STUDY REPORT

SR 285 (2013)

House repair priorities

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Preface

This report describes the condition of the housing stock matched to categories of occupants. The condition of the stock has been assessed in several surveys over the last 20 years and data collected on the occupants. Early reports have described a slow deterioration, or at best a static state, in overall condition. Part of this is due to lack of income and/or knowledge of repair/maintenance priorities.

The aim of this work is to provide advice on the repair priorities based on types of defect and household socio-economic factors. It is mainly tailored for the owner-occupier, though some data is provided for rental stock owners. Certain repairs are more important than others due to the possibility of accelerated physical deterioration. As well, there can be health impacts when repairs are neglected and this varies by component and household type. Priorities are provided for various house and occupant types, including repair cost information matched to household income.

Acknowledgments

This work was funded by the Building Research Levy.

Note

This report is intended for researchers, builders and home owners. It provides data on the quantum of repairs needed in housing, and this is related to household incomes.

House repair priorities

BRANZ Study Report SR 285

IC Page, MD Curtis

Abstract

Home owners are usually aware of the need to maintain their homes, but often they are limited in the funds available for maintenance. What are the implications of funding shortfalls for maintenance and what are the main priorities in maintenance? This report outlines the average state of housing by age of house and household income. It provides recommendations on repair priorities for various house and occupant types, including repair cost information matched to household income. Certain repairs are more important than others due to the possibility of accelerated physical deterioration. The report is mainly tailored for officials and researchers but owner-occupiers and rental stock owners will find it of interest.

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1. INTRODUCTION

For most households their dwelling is the largest single asset they own. It is a store of wealth as well as its primary purpose of providing shelter. Historically, existing house prices have risen above the rate of inflation in most locations, even when the house is somewhat rundown. However, due to increasing unaffordability we may be in for a period of lower price escalation. In this environment owners need to maintain their homes to preserve their physical integrity as well as to protect a large financial asset. Overseas the maintenance issues for owners have received some attention because it is recognised it affects efficiency and sustainability goals, it has health impacts, demand for social housing may increase if the private stock is not maintained and slow deterioration of housing has a destabilising impact on communities.

This research is into the condition of the housing stock, what spending owners need to undertake to maintain it and an assessment of how affordable the maintenance requirements are for various income groups. The analysis is based on the BRANZ House Condition Survey 2010 (HCS). It is a survey of over 400 houses representative of the total housing stock and over 25 components were inspected for condition. Some components are more important than others in terms of health and safety, and when these get into a poor condition owners need to take remedial measures as soon as possible. Often the availability of surplus money limits what can be done. This report lists priorities for various income groups.

Beyond the need for normal maintenance, housing in some parts of the country need strengthening to resist earthquake and wind loads that may cause damage in older houses. These measures and their costs and benefits are outlined in the report.

2. SUMMARY

The main findings were:

- For owner-occupiers the lower income groups generally have the worst condition of houses. Almost 87% of households with incomes below $20,000 require immediate repairs at an average cost of $5800. This obviously poses a problem for repairing these houses due to affordability constraints.
- Claddings and windows should be the first priority when funds are limited to avoid further damage to the structure. This reduces the percentage of houses needing immediate repairs in the below $20,000 income group to about 44%. But the average cost is similar to the above because these components are the most expensive to repair.
- Above $50,000 household income the amount of required immediate repairs averages about $5100 for those houses needing repair and is less than 10% of annual income which is likely to be affordable over two or three years.
- A significant proportion of high income households live in houses in bad condition and while they are more likely to be able to afford repairs, these have not been done. The main reasons for this are believed to be lack of knowledge of how to assess the condition of their house and other spending priorities.
- Low-cost measures to be untaken by all households with timber ground floors are to clear any obstructions to the sub-floor vents to ensure adequate ventilation and

to install plastic sheeting on the ground under the house to reduce moisture problems.

- Where regular income is insufficient to undertake repairs, the main option is to use any savings the household may have to complete the work. Any do-it-yourself (DIY) the owner is able to do on these components will significantly reduce costs. Otherwise, unrepaired housing may have health and safety implications as well as diminishing the investment value of their house.
- Rental houses tend to be in the worst condition, on average, than owner-occupier housing of the same house age.
- Strengthening of older houses for earthquake resistance can involve a number of low-cost measures (wire dogs between floor joists and piles, removing old chimneys, fixing hot water cylinders), it is cost-effective and is relatively affordable by most households.
- Wind load strengthening to roofs of older houses is likely to be cost effective in wind hazard zones.

3. MAIN RESULTS

3.1 2010 House Condition Survey (HCS)

The database of the 2010 HCS was analysed for repair costs and household characteristics. Summary data is shown in this section and more details are in the Appendix. The main findings were:

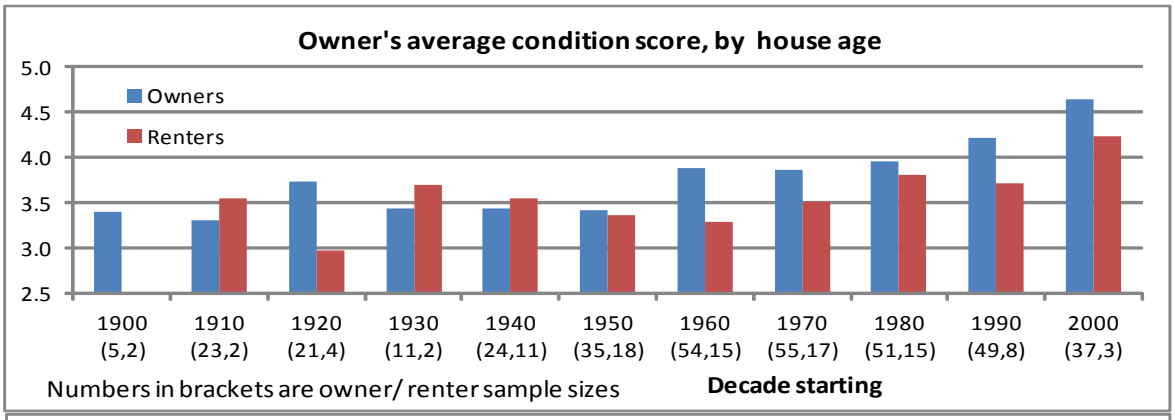
- Section 3.1.1 House condition improved the younger the house. Owners generally lived in better condition houses than renters.
- Section 3.1.2 The highest outstanding repair costs were in the $40K-$50K household income group averaging about $11,100 or 25% of their annual income. The $10K-$20K group had the highest percentage at 62% for the repairs to income ratio.
- Section 3.1.3 Approximately 75% of all owner-occupied houses needed some immediate repairs.
- Section 3.1.4. Additional to necessary physical repairs to avoid deterioration was the mitigation of trip and fall hazards, averaging about $3000 per house.
- Section 3.1.5 Components most commonly needing immediate repair were sub-floor fasteners, window frames and wall claddings. Also, most houses needed floor and extra ceiling insulation.
- Section 3.1.6. Households were spending significantly less on repairs and maintenance than they should have been doing to address the immediate repair needs.
- Section 3.1.7. Maintenance expenditure by households tends to be greater in the first year of occupancy than later years.
- Section 3.1.8. The major reason for deferring maintenance is the expense. Other reasons for deferral include “other priorities” and “maintenance was not serious”.

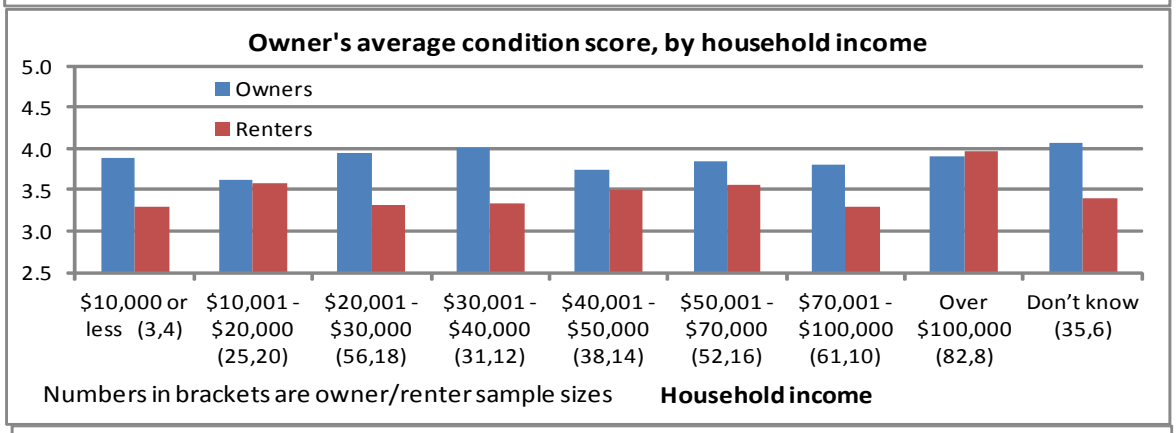
- Section 3.3 Wind load strengthening to roofs of older houses is likely to be cost effective in wind hazard zones.

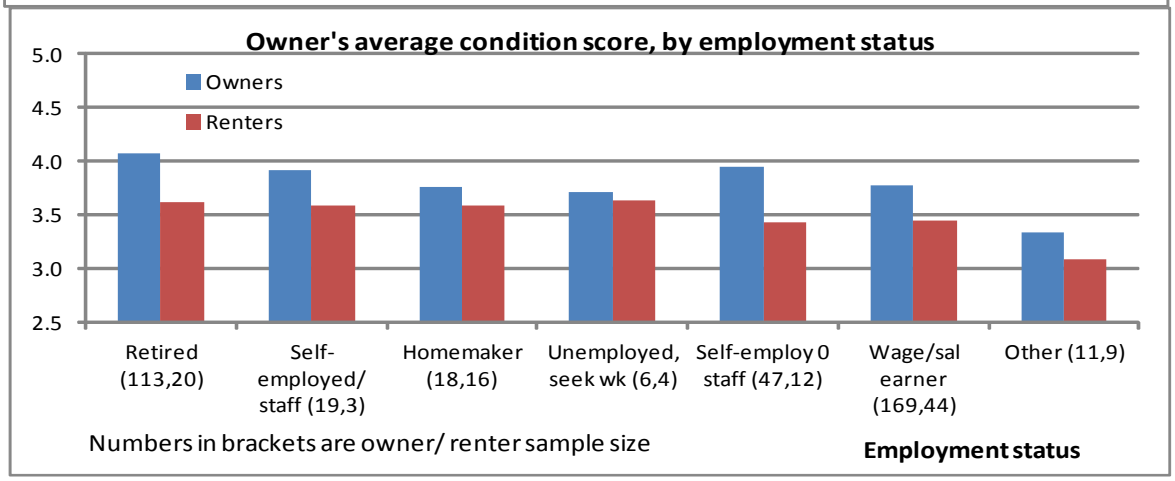
3.1.1 Condition scores for owner-occupiers

Figure 1 shows the average condition score for various household characteristics, for owner and rental housing. There were 25 components which were rated on a five-point scale ranging from 1 = serious, 2 = poor, 3 = moderate, 4 = good to 5 = as-new condition. The average scores are for all components. The 25 components are listed in the Appendix.

