.

Over time, an increasing base of information on this critical national asset should be maintained and built on, with each survey highlighting areas of concern for future surveys. It is believed that this survey is generally representative of the average New Zealand house, although it does not include the reputed worst regions for housing conditions. As a reflection of the average house, it provides a base against which issues of concern may be measured.

14.11 Are there extra issues for future surveys?

14.11.1 Increased objectivity

Although the survey forms were very detailed and provide valuable detailed data, future surveys should investigate the establishment of a benchmark standard. The maintenance condition could then be measured on a more objective basis in order to minimise variability between inspectors conducting the surveys, and to allow more reliable quantification of maintenance exposure.

Further methods of reducing the inherently subjective nature of parts of the inspection process should be considered. With the increasing use of monolithic claddings, non-destructive methods of fault detection also need to be investigated in order to pick up problems that cannot be seen from surface inspection.

14.11.2 Life-cycle issues

This survey did not consider life-cycle issues. Some faults identified may be considered capital works rather than maintenance issues, as current building standards tend to be used as the measure of compliance when these did not apply when the house was built. It could be argued that such compliance should only be considered when costing the life-cycle replacement of a particular component. Renovation of a property is a mix of capital upgrade and life-cycle maintenance – particularly in cases where the owner considers that upgrading adds value. Such issues should be considered in more detail in future surveys.

14.11.3 Benefits of deferred maintenance

The benefits as well as the costs of deferred maintenance can be explored further. Money not spent on maintenance can be used to reduce a mortgage thus reducing interest payments, a tangible benefit. Deferred maintenance may incur an additional cost in the future, but this additional future cost should be discounted against the present value of reductions in interest payments. The value of forgoing utility by deferring maintenance can also be addressed. An owner may place low value on repainting a house if it means that the mortgage can be reduced more quickly, even if it means a higher painting cost in the future due to additional preparation and perhaps even replacement of weatherboards.

14.11.4 New survey components

There are several areas in this survey that are new. As was done for new components in the 1999 survey, these should be re-examined in the light of the 2005 findings and further details added as necessary. There will also be areas that may warrant reduced attention in the light of the lack of problems revealed over past surveys. Five years is a long time in terms of new products and trends, and there will be other components around in 2010 which are not anticipated now, and which may need to be added to the list of items to be considered. At the same time, older components will be showing effects of further ageing, and will need to be monitored for performance over time.

There are specific items or areas highlighted in this report for further investigation or monitoring, such as:

a) Owner perception of condition in relation to:
- *i) valuations*
- *ii) regional differences*
- *iii) ages of houses*

b) Changes of condition with age in relation to:
- *i) improvements in older housing stock*
- *ii) regional differences*
- *iii) interior versus exterior (decreasing discrepancy)*
- *iv) decreasing polarisation between best and worst houses (selective renovation)*

c) Monitoring of newer products (now covered in the 2005 survey)
- *i) paint finishes to old concrete tiles*
- *ii) equipment use e.g. dehumidifiers, LPG heaters, Domestic Ventilation Systems (DVS's)*
- *iii) increasing use of security devices*
- *iv) increasing use of fire protection devices*
- *v) increasing use of double glazed windows*

d) Monitoring of newly added components
- *i) changes in condition of attached decks*
- *ii) changes in condition of internal staircases*
- *iii) changes in shower flow rates*
- *iv) changes in disparity between thermostat settings and measured hot water temperatures*

e) Monitoring of older components
- *i) adequacy of sub-floor fasteners (in Auckland houses particularly)*
- *ii) rating of condition of plumbing wastes*
- *iii) earthquake restraints to water tanks*
- *iv) deterioration of older products e.g. loss of chip coating to metal tiles*
- *v) ages, storage capacities, energy efficiency and safety of hot water cylinders*

f) Monitoring of moisture-related conditions
- *i) sub-floor ventilation*
- *ii) moisture-related defects*
- *iii) interior dampness*

15. REFERENCES

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B1 Structure

B2 Durability

C3 Spread of Fire

E2 External Moisture

E3 Internal Moisture

F4 Safety from Falling

H1 Energy Efficiency.

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16. APPENDIX INFORMATION

16.1 Component and cost tables

The following gives some of the detailed tables on which charts on component conditions, defects, and maintenance costs are based. These show equivalent 1994 and 1999 figures where applicable.

16.1.1 Average component conditions

Table 8: Average component conditions – surveys to date

	1994 survey					1999 survey					2005 survey				
	Regions				%	Regions				%	Regions				%
component	Akld	Wgtn	Chch	Total	S/Poor	S/Pr	Wgtn	Chch	Total	S/Poor	Akld	Wgtn	Chch	Total	S/Poor
Foundations	2.0	3.4	3.9	**3.2**	*40%*	3.4	4.0	4.3	**3.9**	*11%*	3.5	4.0	3.7	**3.7**	*16%*
Cladding clearance	3.7	3.6	4.1	**3.8**	*30%*	3.5	3.0	3.8	**3.4**	*44%*	3.5	2.8	3.0	**3.2**	*49%*
Fasteners	3.2	3.7	3.2	**3.5**	*23%*	3.1	3.7	4.0	**3.6**	*21%*	3.5	3.5	3.5	**3.5**	*22%*
Steps/ramp									**3.7**	*9%*	3.8	4.0	3.9	**3.9**	*7%*
Pipework											3.9	4.0	4.0	**4.0**	*4%*
Joists/bearers	3.8	3.7	3.7	**3.7**	*13%*	3.9	3.9	4.1	**3.9**	*7%*	4.1	4.2	3.9	**4.1**	*3%*
Floor	3.8	3.9	3.7	**3.8**	*9%*	3.8	4.0	4.0	**4.0**	*4%*	4.1	4.2	3.9	**4.1**	*2%*
Vents	2.2	2.5	2.8	**2.5**	*60%*	2.3	2.5	2.0	**2.3**	*75%*	3.3	3.2	2.9	**3.2**	*43%*
Decks											3.9	4.1	4.1	**3.9**	*7%*
Wall cladding	3.0	3.0	3.8	**3.2**	*28%*	3.6	3.6	3.9	**3.7**	*13%*	3.9	3.8	3.9	**3.9**	*7%*
Doors	3.1	3.6	3.4	**3.4**	*22%*	3.6	3.5	3.9	**3.7**	*8%*	3.9	3.6	3.9	**3.9**	*6%*
Windows	2.9	3.1	3.8	**3.3**	*27%*	3.5	3.5	3.6	**3.5**	*14%*	3.8	3.6	3.8	**3.8**	*11%*
Carport									**3.7**		4.0	3.7	3.2	**3.9**	*5%*
Roof cladding	2.9	2.9	3.6	**3.1**	*28%*	3.5	3.6	3.9	**3.7**	*11%*	4.0	3.7	3.9	**3.9**	*9%*
Gutters/dp's	3.2	3.3	3.2	**3.2**	*14%*	3.5	3.8	3.7	**3.6**	*14%*	4.1	4.1	3.8	**4.1**	*7%*
Chimney	3.6	3.4	3.3	**3.4**	*11%*	3.7	3.7	3.9	**3.8**	*9%*	4.0	4.3	3.8	**4.0**	*5%*
Basement											3.7	3.2	3.0	**3.6**	*14%*
Insulation	3.1	3.2	4.2	**3.5**	*30%*	3.3	3.4	4.2	**3.6**	*26%*	3.4	3.4	3.8	**3.5**	*12%*
Roof space	3.0	2.7	3.1	**2.9**	*56%*	3.1	2.8	2.4	**2.8**	*5%*	3.5	3.8	3.9	**3.7**	*7%*
Roof framing	3.4	3.7	3.9	**3.7**	*17%*	3.8	3.8	4.1	**3.9**	*5%*	4.1	4.2	4.2	**4.1**	*2%*
EXTERIOR	**3.3**	**3.4**	**3.6**	**3.4**		**3.4**	**3.5**	**3.7**	**3.6**		**3.8**	**3.8**	**3.8**	**3.8**	
Kitchen linings	3.4	3.5	4.2	**3.7**	*24%*	3.7	4.0	4.2	**3.9**	*7%*	4.2	4.5	3.9	**4.2**	*3%*
Kitchen fittings	3.5	3.5	4.1	**3.7**	*22%*	3.9	3.9	4.1	**3.9**	*9%*	4.1	4.4	3.9	**4.1**	*4%*
Kitchen cooker	3.7	4.2	4.4	**4.1**	*8%*	3.9	4.3	4.3	**4.2**	*4%*	4.3	4.7	3.9	**4.3**	*3%*
Waterheating											4.0	4.1	4.0	**4.0**	*5%*
HWC only	2.4	3.2	4.3	**3.2**	*50%*	2.4	3.3	2.9	**2.9**	*64%*	2.8	3.0	3.3	**3.0**	*58%*
Staircase											3.9	4.3	4.0	**4.0**	*4%*
Laundry linings	3.3	3.4	3.9	**3.5**	*22%*	3.5	3.8	3.8	**3.7**	*15%*	3.9	4.0	3.8	**3.9**	*10%*
Ldry fittings	3.3	3.4	4.0	**3.6**	*24%*	3.7	4.0	3.9	**3.9**	*8%*	4.2	4.4	3.9	**4.1**	*4%*
Bath 1 linings											4.1	4.5	3.9	**4.1**	*6%*
Bath 1 fittings											4.1	4.5	3.9	**4.1**	*5%*
Bath 2 linings											4.3	4.2	4.3	**4.3**	*6%*
Bath 2 fittings											4.3	4.6	4.3	**4.3**	*3%*
Bath 3 linings											4.6	3.5	4.2	**4.4**	*0%*
Bath 3 fittings											4.5	5.0	4.2	**4.5**	*0%*
Bathrm linings	3.1	3.4	3.9	**3.5**	*28%*	3.7	3.8	4.0	**3.8**	*11%*	4.0	4.4	3.9	**4.1**	*6%*
Bathrm fittings	3.3	3.3	3.9	**3.5**	*28%*	3.9	3.9	4.1	**4.0**	*9%*	4.1	4.4	3.9	**4.1**	*4%*
Other linings	3.3	3.5	4.0	**3.6**	*17%*	3.6	3.8	3.8	**3.7**	*9%*	4.0	4.3	3.8	**4.0**	*4%*
Trim											4.2	4.5	3.8	**4.1**	*1%*
Doors	3.7	3.7	4.0	**3.8**	*7%*	3.8	3.9	4.1	**3.9**	*5%*	4.2	4.5	3.9	**4.2**	*1%*
INTERIOR	**3.5**	**3.7**	**4.0**	**3.7**		**3.6**	**3.9**	**3.9**	**3.8**		**4.1**	**4.4**	**3.9**	**4.1**	
ALL	**3.3**	**3.5**	**3.8**	**3.5**		**3.5**	**3.7**	**3.8**	**3.6**		**4.0**	**4.1**	**3.9**	**4.0**	

16.1.2 Defects with most serious or poor condition ratings

Table 9: Components with 5% or more poor to serious ratings

2005 Survey (Descending order of severity)	***Cond. 2005***	***poor / serious >=5%***	***Class***	***1999 Survey (Descending order of severity)***	***Cond. 1999***
Ground Clearance Inadequate clearance to cladding	**3.2**	**49%**	*C P M*	**Inadequate sub-floor ventilation** Insufficient and/or blocked vents	2.3
Inadequate sub-floor ventilation Insufficient and/or blocked vents	**3.2**	**43%**	*C P M*	**Roof Space** Header-tanks, roof underlay, venting from bathrooms & kitchens	2.8
Sub-floor fasteners Corrosion, no or inadequate fixing	**3.5**	**22%**	*C P M*	**Ground Clearance** Inadequate clearance to cladding	3.4
Foundations Unsafe excavations, ground subsidence, poor bracing, missing/ poor piles, decay, damp ground	**3.7**	**16%**	*C P M*	**Windows** Decay, paint deterioration, poor or missing flashings, broken glass	3.5
Ceiling insulation None or gaps, settling, damage	**3.6**	**14%**	*C P M*	**Ceiling insulation** Inadequate ceiling insulation	3.6
Windows Decay, paint deterioration, poor or missing flashings, broken glass	**3.5**	**12%**	*C P M*	**Sub-floor fasteners** Corrosion, no or inadequate fixing	3.6
Roof Cladding Rust, loss of chip coating, cracked tiles, missing mortar, poor fixing, paint deterioration.	**3.8**	**11%**	*C M*	**Gutters & downpipes** Rust, holes, inadequate falls, damage	3.6
Roof Space Header-tanks, roof underlay, venting from bathrooms & kitchens	**3.9**	**9%**	*C P M*	**Wall Cladding** Decay, holes, checking, poor fixing, cracks, paint deterioration	3.7
Decks Unsafe barriers, slippery surfaces, decay, fasteners corroding,	**3.7**	**7%**	*C P M*	**Roof Cladding** Rust, loss of chip coating, cracked tiles, poor fixing, paint deterioration.	3.7
Gutters & downpipes Rust, holes, inadequate falls, dents, misaligned downpipes	**3.9**	**7%**	*M*	**Exterior Doors** Paint deterioration, cracks, poor hardware	3.7
Steps/ramps Uneven risers, unsafe or missing barriers, unsafe/slippery surface	**4.1**	**7%**	*C P M*	**Chimneys** Cracks, fire risk, earthquake hazard	3.8
Wall Cladding Decay, holes, checking, poor fixing, cracks, paint deterioration	**3.9**	**7%**	*P M*	**Foundations** Unsafe excavations, ground subsidence, poor bracing, missing/ poor piles, decay, damp ground	3.9
Exterior Doors Paint deterioration, cracks, poor hardware	**3.9**	**7%**	*M*	**Roof Framing** Borer, inadequate framing	3.9
Chimneys Cracks, fire risk, earthquake hazard	**3.9**	**6%**	*C P M*	**Floor Framing** Inadequate bracing, borer, decay	4.0
Hot Water Cylinder Unrestrained, corrosion, leaks	**2.8**	**58%**	*M*	**Hot Water Cylinder** Unrestrained, corrosion, leaks	2.9
Laundry Linings Decay, mould, wear	**3.9**	**10%**	*M*	**Laundry Linings** Decay, mould, wear	3.7
Bathroom Linings Decay, mould, paint peeling	**4.0**	**6%**	*M*	**Other Linings** Wear, damage, peeling paper	3.7
Waterheating Thermostat unreliable, inaccessible	**4.0**	**5%**	*C M*	**Bathroom Linings** Decay, mould, paint peeling	3.8
(no further serious or poor conditions 5% or over)				**Kitchen Fittings** Wear, paint, seals, tap ware	3.9
				Laundry Fittings Wear, paint, seals, tap ware	3.9
				Kitchen Linings Decay, mould, staining	3.9
				Interior Doors Holes, dents, poor hardware	3.9
				Bathroom Fittings Wear, seals, decay, staining, tapware	4.0

NOTE:
%'s of *serious* or *poor* condition ranking does not line up with average condition ranking (which takes into account all ratings on each component for each house, including *average* to *excellent* conditions).

C = Building Code requirement
M = poor maintenance
P = poor building practice

16.1.3 Sub-floor defects

Table 10: Sub-floor defect frequencies

Defect	Frequency of defects				Totals	% of cases
	low (to 10%)	moderate (to 25%)	high (to 50%)	very high (over 50%)		
FOUNDATIONS						
Inadequate bracing	8	125	4	3	**140**	36%
Poor fixing	8	16	10	48	**82**	21%
Missing/insecure ties to bearers	7	14	10	46	**77**	20%
Common borer	60	4	1	1	**66**	17%
rising damp	29	15	5	14	**63**	16%
Non vertical piles	43	5	1	0	**49**	13%
Insufficient footing depth	8	6	4	19	**37**	9%
DPM missing	11	3	5	10	**29**	7%
Water ponding under house	12	6	0	0	**18**	5%
Unsafe excavation	9	9	0	0	**18**	5%
Structural cracks in concrete	16	2	0	0	**18**	5%
Missing/damaged/rotten baseboards	9	3	0	0	**12**	3%
Timber decay	7	1	0	0	**8**	2%
Non structural cracks	5	3	0	0	**8**	2%
Subsidence	6	0	0	0	**6**	2%
FASTENERS						
Incorrect fixing of fasteners	67	35	10	48	**160**	41%
Missing fixings	15	14	9	44	**82**	21%
Some corrosion	39	15	5	8	**67**	17%
White rust	35	12	9	6	**62**	16%
Missing/too small washers	7	1	0	4	**12**	3%
Base material corroded	1	1	2	6	**10**	3%
Failure of coating	1	1	3	1	**6**	2%
JOISTS/BEARERS						
Common borer	76	14	5	2	**97**	25%
Insufficient joists/bearers	5	7	2	4	**18**	5%
Timber decay	14	0	0	0	**14**	4%
Two toothed borer	9	3	0	1	**13**	3%
Minor cracks/checking	9	4	0	0	**13**	3%
FLOOR						
Common borer	73	8	4	4	**89**	23%
Floor squeaks	65	6	0	0	**71**	18%
Water stains (from above)	25	2	0	0	**27**	7%
Holes or gaps	9	1	1	0	**11**	3%
NOTE: only defects occurring in more than 1% of applicable situations are included in table						

16.1.4 Cladding and window defects

16.1.4.1 Wall cladding materials

Table 11: Wall cladding defect frequencies

Defect	Frequency of defects: low (to 10%)	moderate (to 25%)	high (to 50%)	very high (over 50%)	Totals	% of material
TIMBER WEATHERBOARDS (51% of sample)						
Paint deterioration	30	17	24	28	**99**	34%
Minor cracks	56	12	6	1	**75**	26%
Top coat deterioration	16	1	7	24	**48**	17%
Corrosion of metal components	32	5	4	2	**43**	15%
Decay/rot	32	5	0	0	**37**	13%
Checking	28	3	3	1	**35**	12%
Common borer	25	4	1	0	**30**	10%
Fungi growth	19	5	4	0	**28**	10%
Full depth holes/cracks	23	1	0	1	**25**	9%
Cracking at cladding joints	10	6	0	1	**17**	6%
Insecure cladding	6	2	0	0	**8**	3%
Missing/faulty flashings	3	2	1	0	**6**	2%
Cladding bottom buried	4	0	2	0	**6**	2%
Dislodged boards	5	0	0	0	**5**	2%
Cupping/distorted boards	2	2	1	0	**5**	2%
MASONRY VENEER (34% of sample)						
Minor cracks	21	1	3	0	**25**	13%
Full depth holes/cracks	11	3	0	0	**14**	7%
Loose/ missing mortar	10	2	0	0	**12**	6%
Efflorescence	10	1	0	0	**11**	6%
Fungi growth	6	1	1	0	**8**	4%
Cladding bottom buried	1	1	1	0	**3**	2%
FIBRE CEMENT SHEET - non-monolithic (15% of sample)						
Paint deterioration	5	7	2	13	**27**	33%
Minor cracks	12	4	2	0	**18**	22%
Top coat deterioration	2	0	1	13	**16**	19%
Full depth holes/cracks	13	1	0	0	**14**	17%
Corrosion of metal components	7	4	0	2	**13**	16%
Fungi growth	8	1	2	0	**11**	13%
Cracking at cladding joints	5	2	0	1	**8**	10%
Insecure cladding	3	2	0	0	**5**	6%
Faulty/faulty flashings	3	1	1	0	**5**	6%
Broken sheets	3	0	0	0	**3**	4%
Leaking at cladding joints	1	1	1	0	**3**	4%
Cladding bottom buried	2	0	0	0	**2**	2%
NOTE: only defects occurring in more than 1% of applicable situations are included in table						

Defect	Frequency of defects				Totals	% of sample
	low (to 10%)	moderate (to 25%)	high (to 50%)	very high (over 50%)		
FIBRE CEMENT WEATHERBOARDS (10% of sample)						
Fungi growth	7	5	3	0	**15**	27%
Paint deterioration	6	6	0	3	**15**	27%
Top coat deterioration	2	2	2	5	**11**	20%
Minor cracks	8	1	0	0	**9**	16%
Full depth holes/cracks	8	1	0	0	**9**	16%
Corrosion of metal	2	4	0	1	**7**	13%
Insecure cladding	3	0	0	0	**3**	5%
Cracking at cladding joints	1	2	0	0	**3**	5%
Missing/faulty flashings	2	1	0	0	**3**	5%
Cladding bottom buried	2	1	0	0	**3**	5%
CONCRETE BLOCKS (9% of sample)						
Paint deterioration	2	3	3	2	**10**	20%
Top coat deterioration	3	2	1	2	**8**	16%
Fungi growth	5	1	1	0	**7**	14%
Minor cracks	5	1	0	0	**6**	12%
Full depth holes/cracks	6	0	0	0	**6**	12%
Corrosion of metal components	2	1	0	0	**3**	6%
Loose/ missing mortar	2	0	0	0	**2**	4%
Efflorescence	2	0	0	0	**2**	4%
STUCCO (5% of sample)						
Minor cracks	8	2	2	0	**12**	40%
Paint deterioration	3	4	0	2	**9**	30%
Top coat deterioration	1	2	0	3	**6**	20%
Full depth holes/cracks	2	0	0	0	**2**	7%
FLUSH-FINISHED FIBRE CEMENT (4% of sample)						
Full depth holes/cracks	6	0	0	0	**6**	25%
Minor cracks	1	2	0	0	**3**	13%
Fungi growth	3	0	0	0	**3**	13%
Cracking at joints	0	2	0	1	**3**	13%
Top coat deterioration	1	1	0	1	**3**	13%
Leaking at cladding joints	1	0	0	1	**2**	8%
Faulty/faulty flashings	1	1	0	0	**2**	8%
Cladding bottom buried	0	1	0	1	**2**	8%
EIFS (3% of sample)						
Fungi growth	2	0	0	0	**2**	13%
Minor cracks	1	0	0	0	**1**	7%
Full depth holes/cracks	1	0	0	0	**1**	7%
Leaking at cladding joints	1	0	0	0	**1**	7%
Top coat deterioration	0	1	0	0	**1**	7%
Cladding bottom buried	0	0	1	0	**1**	7%
NOTE: only defects occurring in more than 1% of applicable situations are included in table						

Defect	Frequency of defects: low (to 10%)	moderate (to 25%)	high (to 50%)	very high (over 50%)	Totals	% of sample
PLYWOOD SHEET (3% of sample)						
Fungi growth	2	4	0	0	**6**	*35%*
Minor cracks	1	1	0	1	**3**	*18%*
Decay/rot	2	1	0	0	**3**	*18%*
Top coat deterioration	1	0	1	1	**3**	*18%*
Insecure cladding	2	0	0	0	**2**	*12%*
Full depth holes/cracks	2	0	0	0	**2**	*12%*
Checking	0	0	2	0	**2**	*12%*
Cladding bottom buried	1	1	0	0	**2**	*12%*
Component corrosion	0	0	0	1	**1**	*6%*
Cracking at cladding joints	0	1	0	0	**1**	*6%*
Leaking at cladding joints	1	0	0	0	**1**	*6%*
Paint deterioration	0	0	1	0	**1**	*6%*
NOTE: only defects occurring in more than 1% of applicable situations are included in table						

16.1.4.2 Roof claddings

Table 12: Roof cladding defect frequencies

Defect	Frequency of defects: low (to 10%)	moderate (to 25%)	high (to 50%)	very high (over 50%)	Totals	% of sample
PAINTED PROFILED GALVANISED STEEL (30% of sample)						
Top coat deterioration	12	6	4	46	**68**	*40%*
Corrosion of base metal	28	10	4	6	**48**	*28%*
Moss/fungi growth	29	3	4	1	**37**	*22%*
Corrosion of fixings	12	10	10	3	**35**	*20%*
Deterioration of fixings	9	8	5	8	**30**	*17%*
Paint flaking	5	10	6	6	**27**	*16%*
Dents/distortions	14	10	3	0	**27**	*16%*
Missing/loose fixings	8	3	1	0	**12**	*7%*
Nail caps popping	8	1	1	0	**10**	*6%*
Insufficient fixings	3	3	3	0	**9**	*5%*
Rusting internal gutters	2	1	1	0	**4**	*2%*
COIL-COATED PROFILED STEEL (16% of sample)						
Moss/fungi growth	10	1	0	1	**12**	*14%*
Top coat deterioration	3	0	0	7	**10**	*11%*
Nail caps popping	4	0	0	0	**4**	*5%*
Missing/loose fixings	2	0	0	0	**2**	*2%*
Paint flaking	0	0	2	0	**2**	*2%*
Corrosion of base metal	2	0	0	0	**2**	*2%*
UNPAINTED PROFILED GALVANISED STEEL (4% of sample)					**20**	*4%*
Corrosion of base metal	4	0	1	0	**5**	*25%*
Corrosion of fixings	1	0	0	1	**2**	*10%*
Nail caps popping	2	0	0	0	**2**	*10%*
Top coat deterioration	0	0	0	2	**2**	*10%*
Missing/loose fixings	1	0	0	0	**1**	*5%*
Moss/fungi growth	1	0	0	0	**1**	*5%*
Leaks	0	1	0	0	**1**	*5%*
NOTE: only defects occurring in more than 1% of applicable situations are included in table						

Defect	Frequency of defects				Totals	% of sample
	low (to 10%)	moderate (to 25%)	high (to 50%)	very high (over 50%)		
CHIP-COATED METAL TILES (13% of sample)						
Chip coat missing	16	8	3	4	**31**	42%
Moss/fungi growth	17	5	3	1	**26**	35%
Dents/distortions	10	5	3	0	**18**	24%
Top coat deterioration	3	4	2	8	**17**	23%
Corrosion of base metal	4	2	0	0	**6**	8%
Rusting internal gutters	2	0	1	1	**4**	5%
Nail caps popping	2	0	0	0	**2**	3%
COIL-COATED METAL TILES (6% of sample)						
Moss/fungi growth	8	1	0	0	**9**	26%
Top coat deterioration	2	0	1	2	**5**	15%
Dents/distortions	4	0	0	0	**4**	12%
Nail caps popping	1	0	0	0	**1**	3%
Missing/loose fixings	1	0	0	0	**1**	3%
Paint flaking	1	0	0	0	**1**	3%
Faulty flashings	0	0	0	1	**1**	3%
Leaks	1	0	0	0	**1**	3%
MASONRY TILES (32% of sample)						
Moss/fungi growth	49	8	8	4	**69**	38%
Cracked/missing pointing	21	6	1	0	**28**	15%
Cracked/dislodged tiles	18	1	0	0	**19**	10%
Holes/cracks	4	0	0	0	**4**	2%
MEMBRANE (4% of sample)						
Membrane lifting/damaged	3	1	1	0	**5**	20%
Top coat deterioration	0	0	1	2	**3**	12%
Membrane joints lifting	3	0	0	0	**3**	12%
Faulty flashings	2	0	0	0	**2**	8%
Leaks	1	0	0	0	**1**	4%
NOTE: only defects occurring in more than 1% of applicable situations are included in table						

16.1.4.3 Window defects

Table 13: Window defect frequencies

Defect	Frequency of defects: low (to 10%)	moderate (to 25%)	high (to 50%)	very high (over 50%)	Totals	% of sample
TIMBER (55% of sample)						
Paint deterioration to bare timber	70	43	28	20	**161**	52%
Putty cracks	72	44	18	9	**143**	46%
Joint cracks	48	29	25	10	**112**	36%
Top coat deterioration	5	21	13	58	**97**	31%
Dislodged /missing putty	62	14	3	1	**80**	26%
Nail rust staining	46	20	6	4	**76**	25%
Corroding hardware	29	26	8	4	**67**	22%
Checking in timber	44	12	3	1	**60**	19%
Windows sticking	44	9	1	1	**55**	18%
Timber decay/rot	28	2	0	0	**30**	10%
Fungi/moss growth	18	4	3	0	**25**	8%
Missing flashings	9	3	2	1	**15**	5%
Broken/cracked panes	12	0	0	0	**12**	4%
Deteriorating hardware	2	6	0	2	**10**	3%
Corroding flashings	4	1	1	3	**9**	3%
Borer	5	2	0	0	**7**	2%
ANODISED ALUMINIUM (32% of sample)						
Shrinking rubber	33	8	2	6	**49**	27%
Minor anodising failures	15	6	2	6	**29**	16%
Corroding hardware	4	4	6	4	**18**	10%
Loose rubber	11	3	0	3	**17**	9%
Windows sticking	13	2	1	0	**16**	9%
Deteriorating hardware	4	6	3	1	**14**	8%
Broken/cracked panes	7	0	0	0	**7**	4%
Significant pitting/anodising failures	2	2	1	1	**6**	3%
Missing flashings	1	1	2	1	**5**	3%
Stressed joints	2	1	1	0	**4**	2%
Corroding flashings	1	1	0	1	**3**	2%
Double glazing failing	2	1	0	0	**3**	2%
Drain holes plugged up	1	1	0	1	**3**	2%
POWDER-COATED ALUMINIUM (36% of sample)						
Corroding hardware	10	3	1	4	**18**	9%
Shrinking rubber	12	3	1	2	**18**	9%
Minor coating failures	3	5	0	5	**13**	6%
Windows sticking	8	2	0	0	**10**	5%
Loose rubber	2	2	0	2	**6**	3%
NOTE: only defects occurring in more than 1% of applicable situations are included in table						

16.1.5 Outstanding maintenance costs

Table 14: Average costs of outstanding maintenance

Component	Serious only	Poor/serious	All conditions	Past surveys in 2005 $'s 1994	1999
Foundations	$5	$225	$508	$254	$295
Fasteners	$4	$57	$65	$30	$166
Joists / bearers	$15	$117	$184	$60	$203
Floor	$64	$136	$248	$105	$357
Vents	$168	$675	$692	$1,060	$1,271
Plumbing pipes	$2	$17	$28		
Wall cladding	$16	$432	$729	$370	$1,176
Windows/doors	$10	$777	$1,187	$364	$1,129
Chimney	$9	$18	$29	$480	$421
Roofing	$45	$425	$567	$435	$977
Spouting	$20	$66	$88	$55	$196
Roof space	$0	$33	$224	$214	$322
Decks	$39	$93	$114		
Other:					
Basement	$0	$0	$64		
Carport	$0	$0	$22		
Steps/ Ramps	$5	$19	$27		
Sleepout	$0	$13	$18		
Subtotal other	$0	$32	$131		
Hot water system	$47	$47	$288	$128	$181
Kitchen linings	$4	$20	$36	$409	$253
Kitchen bench	$0	$51	$105	$479	$362
Cooker	$1	$15	$37	$41	$25
Laundry linings	$2	$46	$62	$287	$255
Laundry fittings	$1	$6	$11	$230	$155
Bathroom linings	$14	$59	$86	$504	$313
Bathroom fittings	$3	$17	$29	$491	$230
Other linings	$0	$248	$498	$712	$581
Doors/ hardware	$0	$36	$114	$187	$156
Internal stairs	$8	$23	$40		

NOTE:
1994 and 1999 costs updated to 2005 equivalents – based on movements in the cost of house construction.

16.1.6 Maintenance – base costs

Table 15: Base unit maintenance costs

Component		Serious	Poor	Moderate	Good	Excellent
		Condition rating				
Foundations	Concrete perimeter walls	$10,316	$7,221	$1,032	$103	0
	Concrete or timber piles	$3,000	$2,100	$300	$30	0
Fasteners		$600	$420	$60	$6	0
Steps/ Ramps		$500	$350	$50	$5	0
Water reticulation pipes		$550	$385	$55	$6	0
Plumbing wastes		$440	$308	$44	$4	0
Sub-floor framing		$7,977	$5,584	$798	$80	0
Floor	Particle board	$4,760	$1,904	$476	$48	0
	Timber tongue in groove	$13,300	$9,310	$1,330	$133	0
Vents	Baseboards/timber framed	$300	$210	$30	$3	0
	Concrete perimeter walls	$3,000	$2,100	$300	$30	0
Decks	Spaced timber decking	$1,317	$922	$132	$13	0
	Membrane on plywood	$2,067	$1,447	$207	$21	0
Wall	Masonry veneer	$13,720	$9,604	$1,372	$137	0
Cladding	Sheet fibre-cement	$5,978	$2,989	$598	$60	0
	Timber weatherboards	$14,896	$7,448	$1,490	$149	0
Exterior doors		$900	$630	$90	$9	0
Windows	Aluminium	$8,694	$6,086	$869	$87	0
	Timber	$15,134	$7,567	$1,513	$151	0
Basement		$2,339	$1,637	$234	$23	0
Carport		$3,000	$2,100	$300	$30	0
Roof	Metal profiled or tiles	$7,560	$5,292	$756	$76	0
Cladding	Masonry tiles	$5,880	$4,116	$588	$59	0
Spouting/downpipe		$1,395	$976	$139	$14	0
Chimney	Masonry	$1,500	$1,050	$150	$15	0
	Steel flue	$300	$210	$30	$3	0
Roof space		$4,100	$2,870	$410	$41	0
Header-tank		$240	$168	$24	$2	0
HWC	Electric	$880	$440	$88	$9	0
	Gas	$1,530	$765	$153	$15	0
Kitchen	Linings	$783	$548	$78	$8	0
	Fittings	$2,000	$1,400	$200	$20	0
	Cooker	$1,100	$550	$110	$11	0
Internal stairs		$2,128	$1,490	$213	$21	0
Laundry	Linings	$634	$444	$63	$6	0
	Fittings	$200	$140	$20	$2	0
Bathroom	Linings	$994	$696	$99	$10	0
	Fittings	$400	$280	$40	$4	0
Other linings		$10,190	$7,133	$1,019	$102	0
Interior doors and hardware		$4,200	$2,940	$420	$42	0
Sleepout		$2,645	$1,851	$264	$26	0

The above costs are for repair of component according to assessed condition rating.
Unit costs are based on a standard 140 m^2 – then adjusted according to actual area of each house.

16.1.7 Statistics

S-plus version 7 software was used to analyse the statistics as follows.

Distribution of the data

The cost data are not normally distributed, but are approximately log-normally distributed. This creates potential problems with using the Z-test and other statistical test for testing significance of difference between means.