The widest variation in scores within the four panels was across the house ages with a 40% spread in score between the decades. The least variation for owners was by income group with a 12% spread in score. The lowest average score was 3.1 for those renting in the “Other” group in the employment status panel. This group is mainly unemployed people not seeking work and on a benefit. Rentals have a lower score than owners in almost all categories.







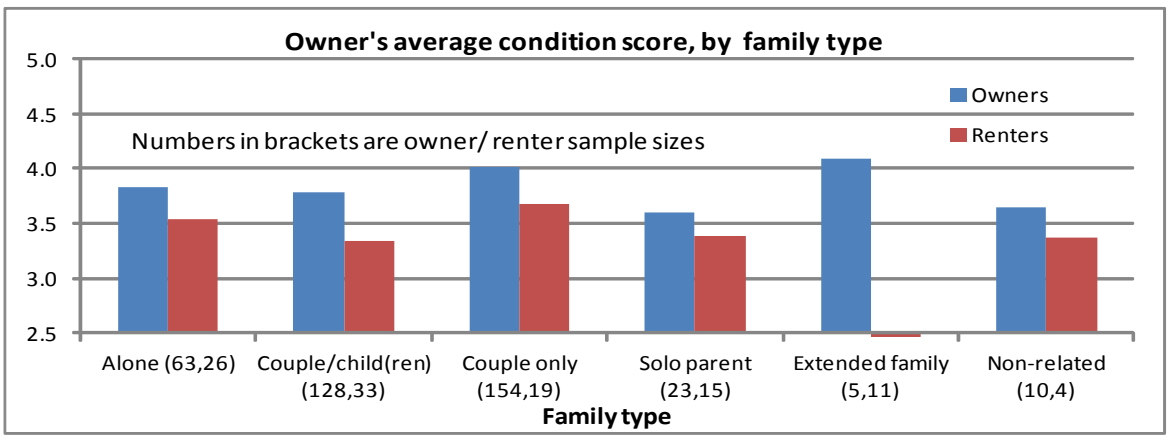


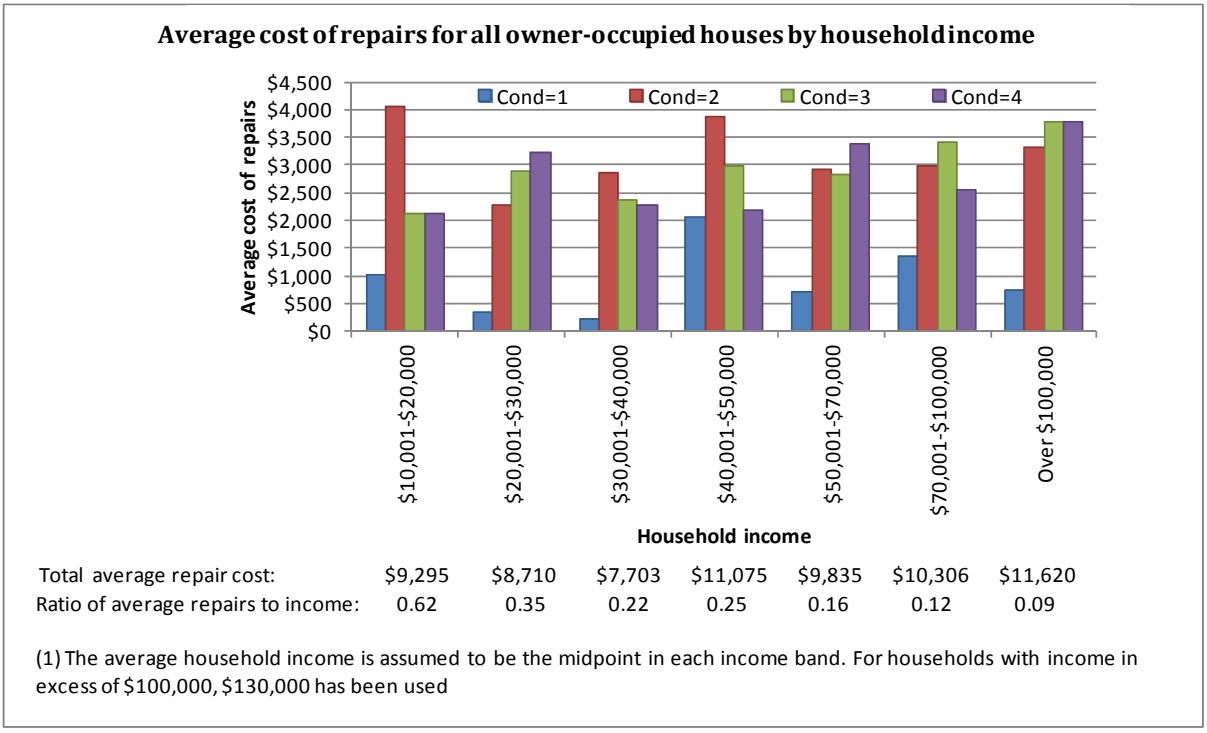
Figure 1 All component condition scores by house age and owner characteristics

3.1.2 Total repair costs for owner-occupiers

Repair costs were estimated for each component and condition level, adjusted for the size of the house. Components in worse condition had a larger cost for repair to as-new condition than the same component in better condition. Details of repair costs by component and condition are in the Appendix.

The average repair cost for all houses by household income is shown in Figure 2. The cost to repair a component in the particular condition was summed for each income group and divided by the number of owners in that income group. “Condition 1” components were fairly rare and hence the averages for this condition are generally low. Conversely, “Condition 2” components were more common and their repair cost is typically quite high. Summing all conditions in each income group gives the average cost to bring houses to an as-new condition. These costs and the income ratio are shown in the bottom of the chart.

The $40,001-$50,000 income group had a comparatively large average repair cost with a high incidence of components in serious condition. This group had the repairs to income ratio of 0.25 meaning that on average, it would have taken a quarter of the household’s annual income to repair all of the defects. Households with a combined income of $10,001-$20,000 had the highest ratio of 0.62.



Total average repair cost:	$9,295	$8,710	$7,703	$11,075	$9,835	$10,306	$11,620
Ratio of average repairs to income:	0.62	0.35	0.22	0.25	0.16	0.12	0.09

(1) The average household income is assumed to be the midpoint in each income band. For households with income in excess of $100,000, $130,000 has been used

Figure 2 Average cost of repairs for all houses

3.1.3 Immediate repairs costs for owner-occupiers

The highest priorities for repairs are the components in “serious” or “poor” condition. Components in serious or poor condition need to be repaired immediately because they pose a hazard to health and/or safety (we have termed these “immediate repairs”).

Figure 3 shows the percentage of houses that required immediate repairs by income group. Well over two-thirds of all houses needed immediate repairs. The lowest percentage, at 72%, was in the $50,001 to $70,000 income group.

The two income groups that had the largest proportion of houses requiring immediate repairs were the $10,001-$20,000 and $40,001-$50,000 groups at 87%. If only the exterior envelope is considered (the claddings, windows and foundations) the percentage of houses that needed immediate repairs drops significantly, to between 23% and 47%. These components are more critical than others for preventing further damage, so they should be the first priority for owners with houses in poor or serious condition.

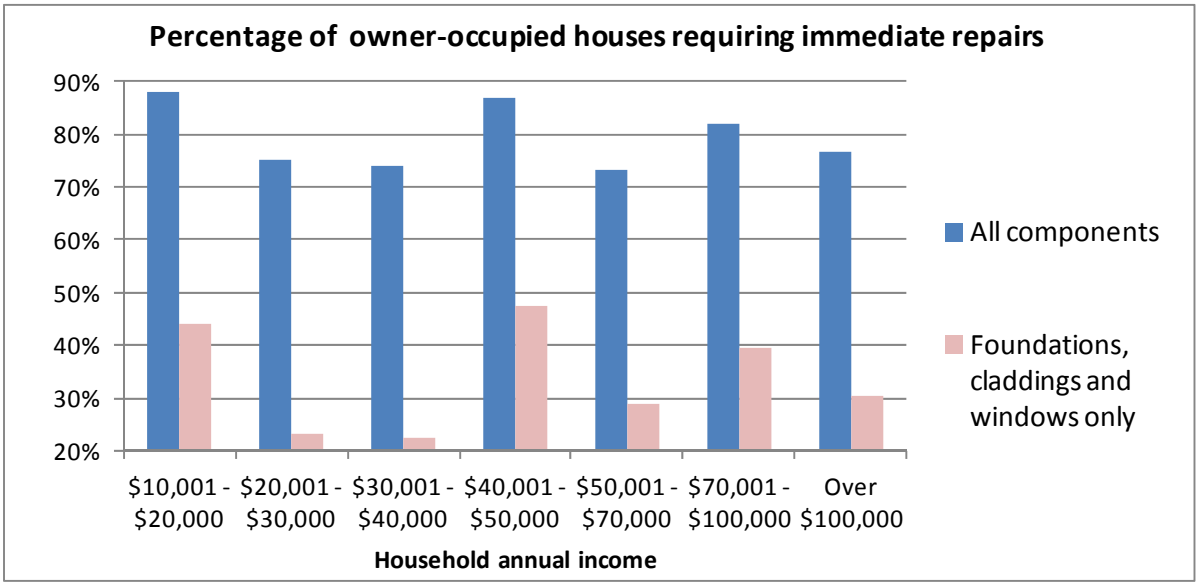
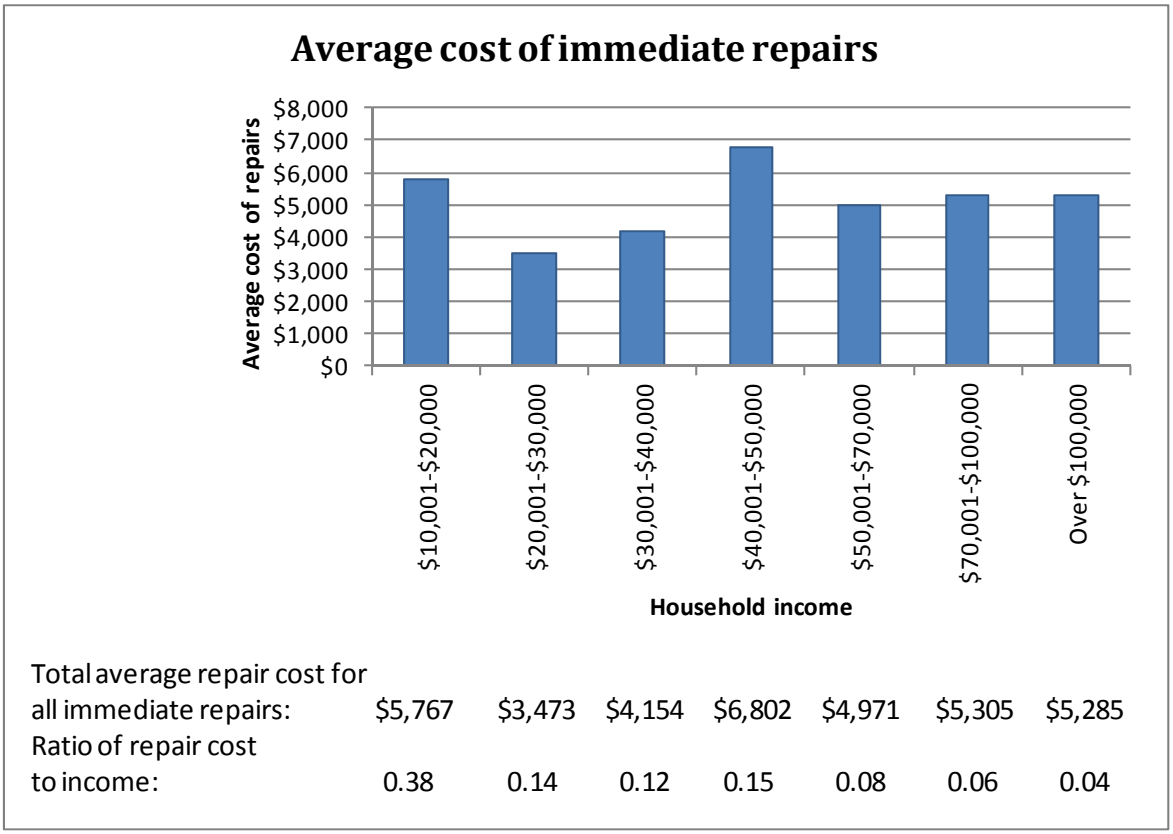