All these statistics were also tested using lognormal distributions, and the basic conclusions are the same.

1999 houses – outliers?

There were a lot of houses in the 1999 survey in a serious condition, with 7 having costs of >$45,000, and ten over $40,000. The highest cost from the 2005 survey was ~$43,000, and ~$40,000 from the 1994 survey. These very high costs from the worst of the 1999 houses are responsible for much of the differences from other surveys. On a statistical basis, it seems unlikely that the 1994 and 2005 surveys would have no houses with costs of over $45,000 and the 1999 survey have 7. It is suspected that either the 1999 survey over-represents serious houses, or the other surveys under-represent them, and it is not clear whether the higher costs for the 1999 survey actually reflect higher average costs for housing stock as a whole. Given that the 1994 and 2005 surveys had similar proportions of houses in a serious condition, it is a bit more plausible that these surveys are more representative of the New Zealand stock, and the high number of 1999 houses in a serious condition is an aberration.

Overall condition, 2005 dollars

The average condition of all houses adjusted to 2005 dollars is:

Survey Year	Average Costs, all conditions	SD of mean
1994	6898	293
1999	9023	443
2005	6045	279

All the differences are statistically significant at the 95% confidence interval (Z-test). Costs rose in 1999, and dropped in 2005, and this rise and fall was real.

The cause of this may be a change in the proportion of new houses, and may not reflect a change in the condition of houses of a given age.

Overall condition, 2005 dollars, comparison by city

CITY	YEAR	Cost	SD	N	Comment
A	1994	7860	532	116	All cities significantly different
W	1994	7426	418	151	
C	1994	5343	568	123	
A	1999	8661	650	156	No diff, A-C
W	1999	9695	696	169	Wellington sig. higher than others
C	1999	8617	973	140	
A	2005	5487	349	304	No diff, A-C
W	2005	8616	834	111	Wellington significantly higher
C	2005	5473	440	150	

Overall condition, 2005 dollars, adjusted to 1999 age distribution

Survey Year	Average Costs, all conditions adjusted to 1999 age distribution	SD of mean
1994	6740	262
1999	9018	459
2005	7048	348

To do the adjustment, both the 1880 and 2000 age groups had to be removed. Also, with only one 1890s houses in the 2005 survey, the standard deviation could not be calculated, so the SD for the 2005 group is slightly underestimated.

The differences between 1999 year and other years are statistically significant, whereas the difference between 2005 year and 1994 is not significant, so the conclusion is that they are the same.

It the above process is repeated, but with 1890s houses also removed, there is not much change, and the conclusions are the same.

Survey Year	**Average Costs, all conditions adjusted to1999 age distribution**	**SD of mean**
1994	6755	264
1999	8915	420
2005	7027	367

It can be concluded that the 1999 year costs were higher than the 1994 or 2005 costs, and that the costs in 2005 and 1994 were the same, when adjusted to 1999 proportions by age.

It appears likely that the lower average costs for the whole 2005 survey may be due to a greater proportion of new housing stock in the 2005 survey, and not due to a decrease in the average costs for the older stock.

Costs by house age

Linear regression models of cost by house age show an increase in costs by age of house with the 1994 and 2005 models are basically identical. Increase of $89 and $94 per year respectively (and these are statistically the same). The 1999 survey had a larger increase, at $179 per year, which is statistically significantly higher than the 1994 and 2005 surveys. This effectively confirms the analysis with the age proportions adjusted to the 1999 figures.

The 1994 showed some pronounced curvature for the oldest houses, with lower costs than a straight line fit would suggest. A curve fitted to this data was significantly better than a linear fit. It was noted that this did include one 1890s house with a zero cost, which may be an error in the data. The other two surveys were fitted best by a straight line.

The models were also re-run using a logarithmic transformation of the data (with an arbitrary $50 added to all costs to prevent problems with zero cost). These models worked better in terms of dealing with the non-normal distribution of the data. All of these models confirmed a trend of increased costs by age.

Deciding which one to use is a rather complex task, and there is no right answer. For simplicity sake, it is perhaps best to use the simple linear models presented here. They are not as good as the more complex ones, but are not telling lies.

16.2 Security rating scale

The following shows the simple numerical scale used to derive a total security level for each house.

Security measures	*Assigned score*	*Security measures*	*Assigned score*
Burglar alarm		**Security lights**	
Monitored	**3**	To all entry points	**3**
Stand-alone	**2**	To most entry points	**2**
Signs – mock alarm only	**1**	To main entry point	**1**
No burglar alarm	**0**	No security lights	**0**
Doors – secure deadlocks		**Door security grilles**	
To all doors	**3**	To all doors	**3**
To most doors	**2**	To most doors	**2**
To main door	**1**	To main door	**1**
No deadlocks	**0**	No door grilles	**0**
Window locks		**Window security stays**	
To all windows	**5**	To all windows	**5**
To more than 75% of windows	**4**	To more than 75% of windows	**4**
To 50% to 75% of windows	**3**	To 50% to 75% of windows	**3**
To 25% to 49% of windows	**2**	To 25% to 49% of windows	**2**
To less than 25% of windows	**1**	To less than 25% of windows	**1**
No window locks	**0**	No security stays	**0**
Window security grilles			
To all windows	**5**		
To more than 75% of windows	**4**		
To 50% to 75% of windows	**3**		
To 25% to 49% of windows	**2**		
To less than 25% of windows	**1**		
No window grilles	**0**		
Lowest possible score	**0**		
Highest possible score	**27**		

16.3 Letters to homeowners

16.3.1 Initial letter

Reference No: ***(BRANZ ID number)***

November 2004

Dear Homeowner

HOME MAINTENANCE RESEARCH

Who is BRANZ Ltd?

BRANZ Ltd is a wholly owned subsidiary of the Building Research Association of New Zealand, which has been in existence for over 25 years, and is the leading research and development organisation servicing the building industry.

BRANZ (Ltd) has accepted a commission funded by the Building Research Levy to survey the maintenance condition of New Zealand's housing stock which has an estimated value of more than $100 billion. This is part of our ongoing efforts to improve the quality and performance of housing in New Zealand, and this current commission builds on similar surveys carried out in 1994 and 1999. To complete such a survey requires the assistance of the New Zealand public.

What is involved in the survey?

The survey is in two parts, in order to allow us to collect data relevant to the condition of the house. These parts are:

- **A 10 to 15 minute telephone survey** followed (some time later) by,
- **A physical inspection** of your property by BRANZ technical surveyors.

Why your property?

Your property is of the particular age group that we are interested in surveying and has been chosen from a random sample of houses in your region. Our team would like access to your property for a two hour inspection by our staff. The inspection involves checking the physical condition of various components such as the roof, walls, foundations, and also interior aspects such as the floor, walls ceiling, roof space and services.

What happens to the information?

Information obtained from both the telephone survey and the physical house inspection will remain totally confidential. It will **not** be provided to any other organisation (not builders, local councils, government departments or marketing organisations).

A published report will combine and analyse all information gathered, but this report will **not** identify either individual houses or their owners. The information is extremely useful in the ongoing analysis of trends in the condition of the national stock. The results of the survey will also expand the extensive database of house information and requirements that has already been developed from the first two surveys. This database provides a valuable resource for both research and commercial work, as well as benefiting house designers, suppliers and builders.

What happens if we find a problem in the house?

The survey is of a general nature and so should not be expected to pick up details of potential problems. However, if any items of particular concern are noted by our inspector during the survey, you will be notified with a suggestion to seek further investigation from an appropriate specialist.

If I agree, what happens next?

An interviewer from the National Research Bureau (NRB), an independent research company, may call you over the next couple of weeks. If you have any questions about the survey, you are welcome to call BRANZ on 04 237 1170.

Thanking you for your assistance

If you agree to participate in our survey, as a token of our gratitude BRANZ will offer you a choice of:

- The BRANZ Home Maintenance Guide (245 pages), or
- $20 Petrol Voucher

As well as

- Entry into a prize draw for a digital camera or DVD recorder

We hope that you will allow us to collect this valuable research data, and thank you for your assistance.

16.3.2 Follow-up letter

Reference No: ***(BRANZ ID number)***

31 January 2005

Dear (name)

HOME MAINTENANCE RESEARCH

Thank you for agreeing to participate in BRANZ's survey of New Zealand houses, and for allowing us to collect this valuable research data. This letter is to keep you up-to-date on the progress of the project.

Progress on the survey

As explained in my initial letter, the survey is in two parts, in order to allow us to collect data relevant to the condition of the house. These parts are:

- **A 10 to 15 minute telephone survey** followed (some time later) by,
- **A physical inspection** of your property by BRANZ technical surveyors.

Late last year you will have completed the first part of the survey. Since that time, our technical surveyors have been working their way through the list of houses that now make up the sample.

Completed your survey?

If your house has already been surveyed, we would like to thank you for your time and patience. The data collected about your house will be extremely useful in helping with our research and analysis of trends in the condition of the national housing stock. You will receive your chosen gift within the next few weeks, and your name has been entered into the prize draw.

Not contacted yet?

Our inspectors have currently completed more than 200 houses, more than a third of the total number of houses to be surveyed. We expect to complete the remaining houses within the next few months.

If you have not yet been contacted, this is simply because the surveyors only book inspection times for the number of houses that they expect to be able to complete within a week or so after contacting the homeowners. You will be contacted sometime within the next few months.

Once again, thank you for your assistance with this project.

16.4 BRANZ survey forms

BRANZ ID number……………………

Date: ______________ **Start time:** [ ] **Finish time:** [ ]

Surveyor: ______________

Owner's name: ______________

Address: ______________

Checklist: tick items as completed

Photographs:
- [ ] Each house elevation
- [ ] Sub-floor area
- [ ] Hot water cylinder(s)
- [ ] Detached garage/sleep-out
- [ ] Other faults
- [ ] Photos identified with ID number
- [ ] Photos and form linked by date/ time
- [ ] Other relevant photos

Instructions:

Ensure that all shaded areas are completed as applicable. Complete final checklist and general assessment.

Add other information that you consider relevant to understanding the condition of the house.

Ensure that digital photographs are linked to house by:

- *BRANZ ID number for house on each photo, or*
- *Each photo coded for date and time taken, with. date and times in this form completed accurately, (in order to identify corresponding photos.)*

General Assessment: *Fill in after completing inspection*

A. Generally the building was
- [ ] Well maintained
- [ ] Reasonably maintained
- [ ] Poorly maintained

B. Subjective interior 'dampness' feel
- [ ] Feels very damp, smells musty
- [ ] Feels slightly damp
- [ ] Feels dry

1. Number of storeys

Ignore un-lived-in spaces [ ]

2. Number of rooms *(enter numbers)*
- [ ] Bedrooms
- [ ] Bathrooms
- [ ] Lounge/Sitting
- [ ] Separate dining
- [ ] Rumpus/Games
- [ ] Study/Sewing, etc
- [ ] Workshop
- [ ] Other – specify

3. Section
- [ ] Flat
- [ ] Gentle slope
- [ ] Sloping
- [ ] Steep
- [ ] Driveway fenced
- [ ] Child's play area fenced

% of impermeable surfaces around house *(estimate)* [ ] %

4. Shade
- [ ] House mostly in shade
- [ ] House in shade in winter
- [ ] Loses sun in late afternoon or early morning
- [ ] House never/rarely shaded

5. Environment
- [ ] Always quiet
- [ ] Mostly quiet
- [ ] Moderate noise
- [ ] Loud noise
- [ ] Constant loud noise

Air quality:
- [ ] Adjacent to busy road
- [ ] Adjacent to unsealed road
- [ ] Close to petrol station
- [ ] Close to polluting industries
- [ ] Close to commercial orchard
- [ ] Other factors…………………………….

6. Security measures

Burglar alarm
- [ ] Monitored
- [ ] Stand-alone
- [ ] Signs/mock alarm only
- [ ] No burglar alarm

Security lights
- [ ] To all entry points
- [ ] To most entry points
- [ ] To main entry point
- [ ] No security lights

Doors: Secure deadlocks
- [ ] To all doors
- [ ] To most doors
- [ ] To main door
- [ ] No deadlocks

Security grilles
- [ ] To all doors
- [ ] To most doors
- [ ] To main door
- [ ] No security grilles

Window locks
- [ ] To all windows
- [ ] To over 75%
- [ ] 50% to 75%
- [ ] 25% to 50%
- [ ] To under 25%
- [ ] No locks

Security stays
- [ ] To all windows
- [ ] To over 75%
- [ ] 50% to 75%
- [ ] 25% to 50%
- [ ] To under 25%
- [ ] No stays

Security grilles
- [ ] To all windows
- [ ] To over 75%
- [ ] 50% to 75%
- [ ] 25% to 50%
- [ ] To under 25%
- [ ] No grilles

BRANZ 2005 House Condition Survey © 2004 1 of 18

BRANZ ID number……………………

7.0 Foundations: general

- [ ] Concrete slab
- [ ] Continuous concrete perimeter walls
- [ ] Continuous brick perimeter walls
- [ ] Continuous concrete block perimeter walls
- [ ] Concrete pile
- [ ] Concrete block piles
- [ ] Brick piles
- [ ] Treated timber piles
- [ ] Untreated timber piles
- [ ] Jack studs

Slab insulation?

- [ ] Can't tell
- [ ] No insulation
- [ ] Perimeter
- [ ] Underslab

Ground clearance

Minimum clearance to cladding ______ mm

Minimum clearance to bearers ______ mm

Unprotected ground? **yes / no**

Cladding deteriorating near ground? **yes / no**

Foundations: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes to indicate frequency of each defect*

Defect	0 - 10 %	10 - 25 %	25 - 50 %	50 - 100 %
Subsidence				
Water ponding under house				
Non vertical piles				
Missing pile(s)				
Unsafe excavation				
Timber decay				
Two tooth borer				
Common borer				
Structural cracks in concrete				
Non structural cracks				
Deep spalling or holes				
Broken blocks				
Missing mortar				
rising damp				
Dpm missing				
Insufficient footing depth				
Inadequate bracing (per 3604)				
Missing/rotten baseboards				
Exterior plaster spalling				
Missing/insecure ties to bearers				
Nail plates/fasteners deformed				
Poor fixing				
Minor blemishes				
Other …………………………..				

8.0 Fasteners

- [ ] Not applicable (conc. slab)
- [ ] Wire & Staples
- [ ] Wire dogs
- [ ] Galvanised bolts
- [ ] Galvanised strip
- [ ] Ungalvanised rod
- [ ] Galvanised nail plates
- [ ] None
- [ ] Other …………………..

Fasteners: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes to indicate frequency of each defect*

Defect	0 - 10 %	10 - 25 %	25 - 50 %	50 - 100 %
Base material >50% corroded				
Failure of coating				
White rust				
Some corrosion				
Incorrect fixing of fasteners				
Other …………………………..				

9.0 Steps/Ramps including surface and handrails

- [ ] Steps
- [ ] Ramp

Steps/ramp materials:

- [ ] Timber
- [ ] Concrete
- [ ] Metal

Handrail materials:

- [ ] Timber
- [ ] Metal
- [ ] Other

Steps/ramp: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes*

- [ ] Missing treads
- [ ] Rotting timber
- [ ] Uneven risers
- [ ] Unsafe surface
- [ ] Unsafe structure
- [ ] Other ………………………..

BRANZ ID number……………………….

10.0 Subfloor

☐ **No access to subfloor**

☐ Not applicable (concrete slab)

Ground covering

☐ None
☐ Plastic: % covered ______ %
☐ Other…………………………….

Floor insulation

☐ None
☐ Foil
☐ Other……………………..…….

10.1 Water reticulation pipes

☐ Copper
☐ Polybutylene
☐ Galvanised steel
☐ Other……………………………….

Water pipes: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes*

☐ Leaking ☐ Rust
☐ Lack of support ☐ Other……………………………….

10.2 Plumbing wastes

☐ Copper
☐ uPVC
☐ Lead
☐ Galvanised steel
☐ Cast or wrought iron

Wastes: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes*

☐ Leaking ☐ Rust
☐ Lack of support ☐ Other…………………………………….

11.0 Joists/Bearers

Floor joists

☐ Radiata
 ☐ Treated
 ☐ Untreated
 ☐ Can't tell
☐ Douglas fir
☐ Native
☐ Other

Bearers

☐ Radiata
 ☐ Treated
 ☐ Untreated
 ☐ Can't tell
☐ Douglas fir
☐ Native
☐ Other

Sub floor moisture levels:

Readings on 2 joists 5m apart *(if access allows)* ☐ ☐

2 readings 5m apart from floor *(if access allows)* ☐ ☐

Joists/bearers: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes, indicate frequency of each defect*

Defect	0 - 10 %	10 - 25 %	25 - 50 %	50 - 100 %
☐ Timber decay				
☐ Two toothed borer				
☐ Common borer				
☐ Insufficient joists/bearers per 3604				

Defect	0 - 10 %	10 - 25 %	25 - 50 %	50 - 100 %
☐ Structural cracks				
☐ Minor cracks/checking				
☐ Insulation decaying				
☐ Other……………………………….				

(Frequency)

12.0 Floor

☐ Not applicable (concrete slab)
☐ Tongue in groove
☐ Particle board
☐ Plywood
☐ Other……………………………..

Floor: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes, indicate frequency of each defect*

Defect	0 - 10 %	10 - 25 %	25 - 50 %	50 - 100 %
☐ Timber decay				
☐ Two toothed borer				
☐ Common borer				
☐ Cupped boards				
☐ Water stains (from above)				

Defect	0 - 10 %	10 - 25 %	25 - 50 %	50 - 100 %
☐ Floor squeaks				
☐ Holes or gaps				
☐ Minor gaps between sheets				
☐ Other……………………………..				
☐ Other……………………………..				

(Frequency)

BRANZ ID number…………………….

13.0 Vents (sub floor)

☐ **No sub floor ventilation** ☐ **Not applicable** (concrete slab)

Type

☐ Baseboards: Type: ☐ Continuous 20 mm gap / ☐ Insufficient ventilation gap / ☐ No ventilation gap

☐ Precast concrete

☐ Pressed metal

☐ Wire

☐ Other………………………………

Vent sizes

Number of vents: ____

Typical overall dimensions: mm x mm

Typical vent's % of clear area %

For example: *Wire vents usually have 90% clear area, concrete vents usually have 50% clear area.*

Note: *If more than 1 vent size, list numbers and types of each, with dimensions, to allow later calculation of total vent area. (house area to be added later, from QV data).*

Spacing of vents ☐ vents not on all sides / ☐ vents not within 0.75m of corner / ☐ vents more than 1.8m spacing

Vegetation ☐ vegetation blocking all vents / ☐ vegetation blocking some vents / ☐ Vents clear of vegetation

14.0 Decks & balconies (attached to house)

No. of decks and balconies ☐

(use 2nd columns for 2nd deck if present)

Heights:

Maximum deck height above ground below	mm	mm
Clearance from deck surface to adjacent floor	mm	mm

Location

☐☐ Ground floor

☐☐ First floor

☐☐ Second floor

☐☐ Third floor and above

Balustrades

☐☐ No balustrades

Handrail height	mm	mm
Maximum baluster spacing	mm	mm

☐☐ Open handrails/balusters of: ☐☐ timber ☐☐ glass ☐☐ metal ☐☐ other

☐☐ **Solid:** clad with: Stucco ☐☐ / EIFS ☐☐ / F/cem. with: monolithic finish ☐☐ / other joints ☐☐ / Plywood ☐☐ / Weatherboards ☐☐ / Profiled metal ☐☐ / Other ☐☐

Deck type

☐☐ Timber - spaced decking

☐☐ Solid deck floor, open below

☐☐ Solid deck floor (interior room(s) below)

☐☐ Other……………………

Deck structure

☐☐ Timber - post & beam (open)

☐☐ Timber - cantilevered joists

☐☐ Supported on lower walls

Deck surface

☐☐ Timber slats - spaced

☐☐ Butyl/EPDM membrane

☐☐ Liquid-applied membrane

☐☐ Tiles over membrane layer

☐☐ Exposed membrane

☐☐ Textured coating on membrane

☐☐ Painted finish on membrane

☐☐ Other……………………………

Deck timber

☐☐ Radiata - untreated

☐☐ Radiata - treated

☐☐ Hardwood

☐☐ Other…………………

☐☐ Unable to identify

Cappings

Continuously coated ☐☐

Separate: Metal ☐☐ / Timber ☐☐ / Membrane ☐☐

Decks: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes*

Timber decks / balustrades:

☐☐ Decay/rot

☐☐ Dislodged boards

☐☐ Nails popping

☐☐ Decking bounces

☐☐ Checking/cracking

☐☐ Balusters more than 100 mm apart

☐☐ Balustrade loose/"shakey"

Substructure:

☐☐ Decay/rot

☐☐ Borer

☐☐ Decking dangerously slippery

☐☐ Structure inadequate per 3604

☐☐ Inadequate fasteners

☐☐ Fasteners corroding

☐☐ Other……………………………

☐☐ Other……………………………

Solid decks:

☐☐ Faulty flashings

☐☐ Leaking at joints

☐☐ Membrane joints lifting

☐☐ Cracks in top surface

☐☐ Top coat deterioration

☐☐ Deck surface dangerously slippery

☐☐ Faulty flashings

☐☐ Suspect baluster fixings thru membrane

☐☐ Fixings thru top of balustrade

☐☐ Cracks at cladding joints

☐☐ Cracks in cladding

☐☐ Cracks at balustrade/wall junctions

☐☐ Top coat deterioration

Cappings:

☐☐ Cracks at capping joints

☐☐ Inadequate slope to top of capping

☐☐ Cracks at capping/wall junctions

BRANZ ID number…………………….

15.0 Wall Cladding

Is wall cladding over drained cavity? (circke) **Yes / No**

Type

	Painted	Stained
Weatherboards - Horizontal		
Weatherboards - Vertical		
Timber: Unknown		
Pine		
Native		
Cedar/Redwood		
Plywood sheet		
Corrugated metal - horizontal		
Corrugated metal - vertical		
Fibre cement weatherboards		
Hardies "Linea"		

	Painted	Coated
Clay brick - loadbearing		
Clay brick veneer		
Concrete brick veneer		
Concrete block		
Stucco		
Stucco		
Fibre cement sheet with:		
Textured jointless finish		
Battened joints		
uPVC mouldings		
Solid timber eg 'lockwood'		
uPVC weatherboards		
Metal weatherboards		

Cladding: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes, indicate frequency of each defect*

Defect	***Frequency*** 0 - 10 %	10 - 25 %	25 - 50 %	50 - 100 %
Missing cladding				
Minor cracks				
Insecure cladding				
Full depth holes/cracks				
Dislodged boards				
Corrosion of metal components				
Two toothed borer				
Common borer				
Decay/rot				
Checking				
Fungi growth				
Broken sheets				
Corrosion of cladding				
Missing bricks				

Defect	***Frequency*** 0 - 10 %	10 - 25 %	25 - 50 %	50 - 100 %
Missing mortar				
Efflorescence				
Broken blocks				
Drummy reinforcing				
Missing plaster				
Corrosion of reinforcing				
Loose fibres				
Cracking at cladding joints				
Signs of leaking at cladding joints				
Unflashed paraphets				
Faulty flashings				
Top coat deterioration				
Paint deterioration				
Other ……………………………				

16.0 Exterior Doors

Type
(enter numbers)

	Glazing			Timber		Aluminium			Steel	Other
	Full	Part	Double glazed	Paint	Clear/stain	Anodized	Powder- coated	No finish		
Solid core										
Paneled										
Solid T&G										
French doors										
Sliding										
Bi-fold										

Doors: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes, indicate frequency of each defect*

Defect	***Frequency*** 0 - 10 %	10 - 25 %	25 - 50 %	50 - 100 %
Missing glass				
Cracked glass				
Double glazing failing				
Missing/inoperative hardware				
Poor/rusty hardware				
Putty cracks/missing putty				

Defect	***Frequency*** 0 - 10 %	10 - 25 %	25 - 50 %	50 - 100 %
Paint/top coat deterioration				
Door sticking				
Holes				
Cracks				
Timber decay/rot/borer				
Other…………………………				

BRANZ ID number…………………….

17.0 Windows

Material *(estimate %)*

% Timber	% Steel
% Anodised aluminium	% uPVC
% Powder coated aluminium	% Other

Type *(estimate %)*

% Casement	% Sliding
% Awning	% Double-hung
% Louvres	% Double-glazed - directions?

(eg.N, NE, etc)………………………………

Windows: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes, indicate frequency of each defect*

Defect	0 - 10 %	10 - 25 %	25 - 50 %	50 - 100 %
General				
Windows sticking				
Broken/cracked panes				
Deteriorating glazing mouldings				
Corroding flashings				
Missing flashings				
Timber windows				
Timber decay/rot				
Leaking flashings				
Borer				
Paint deterioration to bare timber				
Fungi/moss growth				
Checking in timber				
Nail rust staining				
Putty cracks				
Dislodged /missing putty				
Joint cracks				
Other ……………………………				

Defect	0 - 10 %	10 - 25 %	25 - 50 %	50 - 100 %
Hardware				
Corroding hardware				
Broken hinges				
Missing hardware				
Other ……………………………				
Aluminium windows				
Significant pitting				
Minor coating/anodising failures				
Stressed joints				
Double glazing failing				
Loose rubber				
Missing rubber				
Shrinking rubber				
Drain holes plugged up				
Other ……………………………				
Steel				
Metal corrosion				

18.0 Basement/garage (One or more walls below ground)

Signs of current leaking/dampness

(circle) **yes / no / can't tell**

Main walls

- Insitu concrete
- Concrete Block
- Brick
- Timber framing
- Other ……………………………

Basement Room Use

- Garage
- Laundry
- Living room
- Bedroom
- Workshop/hobbies
- Bathroom
- Other ……………

Basement: condition rating: *(circle)*

Serious
Poor
Moderate
Good
Excellent

19.0 Carport (attached to house)

Roof cladding

- Same as house
- Other……………………

Wall cladding

- Same as house
- No cladding
- Other……………

Framing / structure

- Timber
- Steel
- Concrete
- Concrete block
- Brick

Carport: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes, indicate frequency of each defect*

Defect	0 - 10 %	10 - 25 %	25 - 50 %	50 - 100 %
Insufficient fixing at perimeter				
Missing connectors				
Corroding roofing				
Timber decay				

Defect	0 - 10 %	10 - 25 %	25 - 50 %	50 - 100 %
Inadequate bracing				
Inadequate fixing to house				
Inadequate roof framing				
Other………………………				

BRANZ ID number……………………

20.0 Roof

Inspect 2 sides of roof where possible from ladder

Roof Type

- Gable
- Hip
- Dutch Gable
- Monopitch
- Flat
- Mansard
- Skillion: % of roof ____ %
- Other…………………..

Roof material *(if cannot identify if steel is Al-zn, just tick steel)*

	Finish
Profiled metal	
Steel	Steel: painted
Galvanised	Steel: coil coated
Al-zn eg.zincalume	
Aluminium	Painted
Metal Tiles	Chip coating
Concrete Tiles	Re-coated
Clay Tiles	Re-coated
Membrane	Coated
Shingles: type?………………….	
Other	other finish

Roof: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes, indicate frequency of each defect*

Defect	*Frequency* 0 - 10 %	10 - 25 %	25 - 50 %	50 - 100 %
Missing sheets/tiles				
Internal gutters leaking				
Rust in internal gutters				
Corrosion of fixings				
Insufficient fixings				
Deterioration of fixings				
Nail caps popping				
Missing/loose fixings				
Paint flaking				
Moss/fungi growth				

Defect	*Frequency* 0 - 10 %	10 - 25 %	25 - 50 %	50 - 100 %
Top coat deterioration				
Corrosion of base metal				
Dents/distortions				
Chip coat missing				
Holes/cracks				
Cracked/dislodged tiles				
Dislodged pointing				
Membrane lifting/damaged				
Membrane joints lifting				
Other …………………………				

21.0 Spouting and downpipes

- Steel: galvanised
- Steel: coil-coated

uPVC
Membrane
Copper
Aluminium
Other ……………

Gutters/downpipes: condition rating *(circle)*

Water storage

Are there facilities for rainwater storage on site eg. water tanks? *(circle)* **Yes / No**

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes, indicate frequency of each defect*

Defect	*Frequency* 0 - 10 %	10 - 25 %	25 - 50 %	50 - 100 %
Missing spouting/downpipes				
Uneven fall				
Missing/broken supports				
No cladding behind end of gutter				

Defect	*Frequency* 0 - 10 %	10 - 25 %	25 - 50 %	50 - 100 %
Holes				
Dents/buckling				
Corrosion				
Other …………………………				

22.0 Chimney (including fireplace)

- Brick
- Concrete
- Concrete block
- Pumice
- Stone
- Steel
- Other……………
- Other……………

Chimney: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes*

- Missing bricks
- Missing mortar
- Broken/cracked bricks/blocks
- Cracked concrete
- Chimney separating from wall
- Other ……………………………..
- Reinforcing spalling
- Chimney touching combustible material
- Fire risk
- Poor flue installation eg out of plumb
- Corrosion of flue
- Other …………………………………

BRANZ ID number……………………

23.0 Roof space (insulation and wiring)

☐ **No access to roof space**

Roof slope

	Underlay?
☐ 0^o to 15^o	Yes / No
☐ 16^o to 30^o	Yes / No
☐ over 30^o	Yes / No
	(circle)

Wiring

☐ Tough Plastic Sheath
☐ Tough Rubber Sheath
Vulcanised Indian Rubber

Insulation

Material	% cover
☐ Fibreglass batts/blanket	%
☐ Wool batts/blanket	%
☐ Polyester batts/blanket	%
☐ Foil	%
☐ Polystyrene	%
☐ Macerated paper	%
☐ Fibreglass - blown	%
☐ Rocwool	%
☐ Other……………………	%

thickness

☐ <50 mm
☐ 50 mm
☐ 75 mm
☐ 100 mm
☐ >=150 mm

Defects: *tick appropriate defect boxes*

☐ Insulation not fitted properly	☐ Insufficient ties to tiles	☐ Underlay deterioration
☐ Insulation settling	☐ Wiring damaged	☐ Exposed roofing
☐ Insulation damaged	☐ Wiring insulation embrittled	☐ Pest infestation
☐ Gaps in insulation	☐ No underlay	☐ Other ……………………..

23.1 Roof framing (rafters, purlins, joists, trusses etc.)

☐ **No access to roof space**

☐ Closed skillion: % of total roof area ______ %

Framing timbers

☐ Radiata: ☐ Treated
☐ Untreated
☐ Can't tell

☐ Douglas fir
☐ Native
☐ Other…………………..

Roof framing

☐ Trusses
☐ Purlins
☐ Rafters
☐ Roof Sarking
☐ Ceiling Sarking

Roof framing: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes, indicate frequency of each defect*

Defect		***Frequency*** 0 - 10 %	10 - 25 %	25 - 50 %	50 - 100 %
☐ Timber decay					
☐ Insufficient joists	*(per 3604)*				
☐ Insufficient purlins	*(per 3604)*				
☐ Inadequate rafters	*(per 3604)*				
☐ Inadequate bracing	*(per 3604)*				
☐ Inadequate fasteners	*(per 3604)*				
☐ Corroding fasteners					

Defect	***Frequency*** 0 - 10 %	10 - 25 %	25 - 50 %	50 - 100 %
☐ Minor splitting				
☐ Major splitting				
☐ Two tooth borer				
☐ Common borer				
☐ Decay/rot				
☐ Signs of current water penetration				
☐ Other …………………………				

Roof space moisture level:
Reading from one ceiling joist ______

24.0 Header Tank

☐ No header tank
☐ Internal header tank
☐ External header tank

Header tank: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes*

☐ Header tank unrestrained	☐ No lid
☐ No tray	☐ Hazards in tank
☐ Leaking	☐ Other …………………………..

BRANZ ID number……………………

25.0 Hot water system/cylinder

Number of cylinders ☐

Number of systems ☐
(if more than one type, eg. may be 1 cylinder, 1 instantaneous water heater)

25.1 First cylinder (largest cylinder)

Power source(s)

☐ **Electric**
- ☐ Mains pressure cylinder
- ☐ Low pressure with header tank
- ☐ Solar-boosted
- ☐ Wet-back
- ☐ Other eg instantaneous

☐ **Gas**
- ☐ Storage (cylinder)
- ☐ Instantaneous
- ☐ Solar-boosted
- ☐ Wet-back

First cylinder:

Age (date on cylinder) ☐
Size (as per cylinder) ☐
Grade (as shown) ☐
Wrap insulated ☐
Thermostat setting ☐

Thermostat check:
Measured temperature of hot water in kitchen sink ☐ °C

Indicative pipe runs

Distance of kitchen tap from source cylinder
Reasonably close (adjacent room) ☐
Medium distance (eg 2 rooms away) ☐
Long distance (eg more than 2 rooms away) ☐

First cylinder: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes*

- ☐ Leaking at cylinder outlets
- ☐ Cylinder leaking
- ☐ Ineffective earthquake restraint
- ☐ Thermostat not operating/broken
- ☐ Thermostat difficult or impossible to access
- ☐ Pipe lagging deteriorating
- ☐ Gas flue damage
- ☐ Corrosion of fixings/components
- ☐ Cylinder corrosion
- ☐ Wiring damaged/dangerous
- ☐ Pipe deterioration
- ☐ Other

25.2 Second cylinder (next largest cylinder if present)

Power source

☐ **Electric**
- ☐ Mains pressure cylinder
- ☐ Low pressure with header tank
- ☐ Solar-boosted
- ☐ Wet-back
- ☐ Other eg instantaneous

☐ **Gas**
- ☐ Storage (cylinder)
- ☐ Instantaneous
- ☐ Solar-boosted
- ☐ Wet-back

Second cylinder:

Age (date on cylinder) ☐
Size (as per cylinder) ☐
Grade (as shown) ☐
Wrap insulated ☐
Thermostat setting ☐

Thermostat check:
Measured temperature of hot water from one associated tap ☐ °C

Indicative pipe runs

Distance of main outlet from source cylinder
Reasonably close (adjacent room) ☐
Medium distance (eg 2 rooms away) ☐
Long distance (eg more than 2 rooms away) ☐

Second cylinder: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes*

- ☐ Leaking at cylinder outlets
- ☐ Cylinder leaking
- ☐ Ineffective earthquake restraint
- ☐ Thermostat not operating/broken
- ☐ Thermostat difficult or impossible to access
- ☐ Pipe lagging deteriorating
- ☐ Gas flue damage
- ☐ Corrosion of fixings/components
- ☐ Cylinder corrosion
- ☐ Wiring damaged/dangerous
- ☐ Pipe deterioration
- ☐ Other

BRANZ ID number…………………….