Figure 3 Percentage of houses needing immediate repairs by income group

Figure 4 shows the average costs for repairing houses requiring immediate repairs, for all components, within each income group.

The $40,001-$50,000 income group had the largest average repair cost for immediate repairs. For these houses, an average of 15% of the household's annual income was required to repair the defects. However, the $10,001-$20,000 income group needed to spend 38% of their income on immediate repairs at an average total of $5767.

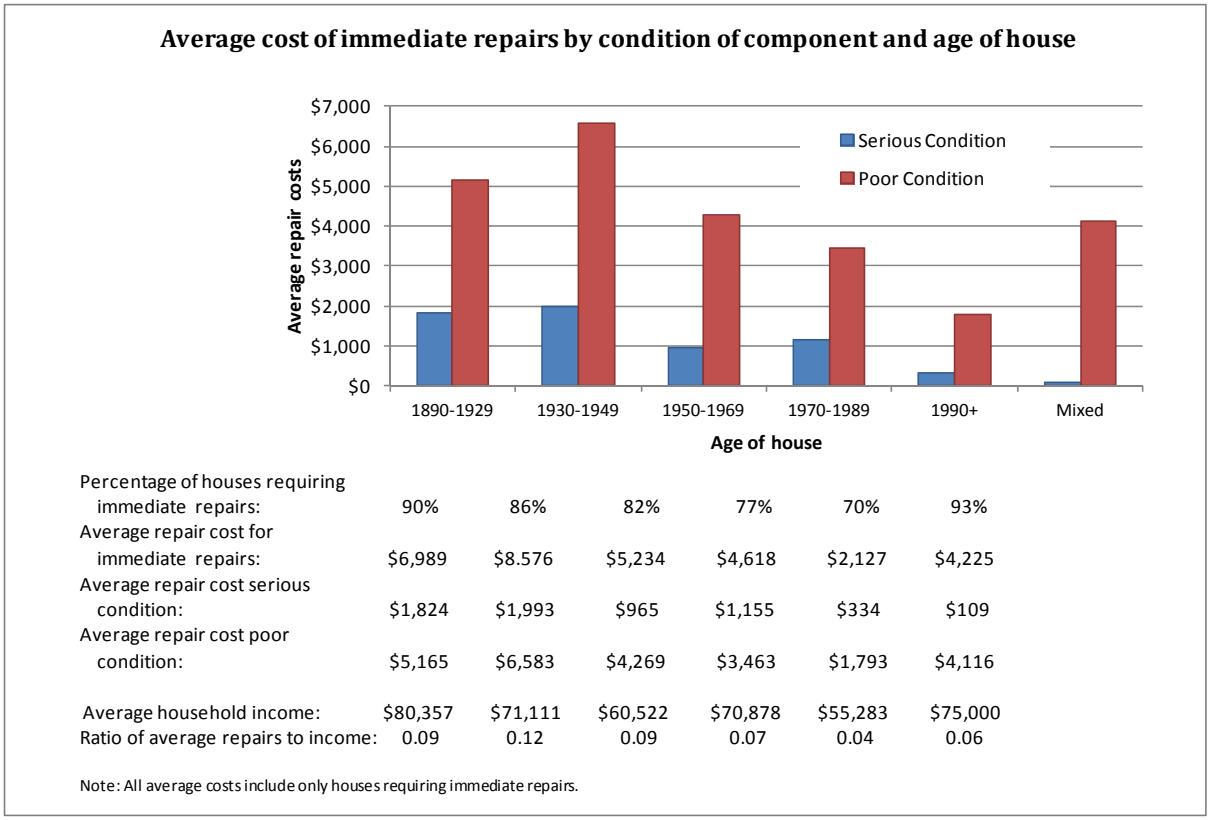


Total average repair cost for all immediate repairs:	$5,767	$3,473	$4,154	$6,802	$4,971	$5,305	$5,285
Ratio of repair cost to income:	0.38	0.14	0.12	0.15	0.08	0.06	0.04

Figure 4 Immediate repair costs by income group

Figure 1 previously illustrated that earlier houses had lower average condition scores than later houses. Figure 5 shows the average cost of immediate repairs by the age of the house. The mixed category is used to represent houses that have had a significant alteration or addition that affects the age of the house.

Houses built since 1990 had the lowest average household income at just above $55,000. However, these houses were also in the best condition. Therefore, they had the lowest average repair cost for immediate repairs and the smallest ratio of average repairs to income at 4% of the household's annual income. The 1930 to 1949 houses had the highest ratio of immediate repairs to income even though their household income was quite high.



Percentage of houses requiring immediate repairs:	90%	86%	82%	77%	70%	93%
Average repair cost for immediate repairs:	$6,989	$8.576	$5,234	$4,618	$2,127	$4,225
Average repair cost serious condition:	$1,824	$1,993	$965	$1,155	$334	$109
Average repair cost poor condition:	$5,165	$6,583	$4,269	$3,463	$1,793	$4,116
Average household income:	$80,357	$71,111	$60,522	$70,878	$55,283	$75,000
Ratio of average repairs to income:	0.09	0.12	0.09	0.07	0.04	0.06

Note: All average costs include only houses requiring immediate repairs.

Figure 5 Average cost of immediate repairs by house age

The above covers owner-occupied houses only. Repair costs for rentals compared to owner-occupied are shown in Figure 6. The costs were typically about $1000 more per house in rentals compared to owner-occupied houses, for immediate repairs.

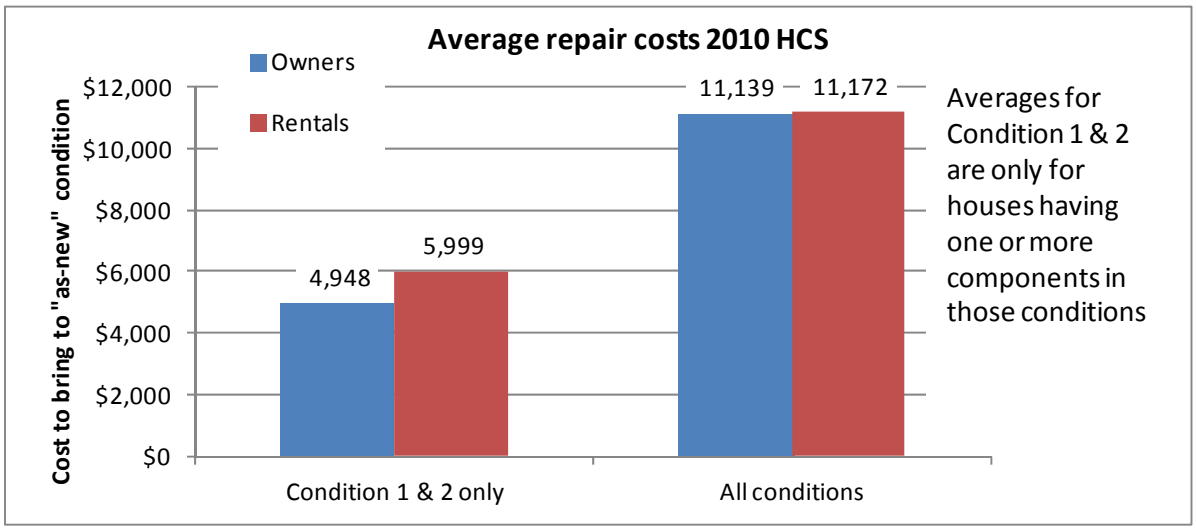


Figure 6 Repair costs owner-occupied vs rental housing

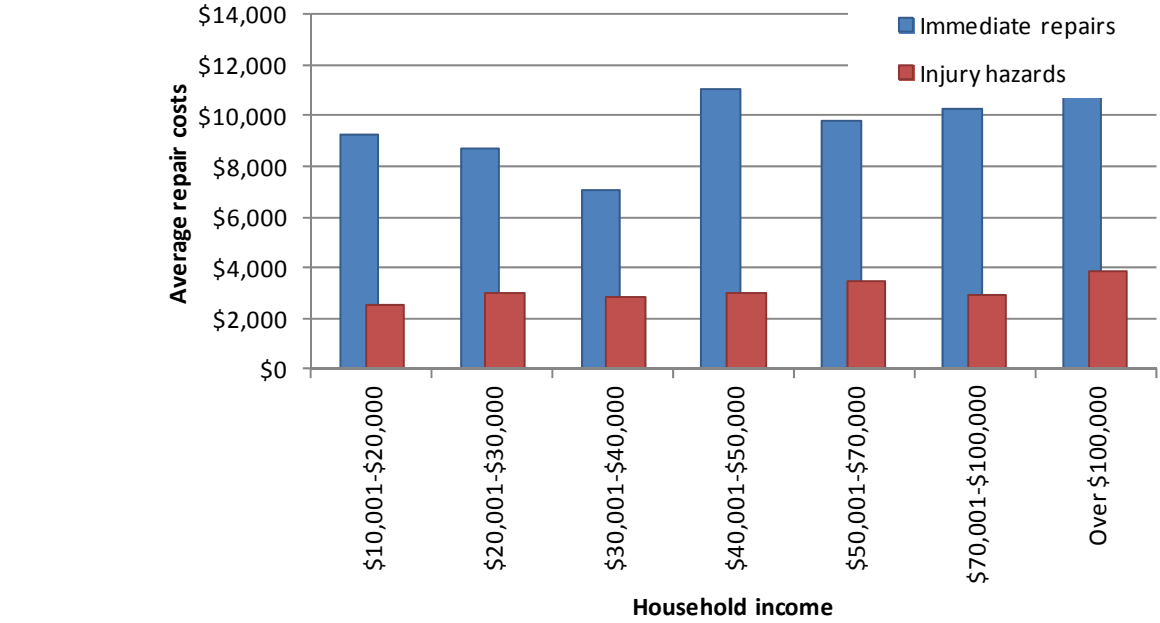
3.1.4 Physical hazards

The major causes of injuries around the home are falls and trips. Most physical hazards are picked up in assessing the condition of the 25 components. These include

defects in floors (slippery, torn covers, holes), unsafe ramps and defects in decking and balconies. However, some physical hazards occur outside these 25 components, namely:

- Poor exterior lighting at entrances.
- Hazardous internal stairs – slippery or uneven.
- Lack of side fencing at driveways.

These repair/hazard mitigation costs were separately estimated, see Figure 7. The largest average cost of repairing the injury hazards was for the over $100,000 income group at $3826 which was about 38% of the total average cost of immediate repairs. The smallest average cost of repairing the injury hazards was for the $10,001 to $20,000 income group at just $2570 which was about 21% of the total average immediate repairs cost. These costs are additional to those previously described.



	$10,001-$20,000	$20,001-$30,000	$30,001-$40,000	$40,001-$50,000	$50,001-$70,000	$70,001-$100,000	Over $100,000
Average cost of injury hazards:	$2,570	$3,029	$2,813	$3,012	$3,470	$2,937	$3,826
Ratio of injury hazards cost to immediate repairs cost:	0.28	0.35	0.40	0.27	0.35	0.28	0.33

Note: All average costs include only houses requiring immediate repairs

Figure 7 Average cost of repairs to injury hazards by household income

3.1.5 Condition breakdown by component

The most common components that were in need of immediate repairs for each age of house category are shown in Figure 8. The selected components, requiring immediate repair, occurred in over a third of all houses.

Almost half of the houses built between 1890 and 1929 required immediate repairs to the sub-floor fasteners. Where only nails had been used as fasteners, the condition was generally poorest, especially in houses built between 1890 and 1929, and since 1990. Approximately 26% of houses built between 1890 and 1929 had nails only used

as fasteners. In houses built since 1990, this was just 2%. Wire and staple fasteners required immediate repairs in 30% of the houses built between 1890 and 1929 where they were used, and wire dog fasteners in 17%.

Just over a third of houses built between 1930 and 1949 required immediate repairs to the wall cladding. No particular type of cladding was more susceptible to being in worse condition than others on the whole. The type of cladding used varied even within the house age bands.

Timber window frames were generally in worse condition than aluminium window frames. Older timber window frames, particularly those in houses built prior to 1970, had the greatest proportion requiring immediate repair. Very few aluminium window frames required repairs, especially those in houses built since 1950.

Carports were not particularly prevalent, with approximately 29% of houses having a carport. A high proportion of steel-framed carports with houses built before 1970 required immediate repair, as well as timber-framed carports with houses built between 1930 and 1949, and concrete/concrete block-framed carports with houses built between 1950 and 1969.

A high proportion of houses, particularly those built prior to 1950, required immediate repairs to the second bathroom's linings and/or fittings. Approximately 28% of houses built prior to 1950 have a second bathroom, of which 48% required immediate repairs to the linings and 52% to the fittings. Since 1950, approximately 44% of houses have a second bathroom. Only 9% of those required immediate repairs to the linings and 6% required immediate repairs to the fittings.

The most common component in need of immediate repair was the insulation in the roof space. The definition of "repair" includes non-existent or inadequate insulation. Just 2% of houses did not have any insulation in the roof space and the most common issue was insufficient insulation. The criteria used was the 2007 revision to clause H1 of the Building Code, effectively requiring ceiling insulation of R3.2 in Zone 1 and 2 (North Island excluding the Central Plateau) and R3.6 in Zone 3 (the South Island).

Other common components in need of repair included the foundations in houses built between 1890 and 1929 and exterior doors, roof cladding, spouting, main bathroom linings, laundry linings and other linings in houses built between 1930 and 1949. Between a quarter and a third of these houses required immediate repairs in such areas.

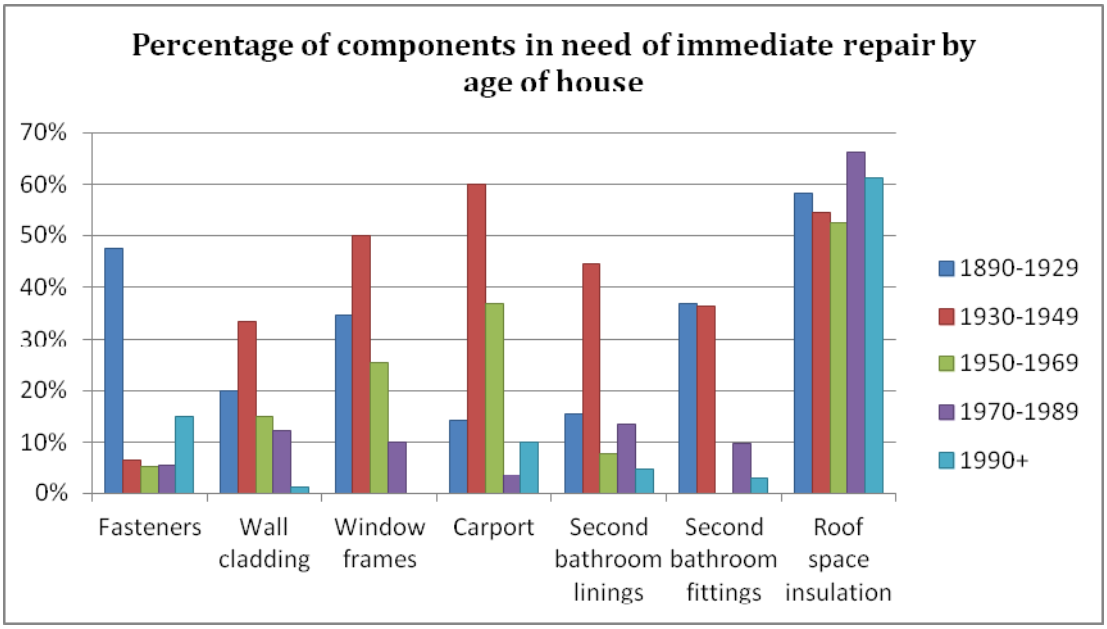


Figure 8 Percentage of components in need of immediate repair

Table 1 shows the five most common components in need of repair by the age of house. The roof space insulation featured highly in all of the house age groups. Excluding the 1890 to 1929 house age group, the prevalence of components in need of immediate repair decreased the newer the house.

The components with the largest repair cost were wall claddings, windows, linings in other rooms and insulation. In a household with limited funds the priority would be the external envelope, i.e. the wall claddings and windows.

Top five most common components in need of repair by age of house

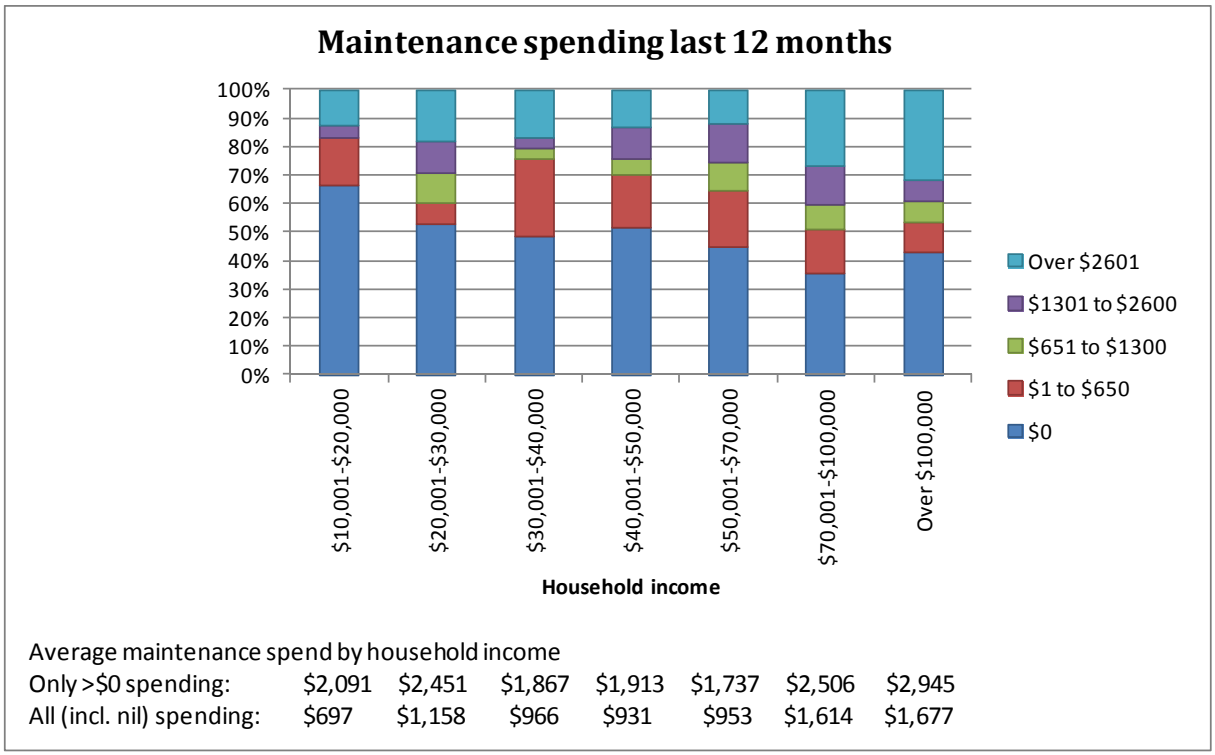
1890-1929	Percentage[(1)]
Roof space insulation	58%
Fasteners	48%
Second bathroom fittings	37%
Window frames	35%
Foundations	28%
1930-1949	
Carport	60%
Roof space insulation	55%
Windows	50%
Second bathroom linings	44%
Second bathroom fittings	36%
1950-1969	
Roof space insulation	53%
Carport	37%
Window frames	25%
Spouting	24%
Laundry linings	24%
1970-1989	
Roof space insulation	66%
Second bathroom linings	14%
Laundry linings	12%
Wall Cladding	12%
Main bathroom fittings	11%
1990+	
Roof space insulation	61%
Joists/bearers	19%
Fasteners	15%
Carport	10%
Steps/ramps	6%