26.0 Kitchen

Estimate of when kitchen last refurbished:

- ☐ Being done at present
- ☐ In last 5 years
- ☐ 5 - 10 years ago
- ☐ 10 - 25 years ago
- ☐ Over 25 years ago

Mould level:

- ☐ Extensive blackened areas
- ☐ Large patches of mould
- ☐ Moderate patches of mould
- ☐ Specks of mould
- ☐ No visible mould

Linings

Walls & ceilings	Ceiling	Walls
Plasterboard	☐	☐
Hardboard	☐	☐
Particleboard/MDF	☐	☐
fibrous plaster/lathe & plaster	☐	☐
Softboard	☐	☐
Timber boarding eg matchlining	☐	☐
Factory finished panel eg formica	☐	☐

Floors

- Tiles - ceramic, slate, marble etc. ☐
- Vinyl/linoleum - seamless ☐
- Vinyl/linoleum tiles ☐
- Carpet ☐
- Cork tiles ☐
- Timber floorboards ☐
- Timber overlay ☐
- Concrete ☐
- Other………………………… ☐
- Other………………………… ☐

Benchtop

- ☐ Stainless Steel
- ☐ Laminate eg formica
- ☐ Timber
- ☐ Tiles
- ☐ Stone (granite etc)
- ☐ Solid resin eg corian
- ☐ Other…………………

Kitchen joinery

		painted?
☐	Solid timber	☐
☐	Hardboard over timber	☐
☐	Laminate veneer on MDF	☐
☐	MDF	☐
☐	Plywood	☐
☐	Other………………..	☐

Cooker: type

- ☐ Free-standing
- ☐ Built-in oven
- ☐ Separate cooktop

Mechanical ventilation

Type

- ☐ None
- ☐ Rangehood
- ☐ Positive ventilation eg. expelair
- ☐ Heat recovery ventilation
- ☐ Other ……………..

Venting to:

- ☐ Outside
- ☐ Recirculating
- ☐ Roof space
- ☐ Another room
- ☐ Other ………..

Cooker power source

- ☐ Electric
- ☐ Gas – reticulated natural
- ☐ Gas – bottle
- ☐ Electric oven, gas hobs
- ☐ Gas oven, electric hobs
- ☐ Coal/Wood
- ☐ Other ……………..

Poison storage

- ☐ High level cupboard available
- ☐ Childproof latches on a cupboard

26.1 Kitchen linings

Kitchen linings: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes*

- ☐ Holes in linings
- ☐ Chipped/peeling of paint/paper
- ☐ Discoloured paint/paper
- ☐ Water stains
- ☐ Decay
- ☐ Worn timber edges
- ☐ Paint deterioration to bare timber
- ☐ MDF swelling
- ☐ Other ……………………………….

- ☐ Reveals/sills cracked
- ☐ Holes in floor
- ☐ Flooring lifting
- ☐ Unsafe floor covering
- ☐ Floor dangerously slippery
- ☐ Deteriorating mortar: tiled surfaces
- ☐ Fat build up in rangehood/fans
- ☐ Damaged wiring/outlet/switches
- ☐ Other ……………………………….

BRANZ ID number…………………….

26.2 Kitchen joinery/bench

Kitchen joinery: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes*

- ☐ Cracked/dented surfaces
- ☐ Poor seals at bench top
- ☐ Laminate lifting
- ☐ Laminate worn
- ☐ Deteriorating mortar
- ☐ Tiles lifting
- ☐ Cracked tiles
- ☐ Scorch marks
- ☐ Benchtop stained
- ☐ Water marks
- ☐ Benchtop pitted
- ☐ Ill-fitting doors/drawers
- ☐ Worn joinery edges
- ☐ Deteriorated hardware
- ☐ Leaking wastes
- ☐ Leaking outlets
- ☐ Taps deterioration
- ☐ Other…………………………..

26.3 Cooker including separate oven and hobs

Cooker: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes*

- ☐ Damaged elements
- ☐ Damaged seals
- ☐ Deteriorating controls
- ☐ Hinges deteriorating
- ☐ Chipped enamel
- ☐ Fire risk
- ☐ Elements corroding
- ☐ Other…………………………

27.0 Internal stairs (safety aspects)

- ☐ No internal staircase

Staircase materials

- ☐ Timber
- ☐ Concrete
- ☐ Steel
- ☐ Other……………………

Tread covering

- ☐ No covering eg clear timber
- ☐ Vinyl
- ☐ Carpet over treads
- ☐ Carpet treads and risers
- ☐ Nosings

Dimensions

Treads ______ mm

Risers ______ mm

Balustrades

Staircase balustrade

- ☐ No handrail/balustrade

Handrail height ______ mm

Maximum baluster spacing ______ mm

Landing balustrade

- ☐ No landing
- ☐ No handrail/balustrade

Handrail height ______ mm

Maximum baluster spacing ______ mm

Stair gate(s)

- ☐ No stair gates
- ☐ Stair gate at top of stairs
- ☐ Stair gate at bottom of stairs

Stair lighting

Number of lights:

- ☐ Switch at top of stairs
- ☐ Switch at bottom of stairs

Staircase: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes*

- ☐ Staircase structurally unsound
- ☐ Staircase balustrade shakey/loose
- ☐ Landing balustrade shakey/loose
- ☐ Missing balustrade/handrails
- ☐ Handrail not continuous
- ☐ Handrail one side only
- ☐ Deteriorating fixings
- ☐ Loose/broken treads
- ☐ Loose/unsafe flooring on treads
- ☐ Uneven tread surface
- ☐ Uneven treads
- ☐ Uneven risers
- ☐ Cracked/broken risers
- ☐ Stair gates weak/ unsafe
- ☐ Catches on gates deteriorating
- ☐ Inadequate stair lighting
- ☐ Stair lighting causing glare
- ☐ Other…………………………

BRANZ ID number…………………….

28.0 Laundry

Location:

- ☐ Laundry in cupboard or in another room
- ☐ Laundry in separate room

(If so, then skip to 28)

Linings

Walls/ceilings

	Ceiling	Walls
Plasterboard	☐	☐
Hardboard	☐	☐
Particleboard/MDF	☐	☐
fibrous plaster/lathe & plaster	☐	☐
Softboard	☐	☐
Timber boarding eg matchlining	☐	☐
Factory finished panel eg formica	☐	☐

Floors

Tiles - ceramic, slate, marble etc.	☐
Vinyl/linoleum - seamless	☐
Vinyl/linoleum tiles	☐
Carpet	☐
Cork tiles	☐
Timber floorboards	☐
Timber overlay	☐
Concrete	☐
Other………………………..	☐

Mould level:

- ☐ Extensive blackened areas
- ☐ Large patches of mould
- ☐ Moderate patches of mould
- ☐ Specks of mould
- ☐ No visible mould

Fittings

- ☐ Tub - stainless Steel
- ☐ Tub - enamel
- ☐ Tub - concrete
- ☐ Tub – acrylic
- ☐ Washing Machine
- ☐ Dryer
- ☐ Other………………………..

Room heating

- ☐ None
- ☐ Heated:

Type:………………

Poison storage

- ☐ High level cupboard available
- ☐ Childproof latches on a cupboard

Ventilation:

Dryer

- ☐ None
- ☐ To outside
- ☐ To roof space
- ☐ To another room

Mechanical

- ☐ None
- ☐ To outside
- ☐ To roof space
- ☐ To another room

28.1 Laundry linings

Laundry linings: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes*

- ☐ Holes in linings
- ☐ Chipped/peeling of paint/paper
- ☐ Discoloured paint/paper
- ☐ Water stains
- ☐ Decay
- ☐ Worn timber edges
- ☐ Paint deterioration to bare timber
- ☐ MDF swelling
- ☐ Reveals/sills cracked
- ☐ Holes in floor
- ☐ Flooring lifting
- ☐ Unsafe floor covering
- ☐ Floor dangerously slippery
- ☐ Deteriorating mortar: tiled surfaces
- ☐ Damaged wiring/outlet/switches
- ☐ Other ……………………………….

28.2 Laundry fittings

Laundry fittings: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes*

- ☐ Cracked/dented surfaces
- ☐ Poor seals at tub top
- ☐ Laminate lifting
- ☐ Laminate worn
- ☐ Deteriorating mortar
- ☐ Tiles lifting
- ☐ Cracked tiles
- ☐ Other…………………………..
- ☐ Water marks
- ☐ Ill-fitting doors/drawers
- ☐ Worn joinery edges
- ☐ Deteriorated hardware
- ☐ Leaking wastes
- ☐ Leaking outlets
- ☐ Taps deterioration
- ☐ Other…………………………..

BRANZ ID number…………………….

29.0 Bathrooms

Bathroom(s) last refurbished:

(estimate)

	main	second	third
In last 5 years			
5 - 10 years ago			
10 - 25 years ago			
Over 25 years ago			

Number of bathrooms

Complete separate assessment for each bathroom

Linings

	Main Ceiling	Main Walls	Main Floor	Second Ceiling	Second Walls	Second Floor	Third Ceiling	Third Walls	Third Floor
Walls/ceilings									
Plasterboard									
Hardboard									
Particleboard/MDF									
fibrous plaster/lathe & plaster									
Softboard									
Timber boarding eg matchlining									
Factory finish panel eg formica									
Floors									
Tiles - ceramic, slate, etc.									
Vinyl/linoleum - seamless									
Vinyl/linoleum tiles									
Carpet									
Cork tiles									
Timber floorboards									
Timber overlay									
Concrete									
Other									

Fittings

	Main	Second	Third
Bath			
Shower over bath			
Sep. shower cubicle			
Toilet in bathroom			
Sep. toilet cubicle			
Heated towel rail			
Fan heater			
Radiant heater			
Heat bulb(s)			
Other heating			
………………………			
Other fittings…………			

Mechanical ventilation

	Main	Second	Third
None			
To outside			
To roof space			
To another room			

29.1 Main bathroom

Mould level - main bathroom

- [ ] Extensive blackened areas
- [ ] Large patches of mould
- [ ] Moderate patches of mould
- [ ] Specks of mould
- [ ] No visible mould

Toilet cistern

- [ ] Dual flush
- [ ] Single flush
- [ ] Large cistern
- [ ] Medium cistern
- [ ]
- [ ] Small cistern

Shower flow

Time to fill 4 litres (seconds) ______ sec.

Use a bucket marked at 4 litre level, time the seconds taken to fill bucket to marked line

Poison storage

- [ ] High level cupboard available
- [ ] Childproof latches on a cupboard

Linings - main bathroom

Main bathroom linings: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes*

- [ ] Decay
- [ ] Chipped/peeling paint/paper
- [ ] Reveals/sills cracked
- [ ] Coating/lining blemishes
- [ ] Deteriorating sealant
- [ ] Borer
- [ ] Water stains
- [ ] MDF swelling
- [ ] Flooring lifting
- [ ] Floor dangerously slippery
- [ ] Rust stains
- [ ] Tiles lifting
- [ ] Holes/cracks/splits
- [ ] Deteriorating mortar
- [ ] Other ………………………

Fittings - main bathroom

Main bathroom fittings: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes*

- [ ] Cracked/chipped enamel
- [ ] Rotten/broken shower linings
- [ ] Staining of surfaces
- [ ] Shower tray pitted
- [ ] MDF swelling
- [ ] Deteriorating bathroom hardware
- [ ] Deteriorating tiles/mortar
- [ ] Broken wc seat or cistern
- [ ] Leaking taps/ showerhead
- [ ] Deteriorating sealant
- [ ] Deteriorating vanity top
- [ ] Corrosion of bath/shower tray
- [ ] Hairline cracking of acrylic bath, whb, shower tray
- [ ] Shower tray dangerously slippery
- [ ] Bath dangerously slippery
- [ ] Other …………………………………

BRANZ ID number…………………….

29.2 Second bathroom

Mould level - second bathroom

- ☐ Extensive blackened areas
- ☐ Large patches of mould
- ☐ Moderate patches of mould
- ☐ Specks of mould visible
- ☐ No visible mould

Toilet cistern

- ☐ Dual flush
- ☐ Single flush
- ☐ Large cistern
- ☐ Medium cistern
- ☐ Small cistern

Shower flow

Time to fill 4 litres (seconds) ______ sec.

Use a bucket marked at 4 litre level, time the seconds taken to fill bucket to marked line

Poison storage

- ☐ High level cupboard available
- ☐ Childproof latches on a cupboard

Linings - second bathroom

Second bathroom linings: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes*

- ☐ Decay
- ☐ Chipped/peeling paint/paper
- ☐ Reveals/sills cracked
- ☐ Coating/lining blemishes
- ☐ Deteriorating sealant
- ☐ Borer
- ☐ Water stains
- ☐ MDF swelling
- ☐ Flooring lifting
- ☐ Floor dangerously slippery
- ☐ Rust stains
- ☐ Tiles lifting
- ☐ Holes/cracks/splits
- ☐ Deteriorating mortar
- ☐ Other ……………………….

Fittings - second bathroom

condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes*

- ☐ Cracked/chipped enamel
- ☐ Rotten/broken shower linings
- ☐ Staining of surfaces
- ☐ Shower tray pitted
- ☐ MDF swelling
- ☐ Deteriorating bathroom hardware
- ☐ Deteriorating tiles/mortar
- ☐ Broken wc seat or cistern
- ☐ Leaking taps/ showerhead
- ☐ Deteriorating sealant
- ☐ Deteriorating vanity top
- ☐ Corrosion of bath/shower tray
- ☐ Hairline cracking of acrylic bath, whb, shower tray
- ☐ Shower tray dangerously slippery
- ☐ Bath dangerously slippery
- ☐ Other …………………………………

29.3 Third bathroom

Mould level - third bathroom

- ☐ Extensive blackened areas
- ☐ Large patches of mould
- ☐ Moderate patches of mould
- ☐ Specks of mould visible
- ☐ No visible mould

Toilet cistern

- ☐ Dual flush
- ☐ Single flush
- ☐ Large cistern
- ☐ Medium cistern
- ☐ Small cistern

Shower flow

Time to fill 4 litres (seconds) ______ sec.

Use a bucket marked at 4 litre level, time the seconds taken to fill bucket to marked line

Poison storage

- ☐ High level cupboard available
- ☐ Childproof latches on a cupboard

Linings - third bathroom

Third bathroom linings: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes*

- ☐ Decay
- ☐ Chipped/peeling paint/paper
- ☐ Reveals/sills cracked
- ☐ Coating/lining blemishes
- ☐ Deteriorating sealant
- ☐ Borer
- ☐ Water stains
- ☐ MDF swelling
- ☐ Flooring lifting
- ☐ Floor dangerously slippery
- ☐ Rust stains
- ☐ Tiles lifting
- ☐ Holes/cracks/splits
- ☐ Deteriorating mortar
- ☐ Other ……………………….

Fittings – third bathroom

condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes*

- ☐ Cracked/chipped enamel
- ☐ Rotten/broken shower linings
- ☐ Staining of surfaces
- ☐ Shower tray pitted
- ☐ MDF swelling
- ☐ Deteriorating bathroom hardware
- ☐ Deteriorating tiles/mortar
- ☐ Broken wc seat or cistern
- ☐ Leaking taps/ showerhead
- ☐ Deteriorating sealant
- ☐ Deteriorating vanity top
- ☐ Corrosion of bath/shower tray
- ☐ Hairline cracking of acrylic bath, whb, shower tray
- ☐ Shower tray dangerously slippery
- ☐ Bath dangerously slippery
- ☐ Other …………………………………

BRANZ ID number…………………….

30.0 Other rooms (excluding kitchen/bathroom/laundry)

Mould levels: **Rooms**_(use extra columns if necessary)_

all	*living areas*			*bedrooms*			
							Extensive blackened areas
							Large patches of mould
							Moderate patches of mould
							Specks of mould
							No visible mould

Linings

Walls & ceilings	**Ceiling**	**Walls**	Painted	Stained	wallpapered	Polyurethane
Plasterboard						
Hardboard						
Particleboard/MDF						
fibrous plaster/lathe & plaster						
Softboard						
Timber boarding eg matchlining						
Factory finished panel eg formica						
Floors						
Tiles – ceramic, slate, marble etc.						
Vinyl/linoleum – seamless						
Vinyl/linoleum tiles						
Carpet						
Cork tiles						
Timber floorboards						
Timber overlay						
Concrete						
Other…………………….						

Trim	Timber	MDF	Plaster	Other
Skirtings				
Architraves				
Window reveals				
Cornices				
Other				

Trim condition	
Serious	
Poor	
Moderate	
Good	
Excellent	

(circle)

Wall insulation

estimate % - inspect by removing a switch – not in recent addition or extension

%	
%	No insulation
%	Fiberglass
%	Macerated paper
%	Rocwool
%	Wool
%	Polyester
%	Polystyrene
%	Other ………………………

30.1 Linings/ finishes

Linings: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes*

- ☐ Holes in linings
- ☐ Damaged wiring/outlet/switches
- ☐ Decay
- ☐ Borer in exposed timber
- ☐ Paint deterioration to bare timber
- ☐ Chipped/peeling of paint/paper
- ☐ Discoloured paint/paper
- ☐ Minor coating/lining blemishes
- ☐ Nail popping
- ☐ Peaking
- ☐ Holes in floor
- ☐ MDF swelling
- ☐ Worn timber edges
- ☐ Reveals/sills cracked
- ☐ Water stains
- ☐ Flooring lifting
- ☐ Unsafe floor covering
- ☐ Floor dangerously slippery
- ☐ Deteriorating mortar
- ☐ Other…………………………

30.2 Glazing safety (internal and external windows and glazed doors)

Safety glass

- ☐ In all lower panels of glazed doors
- ☐ In some lower panels of glazed doors
- ☐ In no lower panels of glazed doors
- ☐ In all windows with sills < 300 mm
- ☐ In some windows with sills < 300 mm
- ☐ In no windows with sills < 300 mm
- ☐ Unable to tell

Visibility stickers/tape

- ☐ No vulnerable full height clear glazing
- ☐ On all vulnerable full height clear glazing
- ☐ On some vulnerable full height clear glazing
- ☐ On no vulnerable full height clear glazing

Safe sill heights

- ☐ Opening windows with sill heights < 1100 mm

Lowest sill height: ______ mm

BRANZ ID number……………………

30.3 Internal doors/ hardware

- Hollow-core
- Solid timber
- Timber and glass
- Timber panelled
- Glazed aluminium
- Other………………………

Doors: condition rating *(circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes*

- Cracked/dented surfaces
- Minor cracks/wear
- Missing/broken hardware
- Worn hardware
- Holes
- Borer
- Cracked glass
- Other…………………………..

31.0 Heating & ventilation (excluding kitchen/bathroom/laundry)

A. Fixed heaters *(enter number)*

Electrical *(enter wattage if possible)*

Panel heaters	w	w
Radiators	w	w
Wall fans	w	w
Night stores	w	w
Heatpumps	w	w
Underfloor heating	w	w
Central heating	w	w
Radiant ceiling heaters	w	w
Wardrobe/cupboard heaters	w	w

Solid fuel

- Enclosed wood-burner/potbelly
- Enclosed wood-pellet burner
- Open fire

Gas (reticulated natural) Flued Unflued *(tick)*

- Radiators
- Panel (no visible flame)
- Flame effect (fake open fire)
- Flame effect (fake wood burner)
- Gas-fired central heating
- Gas-fired underfloor heating
- Other ………………………

Other fuels

- Oil-fired central heating
- Oil-fired underfloor
- Deisel/oil-fired enclosed burner
- Other……………………..

B. Portable heaters *(enter number)*

Electrical *(enter wattage if possible)*

Radiator	w	w
Fan	w	w
Convection ("oil column")	w	w

Other fuels

- LPG heaters
- Kerosene

C. Air treatment (ventilation, conditioning etc.)

- Air conditioner
- Dehumidifiers
- Heat recovery ventilation
- Ventilation from ceiling space (eg DVS)
- Other …………………………………..

32.0 Fire Safety

Total number of smoke alarms

- Battery-powered
- Mains connected

Circle

Yes / No Are the smoke alarms interconnected?

Yes / No Are the smoke alarms operational?

Number/locations:

- Hallway
- Lounge
- Bedrooms
- Kitchen
- Dining
- Garage
- Other

Additional equipment:

- Fire Extinguisher
- Hose Reel
- Fire blanket
- Sprinklers
- Other……………..

Other fire protection issues

Ignition sources

- Heaters sited dangerously
- Cooker sited dangerously
- Fireplace sited dangerously
- Use of candles/naked flames
- Inadequate/poorly sited power points
- Overloaded power points

Means of egress

- Ground floor: < 2 doors to outside
- Upper floors: no alternate means of escape

Flammability

- Flammable wall linings
- Flammable ceiling linings
- Combustible room contents – clutter
- Large amount of upholstered furniture

Flame spread

- Most doors hollow core
- Predominately synthetic carpets

Other

- Other fire dangers………………………
  …………………………………

BRANZ ID number……………………

32.0 Separate garage or sleep-out (used for living)

If the space is lived in, complete the following

(otherwise leave blank)

Function
- ☐ Used for living in
- ☐ Used for storage/workshop
- ☐ Car garage only

Floor
- ☐ Concrete slab
- ☐ Timber
- ☐ Other …………………

☐ mm **Height of concrete slab above ground**

Photos:
Take photos of all elevations
Photograph interior

Cladding

	Painted?
☐ Brick/block veneer	☐
☐ Concrete block	☐
☐ Timber weatherboards	☐
☐ Metal weatherboards	☐
☐ Fibre cement weatherboards	☐
☐ Fibre cement sheet/planks	☐
☐ Corrugated steel	☐
☐ Other …………………………	☐

Roofing

	Painted?
☐ Galvanised profiled steel	☐
☐ Coil coated profiled steel	☐
☐ Pressed metal tiles	☐
☐ Asbestos cement	☐
☐ Concrete/clay tiles	☐
☐ Other ………………………	☐

Framing
- ☐ Treated radiata pine
- ☐ Untreated radiata pine
- ☐ Douglas fir
- ☐ Native timber
- ☐ Steel
- ☐ Other …………………………

Insulation
- ☐ No insulation
- ☐ Insulated – type: ……………………

Internal partitions
- ☐ No partitions
- ☐ Timber framed/lined partitions
- ☐ Curtains
- ☐ Other

Heating
- ☐ No heating
- ☐ Heating type: ……………………………..

External doors
- ☐ Solid timber
- ☐ Timber part glass
- ☐ Aluminium glazed
- ☐ Metal clad
- ☐ Other …………………

Windows
- ☐ Timber
- ☐ Uncoated aluminium
- ☐ Anodised aluminium
- ☐ Powdercoated aluminium
- ☐ Other ………………………..

Internal linings

	painted
☐ No linings	
☐ Plasterboard	☐
☐ Hardboard	☐
☐ Particleboard	☐
☐ Softboard	☐
☐ Timber strip	☐
☐ Other …………………………	☐

Floor covering
- ☐ No floor covering
- ☐ Carpet
- ☐ Vinyl

Internal fixtures & fittings
- ☐ Toilet
- ☐ Washbasin
- ☐ Shower
- ☐ Laundry tub
- ☐ Washing machine
- ☐ Dryer
- ☐ Other …………………………..

***Garage/sleep-out: condition rating** (circle)*

Serious	Poor	Moderate	Good	Excellent

Defects: *tick appropriate defect boxes, indicate frequency of each defect*

Exterior

Frequency	0 - 10 %	10 - 25 %	25 - 50 %	50 - 100 %
☐ DPM (plastic sheet) missing	☐	☐	☐	☐
☐ Leaking gutters/downpipes	☐	☐	☐	☐
☐ Holes/missing cladding	☐	☐	☐	☐
☐ Corrosion roof metal	☐	☐	☐	☐
☐ Significant pitting – alum. joinery	☐	☐	☐	☐
☐ Moss/fungi growth	☐	☐	☐	☐
☐ Missing/loose fixings	☐	☐	☐	☐
☐ Top coat deterioration	☐	☐	☐	☐
☐ Paint flaking	☐	☐	☐	☐
☐ Broken glass	☐	☐	☐	☐
☐ Leaking outlets	☐	☐	☐	☐

Interior

Frequency	0 - 10 %	10 - 25 %	25 - 50 %	50 - 100 %
☐ Missing linings	☐	☐	☐	☐
☐ Holes/cracks in linings	☐	☐	☐	☐
☐ Damp/mouldy linings	☐	☐	☐	☐
☐ Unfinished/unpainted linings	☐	☐	☐	☐
☐ Damage/peeling of paint coating	☐	☐	☐	☐
☐ Borer	☐	☐	☐	☐
☐ Holes in floor coverings	☐	☐	☐	☐
☐ Damp/mouldy floor coverings	☐	☐	☐	☐
☐ Chipped/broken fixtures	☐	☐	☐	☐
☐ Damaged fixture surfaces	☐	☐	☐	☐
☐ Other………………………………	☐	☐	☐	☐

16.5 CRESA telephone interview
16.5.1 Telephone survey questionnaire

04-111 NOVEMBER 2004

HOUSE CONDITION SURVEY

QUESTIONNAIRE

“The following questions relate to <ADDRESS ON SAMPLE SHEET>”

Q.1 “Do you own this house…?” (READ OUT, CIRCLE ONE)

“With a mortgage” ------------------------------ 1

“Mortgage Free” -------------------------------- 2

Q.2 “How long have you lived at this address?” (CIRCLE ONE)

Less than one year ----------------------------- 1

1 - 4 years --------------------------------------- 2

5 - 7 years --------------------------------------- 3

More than 7 years ------------------------------ 4

Q.3 “Do you intend to sell and move out of this house within the next 12 months?” (CIRCLE ONE)

Yes -- 1

No --- 2

Unsure -- 3

Q.4 “Which of the following best describes this house’s overall condition, both inside and out, <u>when you first moved into it</u>?” (READ ALL, BEFORE CIRCLING ONE)

“Excellent – No immediate repair and maintenance needed” ------------------------- 1

“Good – minor maintenance needed” --- 2

“Average – Some repair and maintenance needed” ------------------------------------- 3

“Poor – Immediate repairs and maintenance needed” --------------------------------- 4

“Very poor – Extensive and immediate repair and maintenance needed” ----------- 5

Q.5 “And which of these best describes the <u>current</u> condition of this house?”

(READ ALL, BEFORE CIRCLING ONE)

“Excellent – No immediate repair and maintenance needed” ------------------------- 1

“Good – minor maintenance needed” --- 2

“Average – Some repair and maintenance needed” ------------------------------------- 3

“Poor – Immediate repairs and maintenance needed” --------------------------------- 4

“Very poor – Extensive and immediate repair and maintenance needed” ----------- 5

Q.6a “Do you have one or more smoke detectors in your house?” (CIRCLE ONE)

Yes - 1 ↓ No - 2 → GO TO Q.7

Q.6b "How often in the last six months did you…?"

i. "Check the smoke detectors were operating?" (RECORD) [ ] times

ii. "Change the batteries?" (RECORD) [ ] times

Not applicable – battery operated –

Q.7 "For each of the following please tell me if you always, usually, sometimes, rarely or never feel safe in your house from…?" (READ ALL, CIRCLE ONE PER LINE)

	Always	Usually	Sometimes	Rarely	Never
a. "Fire"	1	2	3	4	5
b. "Earthquake"	1	2	3	4	5
c. "Flood"	1	2	3	4	5
d. "Burglary or attack"	1	2	3	4	5

Q.8 "During the last 12 months, have there been any painting, repairs or replacement to any parts of your house? Please exclude re-modelling, unless it was prompted by a need for repair." (CIRCLE ONE)

Yes - 1 ↓ No - 2 → GO TO Q.13a

Q.9 "Which parts of your house were those? I'll start with outside parts. Did you paint, repair or replace the…?" (READ EACH PART, CIRCLE ONE PER LINE)

	Paint	Repair	Replace	None
a. "Roof"	1	2	3	4
b. "Outside walls"	1	2	3	4
c. "Windows"	1	2	3	4
d. "Guttering/downpipes"	1	2	3	4
e. "Outside doors"	1	2	3	4
f. "Foundation piles"	1	2	3	4

"Now I'll read some inside parts. Did you paint, repair or replace the…?"

(READ EACH PART, CIRCLE ONE PER LINE)

	Paint	Repair	Replace	None
g. "Kitchen fittings such as cupboards or benches"	1	2	3	4
h. "Kitchen walls, ceilings, floor coverings"	1	2	3	4
i. "Bathroom fittings such as cupboards, basin, shower"	1	2	3	4
j. "Bathroom walls, ceilings or floor coverings"	1	2	3	4
k. "Living room walls, ceilings or floor coverings"	1	2	3	4
l. "Bedroom walls, ceilings or floor coverings"	1	2	3	4
m. "Something else" (RECORD) ______________________	1	2	3	4

Q.10 "How did you know that repairs, painting or replacement was needed? Was it from…" (READ ALL, CIRCLE EACH MENTIONED)

"Your own observation" --- 1

"Advice from a tradesman" -- 2

"You got a building inspection" ------------------------------------ 3

"Or some other way" (RECORD) ________________________

Q.11 "Who did the repairs, painting or replacements on this house over the last 12 months?" (READ ALL, CIRCLE EACH MENTIONED)

"Yourself" --- 1

"Other family members living in the house" -------------------- 2

"Paid tradesmen" -- 3

"Other paid people" -- 4

"Other unpaid people" --- 5

Q.12 "How much was spent on maintenance or repairs over the <u>last 12 months</u>?" (READ ALL, CIRCLE ONE)

"$0" -- 1

"$1 - $650" -- 2

"$651 - $1300" ----------------------------------- 3

"$1301 - $2600" --------------------------------- 4

"Over $2601" -------------------------------------- 5

DO NOT READ OUT: Don't know ------

Q.13a "Did you decide to delay or defer any maintenance in the last 12 months?" (CIRCLE ONE)

Yes - 1 ↓ No - 2 → GO TO Q.14

Q.13b "What was the main reason for delaying or deferring maintenance? Was it…?"

(READ ALL, CIRCLE ONE. PROMPT IF NEEDED: "What was the one most important reason?")

"Inconvenient" ----------------------------------- 1

"Wanted better information" ------------------- 2

"Too expensive" --------------------------------- 3

"Maintenance was not serious" --------------- 4

"Or some other reason" (RECORD) ________________________

Q.14 "How much do you expect to spend on maintenance or repairs in the <u>next 12 months</u>?"

(READ ALL, CIRCLE ONE)

"$0" -- 1

"$1 - $650" -- 2

"$651 - $1300" ----------------------------------- 3

"$1301 - $2600" --------------------------------- 4

"Over $2601" -------------------------------------- 5

DO NOT READ OUT: Don't know -------- 6

Q.15 "When you need information on repairs and maintenance, where do you get it from? Is it from…?" (READ ALL, CIRCLE EACH MENTIONED)

"Your own experience and knowledge suffices" -------------- 1

"Family" --- 2

"Friends" -- 3

"Advice from tradespeople" -------------------------------------- 4

"Advice from building suppliers" ---------------------------------- 5

"Advice through building inspection" --------------------------- 6

"Books, magazines and newspapers" -------------------------- 7

"Internet" --- 8

"BRANZ" --- 9

"I'll now ask for some facts that describe you."

Q.16 "Please say "stop" when I read out the age group you come into." (READ OUT AND CIRCLE)

"Under 24 years" -------------------------------- 1

"25 – 49 years" --------------------------------- 2

"50 – 64 years" --------------------------------- 3

"65 or over" --------------------------------------- 4

DO NOT READ OUT: Refused ------------ 5

Q.17 "Which of the following BEST describes you? Are you…?" (READ ALL, CIRCLE ONE)

"A wage and salary earner" -------------------------------------- 1

"Self-employed with no employees" -------------------------- 2

"Self-employed with employees" ------------------------------- 3

"A homemaker" --- 4

"Not in paid work, seeking employment" --------------------- 5

"Retired" -- 6

"Something else" (RECORD) ________________________

Q.18a "Do you have a partner or spouse living with you?" (CIRCLE ONE)

Yes - 1 ↓ No - 2 → GO TO Q.19a

Q.18b "Which of the following BEST describes your partner/spouse? Is he/she…?" (READ ALL, CIRCLE ONE)

"A wage and salary earner" --------------------------------------- 1

"Self-employed with no employees" ---------------------------- 2

"Self-employed with employees" -------------------------------- 3

"A homemaker" --- 4

"Not in paid work, seeking employment" --------------------- 5

"Retired" -- 6

"Something else" (RECORD) ________________________

Q.18c "Do you, or your partner/spouse, receive any of the following? Please say which."

(READ ALL, CIRCLE EACH MENTIONED)

"National superannuation"	1
"Unemployment benefit"	2
"Domestic Purposes benefit"	3
"Sickness or invalid's benefit"	4
"Other government income support payments"	5
DO NOT READ OUT: Refused	6

Q.18d "Please say "stop" when I read out the COMBINED ~~an~~nual income before tax for you and your partner/spouse." (READ OUT AND CIRCLE)

"$10,000 or less"	01	
"$10,001 - $20,000"	02	
"$20,001 - $30,000"	03	
"$30,001 - $40,000"	04	
"$40,001 - $50,000"	05	
"$50,001 - $70,000"	06	→ GO TO Q.20
"$70,001 - $100,000"	07	
"Over $100,000"	08	

DO NOT READ OUT:

Refused	09
Don't know	10

Q.19a "Do you receive any of the following? Please say which."
(READ ALL, CIRCLE EACH MENTIONED)

"National superannuation"	1
"Unemployment benefit"	2
"Domestic Purposes benefit"	3
"Sickness or invalid's benefit"	4
"Other government income support payments"	5
DO NOT READ OUT: Refused	

Q.19b "Please say "stop" when I read out your own annual income before tax."
(READ OUT AND CIRCLE)

"$10,000 or less"	01
"$10,001 - $20,000"	02
"$20,001 - $30,000"	03
"$30,001 - $40,000"	04
"$40,001 - $50,000"	05
"$50,001 - $70,000"	06
"$70,001 - $100,000"	07
"Over $100,000"	08

DO NOT READ OUT:

Refused	09
Don't know	10

Q.20 "Including yourself, how many people aged 15 years and older usually live in your house?"