[(1)] the percentage of houses with the particular component in need of immediate repair

Table 1 Most common components in need of repair by age of house

3.1.6 Actual maintenance expenditure by owners

A telephone survey was undertaken as part of the house condition survey. One question to owners was "How much was spent on maintenance or repairs over the last 12 months?". The response was recorded in five bands, namely $0, $1 to $650, $651 to $1300, $1301 to $2600 and over $2600. The spending by household income is shown in Figure 9 and indicates that in households between $20,000 and $70,000 income the average spend was about $1000 over the year and higher above $70,000. This includes the households not having any maintenance spending which was 47% of all those providing data on income and maintenance spending.



Average maintenance spend by household income

Only >$0 spending:	$2,091	$2,451	$1,867	$1,913	$1,737	$2,506	$2,945
All (incl. nil) spending:	$697	$1,158	$966	$931	$953	$1,614	$1,677

Figure 9 Maintenance spending in 2010 by income bands from HCS

Figure 10 shows the amount that was spent on maintenance or repairs contrasted against the immediate repair costs. The number in brackets beside the total spent on repairs in the last 12 months band shows the number of responses in each band.

Some 45% of respondents did not spend anything on maintenance or repairs over the last 12 months. However, 79% of the houses surveyed that did not spend anything on maintenance or repairs in that period required immediate repairs.

The two bands with the lowest actual spending on repairs/maintenance ($0 and $1 to $650) also generally required only small amounts of "immediate repairs". This is possibly because they were better maintained in earlier years. But even so, they still had a significant need for repairs, amounting to about $4000 per house.

The peak of average repair costs was for the $651 to $1300 band.

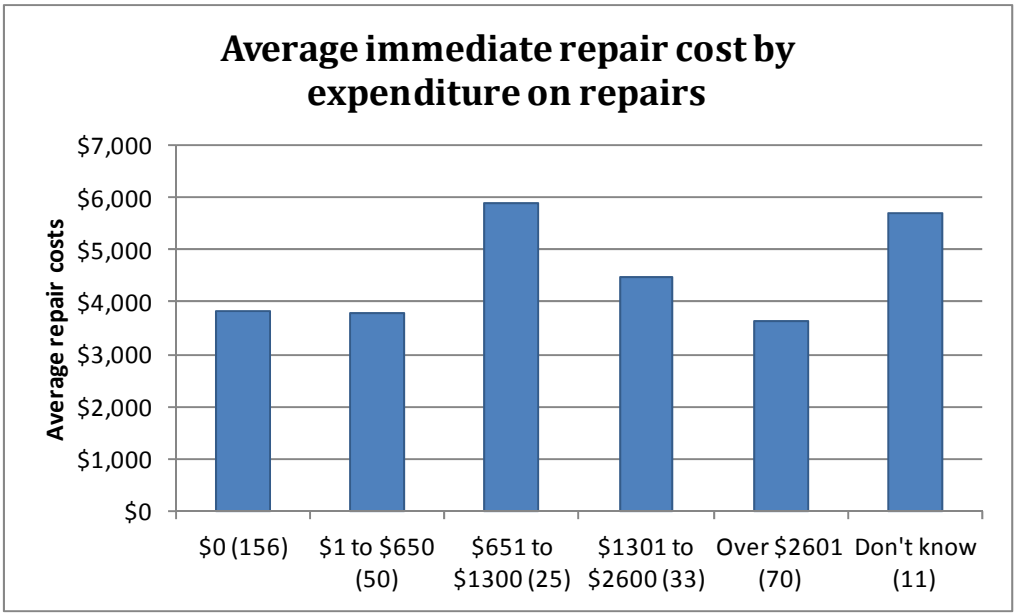


Figure 10 Average repair costs by repairs over the last 12 months

Where money had been spent on repairs and maintenance in the last 12 months, the average component scores were higher. Figure 11 shows a comparison of average component scores for certain components where some money had been spent on repairs or maintenance against houses where no money had been spent on the component. The percentage in brackets is the percentage of households surveyed that had spent money on that component in the last 12 months.

The two components that had higher average condition scores where money was not spent than where money was spent on repairs or maintenance were outside walls and windows. Some 35% of those surveyed stated they had spent money on repairs or maintenance of their windows, yet these houses had a lower average component score than the 65% that had not had any money spent. Only the houses built between 1930 and 1969 had a higher average component score for the windows where some money was spent on repairs or maintenance than where no money was spent.

The windows result is puzzling because the “some money spent” windows had lower scores than “no money spent” windows. It appears most spending was on older houses with timber windows and, even after repair, their condition was not as good as aluminium windows in both newer houses and as replacement windows in older houses.

The lowest component for repairs was foundation piles with just 1% of households surveyed spending some money on repairs or maintenance. The higher percentages were in outside walls and linings decoration.

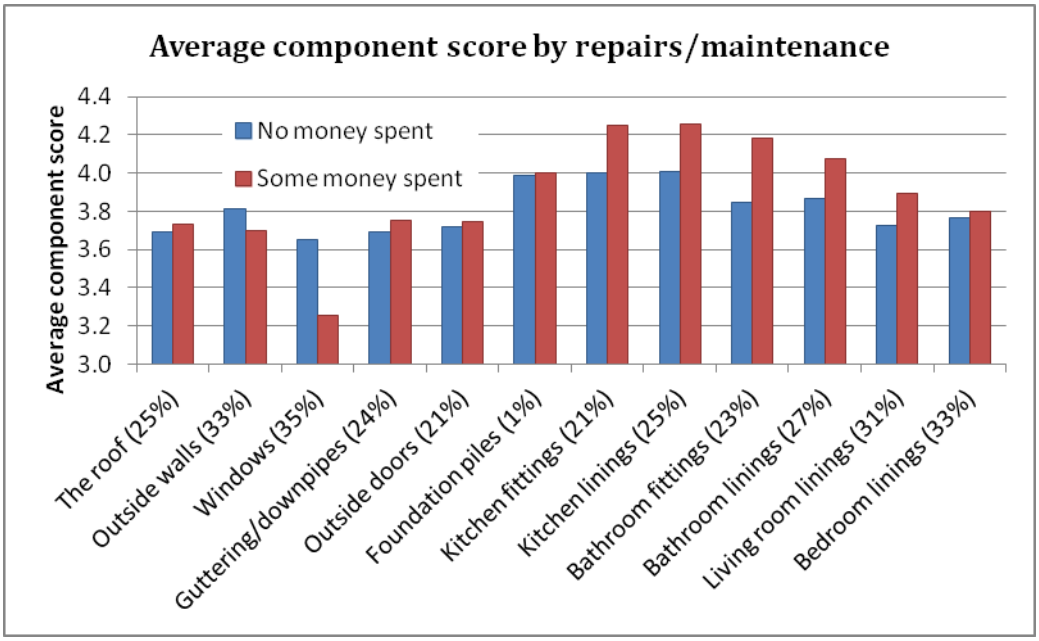
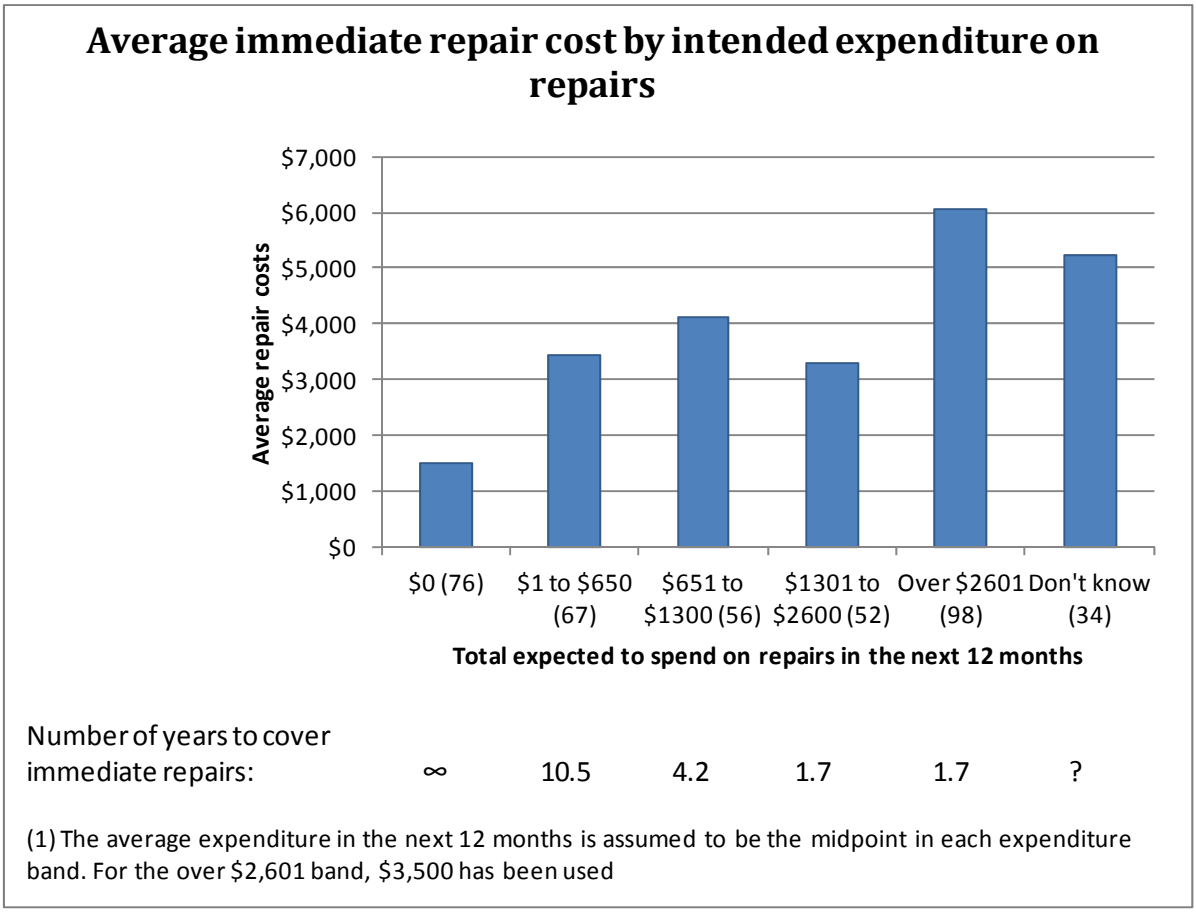


Figure 11 Average component score by repairs/maintenance

Figure 12 illustrates the average immediate repair cost by the homeowners' expected expenditure on maintenance or repairs in the next 12 months. In general, the higher expected expenditures correspond with higher average immediate repair costs. However, these expected expenditures do not cover the average immediate repair costs.