(RECORD) [ ]

Q.21 "How many people aged 14 years and younger usually live in your house?"

(RECORD) [ ]

Q.22 "Can I just check which of these people live in your house with you?"

(READ ALL, CIRCLE EACH MENTIONED)

"A partner or spouse"	1
"A parent or partner's/spouse's parent"	2
"A child or partner's/spouse's child"	3
"A brother or sister or partner's/spouse's brother or sister"	4
"Other relatives of you or of a partner/spouse"	5
"Other people"	6
or "You live on your own"	7

Q.23 **CODE GENDER OF RESPONDENT:** Male – 1 Female – 2

TRANSFER FROM SAMPLE SHEET:

Reference Number: HCS__________________ (RECORD)

Respondent's Name: ____________________________________ (RECORD)

Address: ____________________________________ (RECORD)

____

Telephone Number: ____________________________________ (RECORD)

"On behalf of the BRANZ, thank you very much for talking with me.

As I said, my name is Xxx and I'm from National Research Bureau."

Interview Duration: _________ minutes (RECORD)

CERTIFICATION: I hereby certify that this is a true and accurate record of an interview conducted by me at the time and with the person specified. TICK WHEN CHECKED [ ]

INTERVIEWER'S NAME: ____________________________________ Date: ___________________

(Please print)

Supervisor Sign: ____________________________________ Audit: ___________________

16.5.2 CRESA summary tables

NATIONAL FREQUENCIES FOR EACH SURVEY QUESTION

Question 1

Mortgage Status (n = 607)

Mortgage Status	Home-owners	%
Mortgage	307	50.6
Mortgage-free	300	49.4
Total	607	100

Missing Cases: 4

Question 2

Years Lived at Current Address (n = 611)

Years Lived at Current Address	Home-owners	%
Less than 1 year	1	0.2
1 – 4 years	141	23.1
5 – 7 years	85	13.9
More than 7 years	384	62.8
Total	611	100

Missing Cases: 0

Question 3

Intention to Move/Sell
in the Next 12 Months (n = 611)

Intending to Move/Sell	Home-owners	%
Yes	25	4.1
No	540	88.4
Unsure	46	7.5
Total	611	100

Missing Cases: 0

Question 4

Assessment of Condition of House
When First Acquired (n = 611)

Acquired House Condition	Home-owners	%
Excellent	208	34.0
Good	185	30.3
Average	165	27.0
Poor	37	6.1
Very Poor	16	2.6
Total	611	100

Missing Cases: 0

Question 5

Assessment of the Current Condition of House
(n = 611)

Current House Condition	Home-owners	%
Excellent	170	27.8
Good	311	50.9
Average	115	18.8
Poor	14	2.3
Very Poor	1	0.2
Total	611	100

Missing Cases: 0

Question 6a

Smoke Detectors in House (n = 611)

Smoke Detector(s) present	Home-owners	%
Yes	522	85.4
No	81	13.3
Present but not used	8	1.3
Total	611	100

Missing Cases: 0

Question 6b(i)

Number of times operation of smoke detectors checked in last six months (n = 522)

Frequency Operation checked	Home-owners	%
Never	97	18.6
Once	266	51.0
Twice	88	16.9
Three or more times	71	13.6
Total	522	100.1

Missing Cases: 0

Question 6b(ii)

Number of times batteries in smoke detectors changed in last six months (n = 516)

Frequency Batteries Changed	Home-owners	%
Never	162	31.4
Once	273	52.9
Twice	37	7.2
Three or more times	5	1.0
Not battery operated	39	7.6
Total	516	100.1

Missing Cases: 6

Question 7a

Homeowners feelings of safety in their home from fire (n = 611)

Feels safe from fire…	Home-owners	%
Always	427	70.0
Usually	168	27.5
Sometimes	7	1.1
Rarely	1	0.2
Never	7	1.1
Total	610	99.9

Missing Cases: 1

Question 7b

Homeowners feelings of safety in their home from earthquake (n = 609)

Feels safe from earthquake…	Home-owners	%
Always	390	64.0
Usually	185	30.4
Sometimes	22	3.6
Rarely	3	0.5
Never	9	1.5
Total	609	100

Missing Cases: 2

Question 7c

Homeowners feelings of safety in their home from flood (n = 611)

Feels safe from flood…	Home-owners	%
Always	504	82.5
Usually	83	13.6
Sometimes	14	2.3
Rarely	1	0.2
Never	9	1.5
Total	611	100.1

Missing Cases: 0

Question 7d

Homeowners feelings of safety in their home from burglary or attack (n = 610)

Feels safe from burglary/attack…	Home-owners	%
Always	205	33.6
Usually	332	54.4
Sometimes	60	9.8
Rarely	5	0.8
Never	8	1.3
Total	610	99.9

Missing Cases: 1

Question 8

Maintenance in the Last 12 Months (n = 611)

Performed Maintenance	Home-owners	%
Yes	322	52.7
No	289	47.3
Total	611	100

Missing Cases: 0

Question 9 a - m

Types of Home Maintenance Performed in the last 12 months (n = 322)

	Paint		Repair		Replace		None		Total
	Response	% Home-owners	Response	% Home-owners	Response	% Home-owners	Response	% Home-owners	
Roof	29	9.0	28	8.7	24	7.5	251	78.0	332
Walls	90	28.0	12	3.7	15	4.7	214	66.5	331
Windows	52	16.1	20	6.2	23	7.1	234	72.7	329
Guttering	14	4.3	17	5.3	37	11.5	257	79.8	325
Doors	44	13.7	11	3.4	15	4.7	259	80.4	329
Foundation piles	4	1.2	1	0.3	6	1.9	311	96.6	322
Kitchen fittings	34	10.6	11	3.4	29	9.0	262	81.4	336
Kitchen surfaces	63	19.6	16	5.0	28	8.7	235	73.0	342
Bathroom fittings	37	11.5	17	5.3	52	16.1	243	75.5	349
Bathroom surfaces	72	22.4	16	5.0	42	13.0	216	67.1	346
Living-room surfaces	76	23.6	18	5.6	25	7.8	227	70.5	346
Bedroom surfaces	96	29.8	11	3.4	21	6.5	212	65.8	340
Other	35	10.9	20	6.2	28	8.7	250	77.6	333
Total	**646**		**198**		**345**		**3171**		**4360**

Missing Cases: 0 Multiple Response

Question 10
Maintenance Identification (n = 322)

NEED FOR MAINTENANCE IDENTIFIED FROM	Responses	% Responses	% Home-owners
Own observation	314	88.2	97.5
Advice from a tradesman	29	8.1	9.0
Building inspection	5	1.4	1.6
Other means of identification	8	2.2	2.5
Total	356	99.9	

Missing Cases: 0 Multiple Response

Question 11
Maintenance Workers (n = 322)

Maintenance Worker	Responses	% Responses	% Home-owners
Yourself	208	41.9	64.6
Paid Tradesmen	174	35.0	54.0
Other Family Members	84	16.9	26.1
Other Paid People	16	3.2	5.0
Other Unpaid People	15	3.0	4.7
Total	497	100	

Missing Cases: 0 Multiple Response

Question 12
Maintenance Expenditure in the Last 12 Months (n = 319)

Maintenance Expenditure	Home-owners	%
$0	6	1.9
$1 - $650	118	37.0
$651 - $1,300	39	12.2
$1,301 - $2,600	43	13.5
Over $2,600	113	35.4
Total	319	100

Missing Cases: 3

Question 13a
Delayed or Deferred Maintenance in the Last 12 Months (n = 611)

Delayed or Deferred	Home-owners	%
Yes	293	48.0
No	318	52.0
Total	611	100

Missing Cases: 0

Question 13b
Reason for Delayed or Deferred Maintenance in the Last 12 Months (n = 293)

Reason for Delay or Deferment	Home-owners	%
Too Expensive/Financial Reasons	106	36.2
Inconvenient	57	19.5
Other	50	17.1
Maintenance Not Too Serious	44	15.0
Lack of time	19	6.5
The weather	9	3.1
Wanted Better Information	8	2.7
Total	293	100.1

Missing Cases: 0

Question 14
Maintenance Expenditure in the Next 12 Months (n = 563)

Intended Maintenance Expenditure	Home-owners	%
$0	84	14.9
$1 - $650	148	26.3
$651 - $1,300	85	15.1
$1,301 - $2,600	77	13.7
Over $2,600	169	30.0
Total	563	100

Missing Cases: 48

Question 15
Maintenance Information (n = 611)

Sources of maintenance information	Responses	% Responses	% Home-owners
Own experience/knowledge	426	23.0	69.7
Tradespeople	358	19.3	58.6
Friends	248	13.4	40.6
Family	230	12.4	37.6
Building suppliers	207	11.2	33.9
Books/magazines/newspaper	199	10.7	32.6
Internet	93	5.0	15.2
BRANZ	52	2.8	8.5
Building inspection	41	2.2	6.7
Total	1854	100	

Missing Cases: 0 Multiple Response

Question 16
Age Group (n = 611)

Home-owner Age	Home-owners	%
Under 25 years	0	0.0
25 – 49 years	257	42.1
50 – 64 years	191	31.3
65 years or Over	163	26.7
Total	611	100.1

Missing Cases: 0

Question 17
Homeowner Labour Force Status (n = 611)

Homeowner Labour Force Status	Home-owners	%
Wage & Salary Earner	286	46.8
Retired	167	27.3
Self-employed (with no employees)	78	12.8
Homemaker	40	6.5
Self-employed (with employees)	29	4.7
Other	6	1.0
Not in paid work, seeking employment	5	0.8
Total	611	99.9

Missing Cases: 0

Question 18a

Reside With Their Partner (n = 609)

Live With Partner	Home-owners	%
Yes	491	80.6
No	118	19.4
Total	609	100

Missing Cases: 2

Question 18b

Partner's Labour Force Status (n = 490)

Labour Force Status of Partner	Home-owners	%
Wage & Salary Earner	276	56.3
Retired	86	17.6
Self-employed (with no employees)	50	10.2
Homemaker	46	9.4
Self-employed (with employees)	25	5.1
Not in paid work, seeking employment	4	0.8
Other	3	0.6
Total	490	100

Missing Cases: 1

Question 18c and 19a

Type of Income Support Received (n = 208)

Type of Income Support Payment	Responses	% Responses	% Homeowners
National Superannuation	177	79.7	85.1
Other	32	14.4	15.4
Domestic Purposes Benefit	3	1.4	1.4
Unemployment Benefit	1	0.5	0.5
Sickness or Invalid's Benefit	9	4.1	4.3
Total	222	100.1	

Missing Cases: 4 Multiple Response

Question 18d & 19b

Annual Family Pre-tax Income (n = 538)

Family Income	Home-owners	%
$10,000 or Less	3	0.6
$10,001 - $20,000	52	9.7
$20,001 - $30,000	52	9.7
$30,001 - $40,000	47	8.7
$40,001 - $50,000	75	13.9
$50,001 - $70,000	95	17.7
$70,001 - $100,000	91	16.9
Over $100,000	123	22.9
Total	538	100.1

Missing Cases: 73

Question 20

Number of Household Members15 Years and Over (n = 609)

Adults in Household	Home-owners	%
1 Adult	89	14.6
2 Adults	359	58.9
3 Adults	87	14.3
4 Adults	56	9.2
5 Adults	12	2.0
6 Adults	4	0.7
7 Adults	2	0.3
Total	609	100

Missing Cases: 2

Question 20 + 21

Number of Household Members (n = 609)

Household Members	Home-owners	%
1	83	13.6
2	228	37.4
3	83	13.6
4	142	23.3
5	46	7.6
6	16	2.6
7	4	0.7
8 or more members	7	1.2
Total	609	100

Missing Cases: 2

Question 21

Number of Household Members under 15 Years (n = 610)

Children in Household	Home-owners	%
No Children	416	68.2
1 Child	58	9.5
2 Children	98	16.1
3 Children	27	4.4
4 Children	9	1.5
5 or more Children	2	0.3
Total	610	100

Missing Cases: 1

Question 22

Household Members (n = 526)

Household Members	Responses	% Responses	% Homeowners
A partner	491	57.2	93.3
A parent or partner's parent	19	2.2	3.6
A child or partner's child	288	33.6	54.8
A brother or sister or partner's brother or sister	19	2.2	3.6
Other relatives of you or of a partner	18	2.1	3.4
Other people	23	2.7	4.4
Total	858	100	

Multiple Response

Question 23

Gender of Respondent (n = 611)

Gender	Home-owners	%
Male	344	56.3
Female	267	43.7
Total	611	100

Missing Cases: 0

16.6 Photographs of defects

The following provides a selection of photographs taken by the inspectors during the surveys. These have been chosen to illustrate a range of common defects found in the houses. House details relevant to the particular defects are noted to allow some understanding of the context of the problem.

16.6.1 Sub-floor defects

16.6.1.1 Sub-floor dampness

Photo 1: interior leaks

- 1980s Wellington house
- Treated timber piles
- Dampness and localised timber decay resulting from a leaking wastepipe
- Sub-floor ventilation generally adequate

Photo 2: soil moisture

- 1970s Auckland house
- Concrete piles, timber jackstuds
- Inspected after long dry period
- Severe cracking of ground
- Indication of prolonged periods of high moisture levels, followed by drying
- Sub-floor ventilation less than 25% of required level

Photo 3: exterior moisture

- 1920s Auckland house
- Repiled with treated timber piles
- Sub-floor framing mixture of radiata pine and rimu
- Unsafe excavation, decay and borer in bottom plates of exterior wall framing
- Bottom of weatherboard cladding buried
- No sub-floor ventilation provided.

Photo 4: flooring damage

- 1970s Auckland house
- Particle board flooring moisture damage
- Sub-floor framing radiata pine with some water staining but no decay
- Damage related to past leak from floor above (now repaired)

Photo 5: interior leaks

Same house as in Photo 18.

- 1970s Auckland house
- Concrete piles and radiata pine sub-floor framing
- Flooring particle board and plywood
- Extensive water staining but no sign of decay
- Past leaks from shower above – now fixed
- Adequate sub-floor ventilation provided

Photo 6: exterior moisture

- Large two-storey 1900s Wellington house
- Repiled with concrete piles
- Sub-floor framing mainly rimu
- Water ponding under house
- Decay in lower exterior wall framing and borer in matai flooring
- No clearance to exterior weatherboard cladding
- Sub-floor ventilation only 10% of required level

Photo 7: soil fungi

- 1980s Wellington house
- Concrete perimeter wall and piles, pine framing
- Debris stored in sub-floor
- Corroding fasteners and some timber decay
- Water staining on particle board flooring
- Fungi growth under leaking wastepipe
- No cladding clearance
- Sub-floor ventilation 34% of required level

Photo 8: soil fungi

Same house as Photo 11, Photo 13 and Photo 17.

- 1960s Wellington house
- Concrete perimeter wall and piles, rimu and pine framing, rimu flooring
- Debris stored in sub-floor
- Fungi growth under leaking wastepipe
- Leaking wastepipe
- Corroding fasteners
- No sign of timber decay
- No cladding clearance
- Sub-floor ventilation 60% of required level

16.6.1.2 Sub-floor fasteners

Photo 9: wire and staples

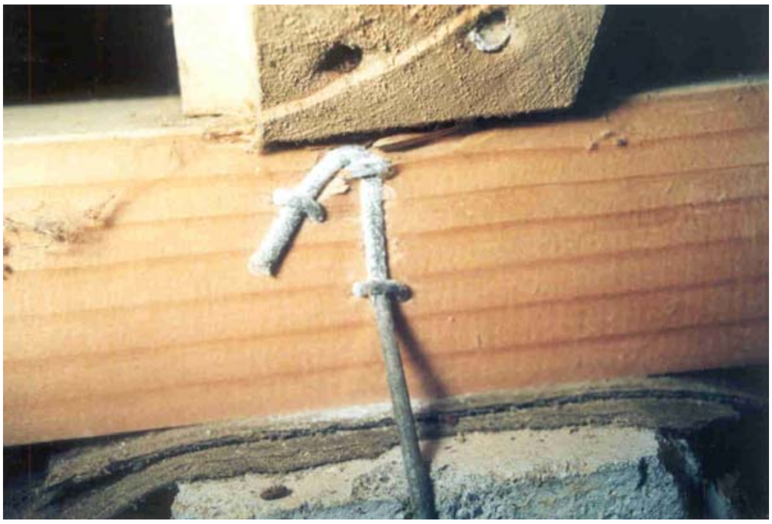
- 1980s Auckland house
- Treated timber piles, radiata pine framing and particle board flooring
- Joist moisture levels at upper level of normal range
- Inspected in late summer, so corrosion may indicate damp conditions during other seasons
- No sign of timber decay
- Adequate sub-floor ventilation provided

Photo 10: inadequate fixing

- Large 1970s Auckland house
- Large house with concrete block perimeter wall and piles, radiata pine framing, particle board flooring
- No specialised fasteners – nails only
- No DPC under jack studs
- No sub-floor ventilation provided

Photo 11: white rust

Same house as Photo 8, Photo 13 and Photo 17.