The highest average immediate repair cost was for the over $2601 expenditure band, which is also the highest expenditure band. Some $3500 has been assumed to be the average these homeowners intended to spend on repairs in the next 12 months. Assuming this spending was continuous until all immediate repairs were fixed, it would take 1.7 years. This does not take in to account the deterioration of other components over this timeframe.

The longest timeframe to fix immediate repairs is for those intending to spend $1 to $650 on maintenance or repairs in the next 12 months. If they did not increase their spending on maintenance or repairs, it would take approximately 10.5 years to fix all of the immediate repairs required.



Number of years to cover immediate repairs:	∞	10.5	4.2	1.7	1.7	?

(1) The average expenditure in the next 12 months is assumed to be the midpoint in each expenditure band. For the over $2,601 band, $3,500 has been used

Figure 12 Average repair costs by intended repairs over the next 12 months

The telephone survey asked who does the repairs and maintenance work, see Figure 13. Approximately 50% of owners undertake DIY and this percentage is fairly even across all income groups. The use of paid persons in the higher income groups, greater than $70K, is not surprising. But the high use in the $20 to $40K groups, where funds are constrained, is also high. The reason is the latter groups have a high proportion of retirees in them and are probably physically less able to do the work themselves.

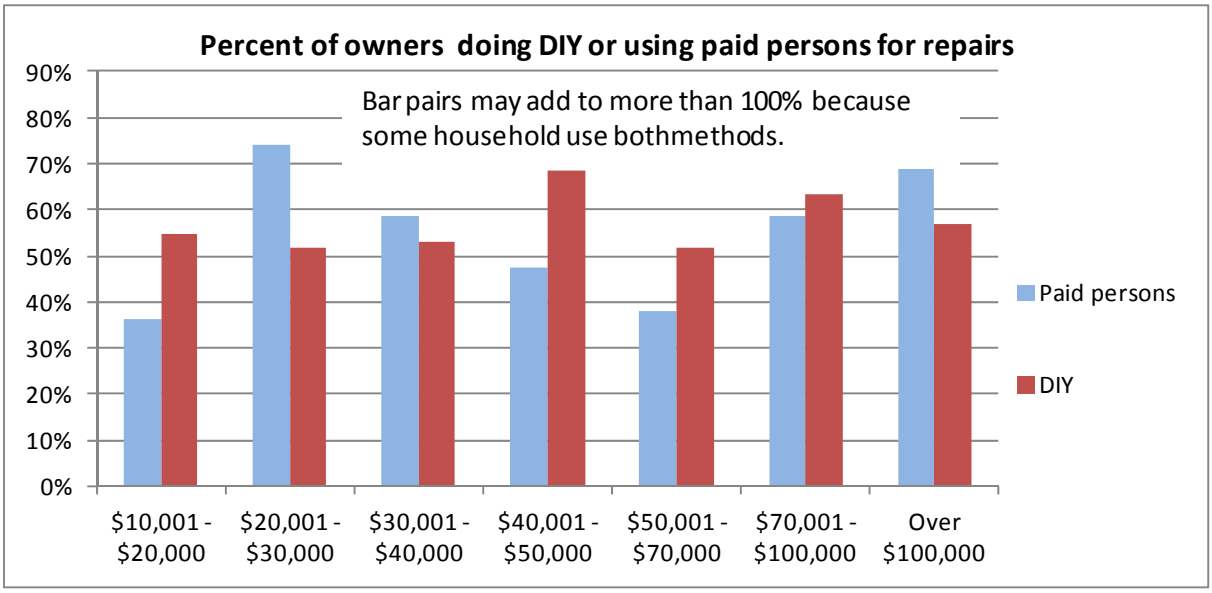


Figure 13 Who did the maintenance work in 2010?

3.1.7 When is maintenance done, and what type of maintenance is done first?

Figure 14 shows actual and intended maintenance spending by owners by length of occupancy. The dollars amounts are for the 12 months before the survey and the intended maintenance 12 months ahead. The highest spending is soon after purchase and thereafter actual spending slowly declines. The longer the occupancy the greater the difference between previous and planned spending. Whether the planned spending actually occurs is unknown and while the planned expenditure increases after 4 years it is still below the average needed as indicated by the third bar in the chart. The immediate repairs in this chart are averaged across all owners including those not needing any immediate repairs.

Does the higher spending in the first year represent essential repairs, or “cosmetic” work? Figure 15 shows the main areas and suggests a mix of work just after purchase. There is some essential “weatherproofing” work to the roof and windows in the first year of occupancy, involving well over 10% of the new owners. Living rooms, kitchen and bathroom also feature in the first year, and these areas are probably done for aesthetic reasons rather than functional problems.

Bedrooms are the last to be upgraded, typically 5 to 7 years after moving-in. Exterior walls have a low incidence of work, possibly because the vendor knows their condition is immediately obvious and need to be in good condition for a sale to proceed.

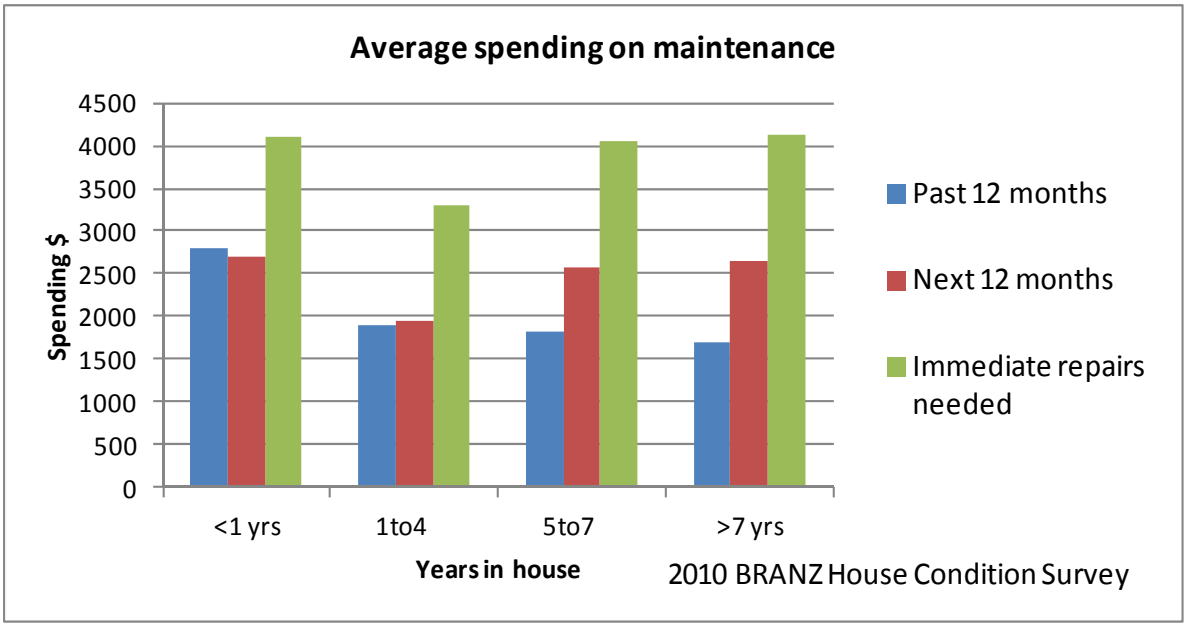


Figure 14 Maintenance and years of occupancy

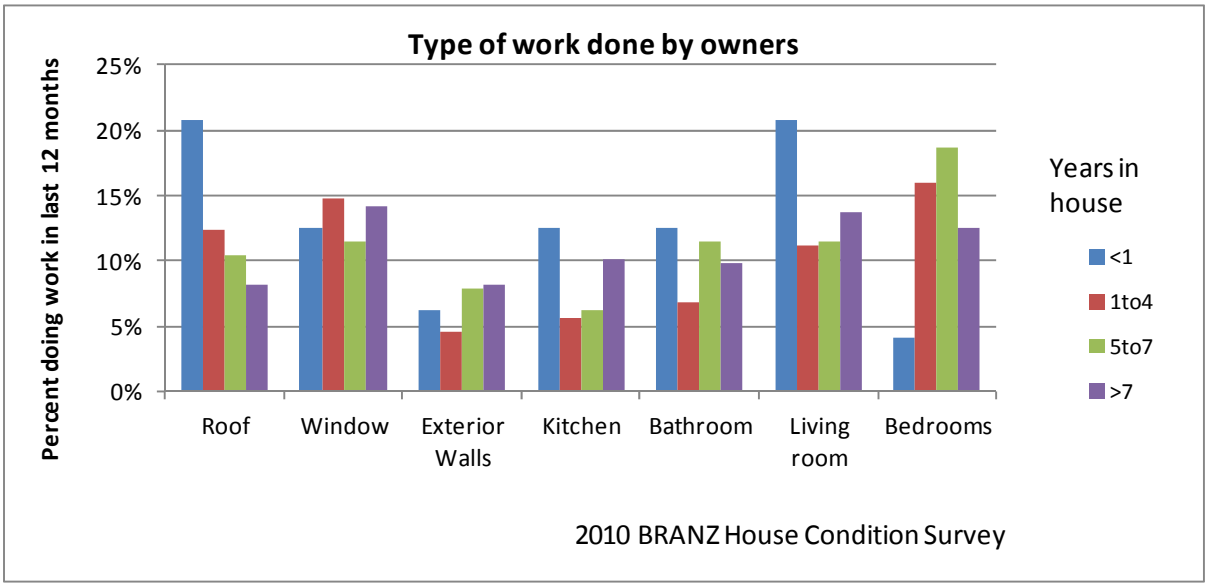


Figure 15 Where maintenance is done, and years of occupancy

3.1.8 Why is maintenance not done?

The 2010 HCS asked whether maintenance had been done in the previous 12 months. It also asked if maintenance had been deferred and the reasons for this. Some 38% of owners said they had deferred maintenance and the reasons are shown in . The chart indicates the main reason is cost (i.e. “Too expensive”), with “Maintenance was not serious” and “Other priorities” also being strong reasons. The average condition score is shown in brackets and the average score of owners deferring maintenance was 4.0 across 26 components, compared to 3.6 for those who had not deferred maintenance. Those wanting better information had a particularly low score.

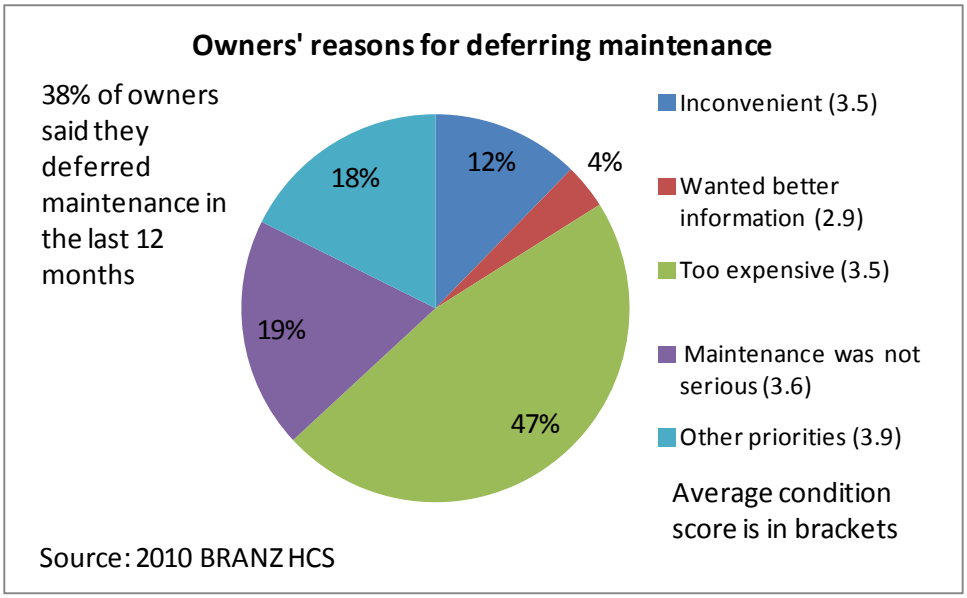


Figure 16 Reasons for deferred maintenance from the 2010 HCS

3.2 Household Economic Survey (HES)

This survey, undertaken by Statistics NZ every year, provides details of household expenditure by item. The main items related to housing are shown in Table 2 by annual household income. The amounts are weekly averages for households reporting spending in each category. Not all households report spending on all categories and the percentages reporting spending are in the Appendix.

Homeownership costs consist of two main parts, namely mortgage principal repayment and additions to the house. The interest payments associated with the mortgage are listed separately by Statistics NZ. The item of interest from a repairs perspective is property maintenance. It includes purchased services (about 82%) with the materials bought by the homeowner for DIY being the other 18%, i.e. the big majority of house repairs are done by contractors rather than the owner.

Most spending is on consumption items such as food, clothing and travel costs, which are not shown. Contributions to savings are shown because it is a measure of household surplus. Funds could possibly be diverted from savings into repairs/maintenance as required. For example, at least $1000 per year on average is available from this source for repairs in the lower income households and over $2000 per year in the higher income groups.

Table 2 Household spending by item from the HES

Average weekly expenditure $ by household income in 2010. Only for households reporting these items											
	Decile	1	2	3	4	5	6	7	8	9	10
		Under $20,000	$20,000 to $28,899	$28,900 to $39,699	$39,700 to $51,399	$51,400 to $63,199	$63,200 to $76,099	$76,100 to $92,199	$92,200 to $110,799	$110,800 to $147,699	$147,700 and over
Actual rentals for housing		166.5	192.3	224.0	247.9	217.8	259.5	265.9	262.6	323.5	364.3
Home ownership (1)		119.1	102.9	72.1	99.2	122.6	126.6	140.3	166.7	196.8	321.2
Property maintenance (2)		66.2	45.2	41.1	46.6	59.6	58.1	98.2	97.3	90.3	172.5
Property rates and related services		31.0	31.1	32.5	32.0	39.0	36.4	36.7	38.7	41.0	51.7
Household energy		32.2	34.4	35.9	38.6	41.6	43.1	48.6	52.5	51.4	65.1
Other housing expenses		na	na	na	na	na	na	na	na	na	na
Interest payments (3)		96.2	52.2	55.9	66.3	110.4	147.4	170.4	157.6	208.1	260.1
Contributions to savings		29.7	19.8	24.4	26.1	37.7	44.3	49.5	59.0	63.8	107.4
(1) Homeownership is 67% principal mortgage repay, 33% alterations/ additions to home											
(2) Property maintenance is mainly contractors rather than DIY											
(3) Interest payments are both mortgage and consumer credit, mainly the former except in the lower four deciles											

The table data on maintenance spending has been reinterpreted into the categories used in the 2010 HCS. The results are in Figure 17 and show average amounts by income only for households undertaking some maintenance. The chart is a comparison of what HCS respondents say they spend on maintenance in 2010 and the Statistic NZ survey of household spending over the same period. The latter is a much larger sample and more likely to be correct than the HCS. It appears the HCS under-estimates actual spending, particularly in the high income groups, by a significant amount.

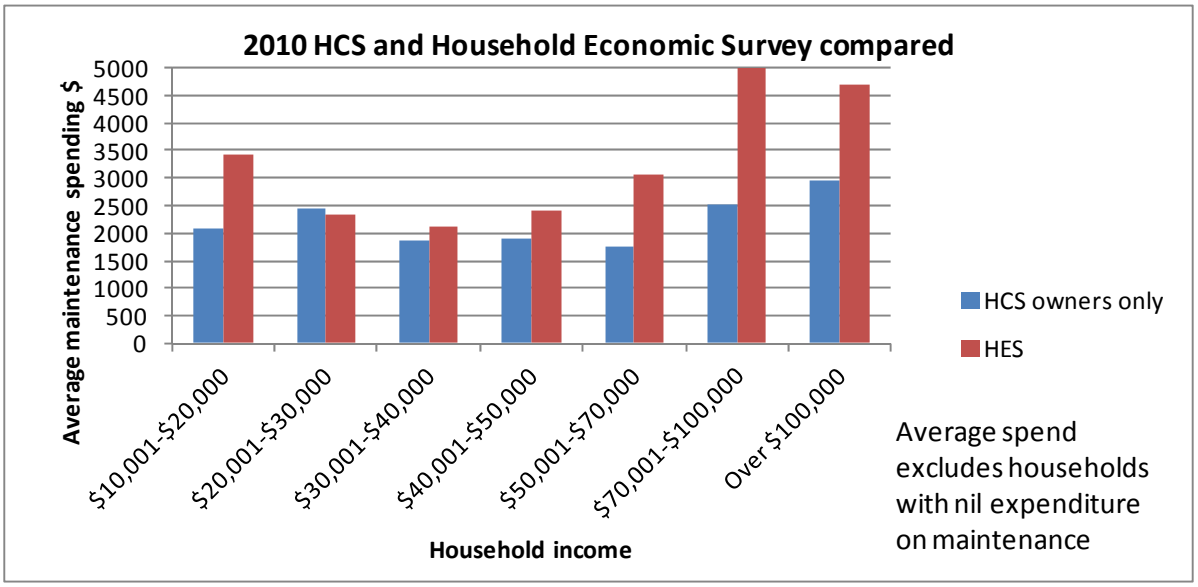


Figure 17 How much is spent on maintenance? The HCS and HES compared

3.3 Earthquake and wind loading strengthening

Many older homes fell off their foundations in the Canterbury earthquakes of 2010 and 2011, as well as suffering damaged cladding, linings and roofs. Also, we had roof loss in the wind storms in Taranaki during 2007. These natural hazards suggest it may be cost effective to retrofit houses to resist these events.

The 2010 and 2011 earthquakes caused widespread damage to housing in Christchurch. Damage occurred to roofs, wall cladding, linings and foundations (Buchanan et al, 2011). The latter included cracked slabs and perimeter walls, tilted piles and houses sliding off their foundations. Most of the damage is not easily mitigated by preventative measures. For example, replacing heavy claddings, strengthening slabs and improving the fixing of linings is not easily done nor is it likely to be cost effective. Two preventative measures which are believed to be cost effective include removal of unreinforced chimneys, and strengthening pile foundation by improved fixings and installation of diagonal bracing.

A BRANZ Study Report (Beattie, 2010) discussed remedial measures in existing houses to strengthen the roof against wind damage. The main finding was that post-1999 houses do not need strengthening. Pre-1999 houses need additional connectors installed in the roof space for houses in high and very high wind zones. The purlins need to be fixed with a Z nail to all rafters and truss top chords. Where the rafter or truss meets the top plate, an L shaped bracket fixed with screws is recommended. The latter may be difficult to fix in low sloped roofs and access to the top plate by removing the soffit and installation of strapping may be an alternative. The roof cladding will also require new fixings where existing nails have rusted or are inadequate in number. For older houses (mainly pre-1970) the main roof system will be rafters and ceiling joists. The cost of strengthening the roof is estimated at about $2200 per typical house. For truss roof houses (after 1970) the cost will be lower (due to the greater spacing of trusses compared to rafters), at about $1400 per house.

Analysis of the cost effectiveness of mitigation measures is shown in Table 3. Approximate repair and damage values are used in the table which are believed to be representative of typical cases. The result for the financial parameter chosen indicates that foundation strengthening and chimney removal are close to the break-even point and could go either way depending on the actual amount of damage avoided or the actual cost of the mitigation measure. For wind storm events with a 20-year return period there is more latitude in the analysis. The wind damage mitigation measures are likely to be cost effective under most cost and damage assumptions.