- 1960s Wellington house
- Concrete perimeter wall and piles, rimu and pine framing, rimu flooring
- Firewood stored
- Fungi growth
- Leaking wastepipe
- Corroding fasteners
- No sign of timber decay
- No cladding clearance
- Sub-floor ventilation 60% of required level

16.6.1.3 Sub-floor debris

Photo 12: storage in sub-floor

- 1980s Auckland house
- Concrete piles, radiata pine framing and particle board flooring
- Sub-floor space filled with stored items
- Storage typical of many houses in survey
- No sign of present moisture problems
- Sub-floor ventilation 66% of required level

Photo 13: firewood in sub-floor
Same house as Photo 8, Photo 11 and Photo 17.

- 1960s Wellington house
- Concrete perimeter wall and piles, rimu and pine framing, rimu flooring
- Firewood in sub-floor
- Fungi growth
- Leaking wastepipe
- Corroding fasteners
- No sign of timber decay
- No cladding clearance
- Sub-floor ventilation 60% of required level

Photo 14: cut floor joist

- 1970s Wellington house
- Concrete perimeter wall and piles, radiata pine framing, particle board flooring
- Floor joist completely cut through to accommodate waste pipe (note prop under end of joist)

Photo 15: leaking HWC pipe
Same house as in Photo 55.

- Large 1960s Wellington house
- Concrete perimeter wall and piles, rimu framing and flooring
- Severe corrosion and signs of leaking under hot water cylinder
- No signs of timber damage as yet

Photo 16: leaking pipe joint

- 1950s Auckland house
- Concrete perimeter wall and piles, rimu framing and flooring
- Water ponding under house
- No cladding clearance in some areas
- Galvanised steel joint in copper water pipe
- Severe galvanic corrosion between incompatible metals and joint leaking
- Signs of leaking from joint, but no timber decay
- Sub-floor ventilation 65% of required level

Photo 17: leaking wastepipe
Same house as Photo 8, Photo 11 and Photo 13.

- 1960s Wellington house
- Concrete perimeter wall and piles, rimu and pine framing, rimu flooring
- Firewood in sub-floor
- Fungi growth
- Leaking wastepipe
- Corroding fasteners
- No sign of timber decay
- No cladding clearance
- Sub-floor ventilation 60% of required level

16.6.1.4 Foundations

Photo 18: unsafe excavation
Same house as in Photo 5.

- 1970s Auckland house
- Concrete piles, radiata pine sub-floor framing and particle board and plywood flooring
- Piles undermined
- Extensive water staining but no sign of decay
- Past leaks from shower above – now fixed
- Adequate sub-floor ventilation provided

Photo 19: undermined piles

- 1990s Auckland house
- Treated timber piles – undermined by sub-floor excavation

Photo 20: rock piles

- 1900s Auckland house
- Some repiling with concrete piles
- Some floor joists supported on rocks sitting on ground.
- No sub-floor fasteners or DPC

Photo 21: foundation cracking

- 1950s Auckland house
- Concrete perimeter wall and piles
- Unsafe excavation behind concrete perimeter wall
- Some piles on lean and some with no fixings to timber framing.

Photo 22: blocked vents

- 1960s Christchurch house on flat site with minimal clearance under bearers
- Concrete perimeter wall and piles and block veneer.
- Driveway concrete poured up against vents
- Sub-floor ventilation 77% of required level

Photo 23: blocked vents

- 1960s Christchurch house on flat site with minimal clearance under bearers
- Concrete perimeter wall and piles
- Garden soil blocking vents
- Sub-floor ventilation 70% of required level

16.6.2 Exterior walls

16.6.2.1 Wall cladding

Photo 24: weatherboard decay

Same house as in Photo 47.

- 1920s Wellington house
- Rimu framing and weatherboards
- Severe decay in some weatherboards
- Nail rust staining

Photo 25: nail corrosion

Same house as Photo 34 and Photo 52.

- 1940s Wellington house on exposed coastal site
- Rimu framing and weatherboards
- Severe nail rust staining
- Paintwork in very poor condition on walls and windows

Photo 26: soaker corrosion

- 1970s Auckland house close to coast
- Corrosion of metal corner soakers
- Corrosion worst in upper walls – where protected by eaves from washing of salt deposits by rainwater
- Nail rust staining elsewhere on weatherboard cladding

Photo 27: metal cladding

- 1990s Wellington house close to coast
- Vertical corrugated powder-coated steel wall cladding
- No cladding clearance and bottom of steel corroding

Photo 28: brick veneer

- 1950s Auckland house
- Concrete piles and timber jack studs
- Brick veneer basement wall showing full depth cracking around garage doors.

Photo 29: flush-finished fibre-cement

Same house as in Photo 42.

- 1990s Auckland house
- Cladding flush-finished fibre-cement sheet
- Severe cracking at head to jamb junctions
- No evidence of adequate head flashings
- Water penetration and timber decay likely

Photo 30: old stucco

Same house as in Photo 53 and Photo 59.

- 1920s Wellington house close to coast
- Cladding stucco on wire mesh
- Full depth cracks in plaster
- Maintenance neglected over long period of time (note roof condition)

16.6.2.2 Windows and doors

Photo 31: window decay

- Large 1980s Auckland house close to coast
- Cedar weatherboards in poor condition
- Half of the original timber windows have been replaced with aluminium
- Remaining timber windows deteriorating rapidly – with some advanced decay
- Aluminium windows also showing signs of deterioration of anodised coating and stressed joints.

Photo 32: deteriorating timber

- 1950s Auckland house close to coast
- Timber windows in poor condition, but no sign of timber decay
- Putty cracked and dislodged
- Cracks in joints and in facing boards
- Corrosion of metal components

Photo 33: hardware corrosion

- 1950s Auckland house close to coast
- Severe corrosion of window hinges
- Corrosion worst where hinges protected by eaves from washing of salt deposits by rainwater
- Nail rust staining

Photo 34: paint deterioration

Same house as in Photo 25 and Photo 52.

- 1940s Wellington house on exposed coastal site
- Rimu framing and weatherboards
- Exposed timber in windows but no decay
- Putty cracks
- Corroding window hinges
- Severe nail rust staining
- Paintwork in very poor condition

Photo 35: rubber seals

- 1990s Auckland house
- Shrinking glazing seals
- The most common problem noted for aluminium windows

Photo 36: aluminium door hinges

- Large 1990s Wellington house on exposed coastal site
- Powder-coated aluminium French doors
- Severe corrosion of door hinges
- Also deterioration of coating

16.6.2.3 Chimneys

Photo 37: brick chimney

- 1940s Auckland house
- Full depth cracks in brick chimney
- Size of crack shown by key

16.6.2.4 Attached decks

Photo 38: timber decking

- 1970s Auckland house
- Ground floor timber deck close to ground
- Advanced timber decay of decking
- Joists too widely spaced
- Loose balusters

Photo 39: timber post-decay

- 1970s Auckland house
- Timber post and beam structure with spaced timber decking
- Deck floor 2.5 m above ground
- Some posts decaying at ground level

Photo 40: bracket corrosion

- 1930s Auckland house with deck added later
- Timber post and beam structure with spaced timber decking
- Deck floor 4 m above ground
- Deck joist brackets corroding badly

Photo 41: unsafe deck barrier
Same house as in Photo 56.

- 1960s Auckland house with deck addition
- Timber post and beam structure with spaced timber decking
- First floor deck 3 m above ground
- Handrail supports at 1200 mm centres with light shade cloth used as infill

Photo 42: handrail fixing
Same house as in Photo 29.

- 1990s Auckland house
- Wall and deck barrier cladding flush-finished fibre-cement sheet
- One of two first floor enclosed decks with membrane floors
- No fall to barrier top
- Handrail supports top fixed through cladding
- Signs of sealant breakdown and moisture penetration
- Corrosion of support

Photo 43: corroding barrier
Same house as in Photo 49.

- 1950s Wellington house close to coast
- Original concrete deck
- Deck floor 2.6 m above ground
- Severe corrosion in steel balustrade

16.6.2.5 Other features

Photo 44: exterior wiring

- 1970s Auckland house close to coast
- Permanently connected exterior electric cable fixed under soffit

Photo 45: pergola beams

- 1950s Christchurch house
- Pergola with clear uPVC roofing added recently
- Pergola beams cut around gutter
- Beams fixed to stringer with nails only

Photo 46: carport beams

- 1980s Christchurch house
- Carport added later
- Carport beams nail-fixed to eaves framing
- No brackets and no stringer

16.6.3 Roof

16.6.3.1 Corrugated iron

Photo 47: corroding roof
Same house as in Photo 24.

- 1920s Wellington house
- Rimu framing, weatherboard cladding
- Unpainted corrugated longrun steel – probably about 30 to 35 years old.
- Wall cladding also in very poor condition
- Note also sag in rafters

Photo 48: corroding roof

- 1920s Auckland house
- Rimu framing and original roof with lapped joints
- Photograph from inside roof space indicates typical corrosion at lap joints
- Water staining of roof framing indicates current leaking
- Note lack of underlay -typical of roofs of this age

Photo 49: corroding roof
Same house as in Photo 43.

- 1950s Wellington house close to coast
- Original galvanised steel roof
- Severe corrosion
- Dents in metal
- Missing and/or corroded fixings
- Note attempts to remedy leaks with sealant

16.6.3.2 Other roof claddings

Photo 50: chip coated tiles

- 1970s Auckland house close to coast
- Roof exhibits most common problems found in this type of cladding
- Chip coating deteriorating with base metal exposed and starting to corrode
- Tiles dented where walked over

Photo 51: metal roof tiles

- 1990s Auckland house
- Coil-coated metal tile roofing
- Severe denting from foot traffic

Photo 52: clay tile erosion

Same house as in Photo 25 and Photo 34.

- 1940s Wellington house on exposed coastal site
- Rimu framing and weatherboards
- Original steep-pitched clay tile roof
- Roof tiles cracking and dislodged in places
- Photographed from inside roof space – showing erosion of tiles

16.6.3.3 Guttering

Photo 53: corroding gutters
Same house as in Photo 30 and Photo 59.

- 1920s Wellington house close to coast
- Wall cladding stucco on wire mesh
- Roof corrugation iron – no repainting for many years
- Very old galvanised steel gutters rusted out in many areas and leaking badly
- Maintenance neglected over long period of time.

Photo 54: leaking gutters

- 1940s Auckland house with recently replaced roof
- New roof is metal tiles with uPVC guttering
- Roof has no overhang over gutter – allows water to drain behind gutter
- Note water stains at back of gutter

Photo 55: gutter debris
Same house as in Photo 15.

- Large 1960s Wellington house
- Original concrete tile roof with flat membrane area forming large internal gutter
- Inadequate falls allow build-up of moss and debris
- Area not regularly cleaned out
- Gutter currently leaking

16.6.4 Roof space

16.6.4.1 General

Photo 56: roof underlay

Same house as in

Photo 41.

- 1960s Auckland house
- Metal tile roof
- Degradation of roof underlay

Photo 57: roof space pests

- 1990s Wellington house
- Roof space in good condition, except for birds nests

Photo 58: roof space pests

- 1990s Wellington house
- Roof space in good condition, except for birds nests

16.6.4.2 Header-tanks

Photo 59: unrestrained header-tank

- 1960s Wellington house
- Header-tank generally in good condition, but not restrained against earthquake movement
- Note also the lack of any ceiling insulation

Photo 60: unrestrained header-tank

Same house as in Photo 30 and Photo 53.

- 1920s Wellington house
- Header-tank generally in good condition, but not restrained against earthquake movement
- Note lack of pipe lagging
- Note also the lack of any ceiling insulation

Photo 61: external header-tank

- 1900s Christchurch house
- Header-tank sits on external platform – only external tank in survey
- Not restrained against earthquake movement

16.6.4.3 Ceiling insulation

Photo 62: insulation damage

- 1970s Auckland house
- Fibreglass batts damaged or not put back after work done in ceiling space
- Note also lack of earthquake restraints on header-tanks

Photo 63: insulation damage

- 1960s Auckland house
- Fibreglass batts damaged and not put back after installation of fan in ceiling space

Photo 64: insulation damage

- 1940s Auckland house
- Fibreglass batts damaged and not put back after installation of fan in ceiling space

Photo 65: insulation settling

- 1990s Auckland house
- Loose fill macerated paper insulation settling over time
- Thickness uneven with some areas only about 50 mm thick

Photo 66: insulation settling

- 1990s Auckland house
- Loose fill macerated paper insulation settling over time
- Thickness uneven with most areas only about 50 mm thick
- Also poor installed with gaps in insulation cover

Photo 67: blown fibreglass

- 1990s Auckland house
- Loose fill fibreglass insulation settling over time
- Poorly installed with gaps and uneven thickness
- Insulation also damaged when later work done in roof space

Photo 68: blown rockwool

- 1990s Auckland house
- Loose fill wool insulation
- Insulation poorly installed with gaps, settling and later damage

16.6.5 Interior

16.6.5.1 Hot water cylinders

Photo 69: sub-floor HWC

- 1950s Auckland house
- 1982 HWC installed in sub-floor space
- Cylinder corroding
- Thermostat difficult to access
- No pipe insulation

Photo 70: wiring to HWC

- 1950s Auckland house
- Original HWC – about 50 years old
- Dangerous wiring to switch
- Deteriorating pipe lagging

Photo 71: wiring to HWC

- 1940s Auckland house
- 10 year old HWC
- No cover to thermostat
- Wiring exposed

Photo 72: corroding HWC

- 1940s Auckland house
- Original cylinder – almost 60 years old
- Cylinder corroding badly at base, and leaking
- Thermostat unreliable – hot water delivered 15^{o}C above setting
- Thermostat difficult to access
- No pipe insulation

Photo 73: roof space HWC

- 1970s Auckland house
- 1999 second HWC installed in ceiling space above bathroom
- No earthquake restraint
- No pipe insulation

16.6.5.2 Bathrooms

Photo 74: bathroom mildew

- 1900s Auckland house
- Bathroom renovated in 1950s and refurbished in last 5 years
- Typical condition of timber plate around bath – mildew and paint deterioration
- No mechanical ventilation or heating in bathroom

Photo 75: bathroom mildew

- 1950s Auckland house
- Extensive mould on ceiling
- Moisture damage to paintwork
- No mechanical ventilation or heating in bathroom
- Shower over bath – flow rate too low at 3 litres/min

Photo 76: bathroom mildew

Refer also Photo 81.

- 1950s Auckland house
- Extensive black mould throughout house
- Moisture damage
- No mechanical ventilation or heating in bathroom
- No insulation in walls or ceilings

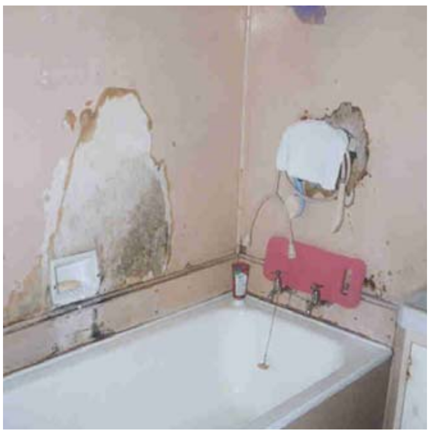
Photo 77: bathroom mildew

Same house as Photo 78.

- 1960s Auckland house
- Extensive mould on ceiling
- Moisture damage to linings
- No mechanical ventilation or heating in bathroom
- No wall insulation
- Ceiling insulation macerated paper – only 50 mm thick

Photo 78: water damage

Same house as Photo 77.



- 1950s Auckland house
- Refer above comments
- Moisture damage to linings – wallpaper peeling
- Inadequate finishes around bath
- No mechanical ventilation or heating in bathroom

16.6.5.3 Other rooms

Photo 79: bedroom mildew

- 1970s Auckland house
- Mildew to bedroom wall
- No wall insulation
- No access to ceiling space to check insulation

Photo 80: ceiling mildew

- 1970s Auckland house
- Extensive black mildew to living room ceiling
- No ceiling or wall insulation
- Limited heating – 1 small portable electric radiator and an enclosed woodburner

Photo 81: bedroom mildew

Same house as in Photo 76.

- 1950s Auckland house
- Photo of bedroom
- Extensive black mould throughout house
- Moisture damage to linings and finishes
- Only heating - enclosed woodburner
- No insulation in walls or ceilings

Photo 82: wall finishes

- 1950s Auckland house
- Photo of bedroom
- Extensive mould in bedrooms, some in living areas
- Finishes poor – holes, cracks, poor repairs, water stains, borer
- Heating – open fire and LPG heater
- No insulation in walls or ceilings