Table 3 Damage mitigation measures cost benefits

Natural hazard damage preventative measures for existing house							
		Remedial measure cost $	Damage repair after EQ $	Expected annual damage	PV of damage saved over the years	Benefit: cost ratio	Remedial measure
Earthquakes							
	Chimneys	$5,000	$15,000	$300	$5,477	1.10	Demolish chimney
Strengthen foundations		$15,000	$40,000	$800	$14,605	0.97	New pile fixings, install several braces
Wind							
	Truss roofs	1400	$7,000	$140	$2,556	1.8	Fixings at purlins, top plate
	Rafter roofs	2200	$7,000	$140	$2,556	1.2	and cladding to purlins
Return period for the damaging event							
	Earthquake	50	years				
	Wind	20	years				
	Analysis period =	50	years USPWF=	18.3			
	Discount rate=	5%					

4. DISCUSSION

There is a large amount of outstanding maintenance required throughout the housing stock and many household budgets are constrained and unable to immediately address all of their repair needs. This creates the need to prioritise repairs. The priority repairs, or so-called “immediate” repairs, are shown in several of the charts.

Reported spending on repairs in the HCS is generally insufficient to bring the house back to good condition, see Figure 10 and Figure 12, in a single year. The Statistics NZ household economic survey has higher levels of spending on maintenance than the HCS but even those amounts are, on average, short of that required. Almost all households have some savings but these are quite low on an annual basis, typically $1000 per year and that amount is often insufficient to address the maintenance backlog out of annual income. Households will have some savings, not necessarily for maintenance purposes, but these could be diverted to maintenance. However, it is not known how many households could draw on this source.

Figure 3 indicates approximately 75% of all owner-occupiers need to complete immediate repairs and Figure 4 shows these repairs average between $3500 to $6800 for the various income groups. This is manageable for most households to fund over two to three years. However, below $50,000 income it becomes a sizable portion of annual income and households may struggle to afford the maintenance, an alternative being the owners do the work themselves.

The survey results were scaled up for all housing and the results are shown in Table 7 in the Appendix. The main result of the table is that about 79% of all owner-occupied houses need immediate repairs, but if only the exterior envelope is counted, about 33% of all owners need to complete immediate repairs. Exterior work needs first priority to avoid further deterioration. Interior defects such as heavy mould, holes in the linings and floor, and unsafe electrical work need immediate attention but are probably not quite as urgent as repairing the exterior.

A New Zealand study on aging-in-place (Saville-Smith et al, 2008) provides a review of overseas issues related to housing and notes lack of maintenance is a common issue. The study relates to the elderly but many of the issues apply to all households, not just the elderly. These include owners who:

- Misread the outcomes of dwelling problems and miscalculate how long repair work can be delayed.
- Do not distinguish between essential and cosmetic work on their dwellings.
- Are reactive to problems rather than undertaking systematic preventative maintenance.
- Are not very accurate in assessing the condition of their house.

A variety of solutions to these problems are used overseas and the following are from the United Kingdom:

- Provision of finance (grants, interest-free loans, cheap loans etc) for maintenance.
- A maintenance subscription service for regular maintenance.
- Free advice on budgeting, planning maintenance and condition assessment.
- Support and training for DIY.
- Quality assurance schemes for contractors.

Saville-Smith notes that the trend in the European Union is away from emergency repairs to preventative maintenance information and provision. However, she cautions that New Zealand should not necessary adopt these overseas approaches as our environment differs, i.e. the housing types and ages differ from Europe, our construction industry is small scale, legislation relating to condition is different and the role of local Government housing in New Zealand is less than in Europe. The aging-place study is ongoing and several tools have been developed, including checklists, that owners can use. See www.goodhomes.co.nz.

What are the local options available to preserve the condition of the stock, particularly in the low income households? Possible measures are:

- Provide information to owners on the need to undertake regular maintenance since some households are unaware of its importance. Buckett et al (2012) notes that in the 2010 HCS, owners generally rated their homes in better condition than the BRANZ assessors found.
- Provide information to owners on how to engage with builders and where to get advice on costs and possible scope of work.
- Provision of interest-free loans by Government to selected lower income owners for maintenance purposes.
- Do nothing and accept that the condition of older houses will gradually deteriorate and be lost to the housing stock earlier than needs be the case.

In the latter option some houses will probably lose re-sale value and eventually be sold. Usually the new owner will undertake the needed repairs to bring the house back to a reasonable condition. Indeed, Section 3.1.7 shows that the owners are likely to spend more on maintenance in their first year of occupancy, than in subsequent years. However, generally the amount is insufficient and extends over several years. While the work is eventually done the house is further damaged by delayed repairs, reducing the life of the house and the overall stock.

Consideration of the ongoing maintenance needs is important when buying a house. Whether it is a new or existing house, potential owners need to be aware of the maintenance implications of the house materials, particularly the wall and roof claddings, and the windows. Modern paint systems provide good durability on timber materials such as weatherboard, but repainting is still a significant outlay needed at approximately 10 to 12-year intervals. There are various BRANZ publications that advise on maintenance regimes and are available from the BRANZ website (www.branz.co.nz).

Further to normal maintenance work, strengthening for earthquake and wind loads is cost effective in the long term on some houses in locations subject to these events. This includes better roof fixing, pile foundation fixings and bracing, and restraints to hot water cylinders. The problem for the owner is that the expected benefit is marginal or is negative if he/she is in the house for only a short period. Often the additional strengthening work is not reflected in the re-sale price, so the owner has little financial incentive to undertake. It is analogous to the retrofit of insulation where a number of years of energy savings are needed to cover the initial outlay. The difference with insulation retrofit is that energy savings (or increased comfort levels) are immediately noticeable after the work. Similarly, the installation of a vapour barrier on the ground beneath piled houses has immediate benefits in reduced internal moisture problems, is quite low cost to install and it extends the life of the subfloor and floor. Retrofitted insulation has increasingly become a selling point for existing housing and it may be that strengthening work will have similar effect, particularly in hazardous (i.e. storm and earthquake-prone) areas.

The 2010 BRANZ HCS found a slight decline in the average overall condition of houses from 4.0 (“good”) in the 2005 survey to 3.8 (between “moderate” and “good”) in the 2010 survey. However, 2010 is an improvement on the 1999 survey which had an average score of 3.6. The last survey had more rentals in the sample than earlier surveys and these tended to be in worse condition than owner-occupied houses. So there is no clear linear trend toward deterioration in overall condition between 1999 and 2010. However, the amount of required maintenance is a concern and further work is needed on the effect of deferred maintenance on condition.

5. REFERENCES

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6. APPENDIX

6.1 Repair costs by component and condition

The repair costs for each of the 25 components monitored in previous surveys are shown in

Table 4.

Table 4 Average repair cost by component and condition score

Average repair cost by component and condition score											
	Total replacement cost $	Percent of total replacement				Repair costs $				
Component		Cond1	Cond2	Cond3	Cond4	Cond1	Cond2	Cond3	Cond4	Cond5
Foundations	4,625	30%	21%	15%	7%	1,388	962	694	324	0
Fasteners	450	100%	50%	10%	0%	450	225	45	-	0
Steps/ramps	600	100%	50%	10%	0%	600	300	60	-	0
Joists/bearers	12,410	35%	22%	14%	6%	4,344	2,765	1,697	796	0
Floor	8,400	30%	22%	13%	8%	2,520	1,872	1,100	672	0
Wall cladding	15,800	40%	27%	17%	10%	6,320	4,311	2,674	1,529	0
Exterior doors	800	100%	50%	10%	0%	800	400	80	-	0
Windows	15,130	37%	25%	18%	12%	5,554	3,767	2,727	1,855	0
Carport	3,000	40%	20%	4%	0%	1,200	600	120	-	0
Roof cladding	7,560	40%	32%	25%	13%	3,024	2,453	1,864	989	0
Spouting	2,120	100%	50%	10%	0%	2,120	1,060	212	-	0
Chimney	1,700	100%	50%	10%	0%	1,700	850	170	-	0
Roof framing	6,300	35%	23%	17%	10%	2,192	1,422	1,060	630	0
Ceiling insulation	2,100	100%	50%	10%	0%	2,100	1,050	210	-	0
Kitchen linings	1,100	100%	50%	10%	0%	1,100	550	110	-	0
Kitchen joinery	2,000	100%	50%	10%	0%	2,000	1,000	200	-	0
Stove	1,250	100%	50%	10%	0%	1,250	625	125	-	0
Laundry linings	900	100%	50%	10%	0%	900	450	90	-	0
Laundry fittings	250	100%	50%	10%	0%	250	125	25	-	0
Bathrm1 linings	1,390	100%	50%	10%	0%	1,390	695	139	-	0
Bathrm1 fittings	2,000	100%	50%	10%	0%	2,000	1,000	200	-	0
Bathrm2 linings	1,390	100%	50%	10%	0%	1,390	695	139	-	0
Bathrm2 fittings	2,000	100%	50%	10%	0%	2,000	1,000	200	-	0
Other rooms	14,270	30%	16%	10%	4%	4,281	2,348	1,446	542	0
Interior doors	3,750	100%	50%	10%	0%	3,750	1,875	375	-	0
All costs are for a 140 sqm house. Repairs for each house are scaled by the house area										

The repair costs are calculated as follows:

1. The replacement cost of the whole component is obtained from Rawlinson, usually as $/sqm, and is calculated for a “standard” 140 sqm house.
2. The major components in the HCS have the defect spread as a percentage. These percentages are averaged across all defects for each condition score and component. For example, wall claddings defects in Condition 2 have an average spread across 27% of the wall area. The results of this analysis are shown in Table 5.
3. The percentage spread is multiplied by the complete replacement cost to give the repair cost for a component in a given condition. This is adjusted for the size of the house using the floor area to the “standard house” area (140 sqm) ratio.
4. The components for which no defect spread is recorded are assumed to have 100% coverage at Condition 1, 50% at Condition 2 and 10% coverage at Condition 3. These are generally small components and in practise the whole item is replaced if the condition is serious (Condition 1).

Table 5 Defect coverage by component and score

Defect frequency analysis for selected components						
		Percentage of total component replacement				
		Condition score				
Component		1	2	3	4	5
Other rooms		30%	16%	10%	4%	0%
Joists/bearers		35%	22%	14%	6%	0%
Wall cladding		40%	27%	17%	10%	0%
Roof cladding		40%	32%	25%	13%	0%
Windows		37%	25%	18%	12%	0%
Floor		30%	22%	13%	8%	0%
Foundations		30%	21%	15%	7%	0%
Roof framing		35%	23%	17%	10%	0%
From the 2010 HCS average defect spread						

6.2 More details on immediate repairs

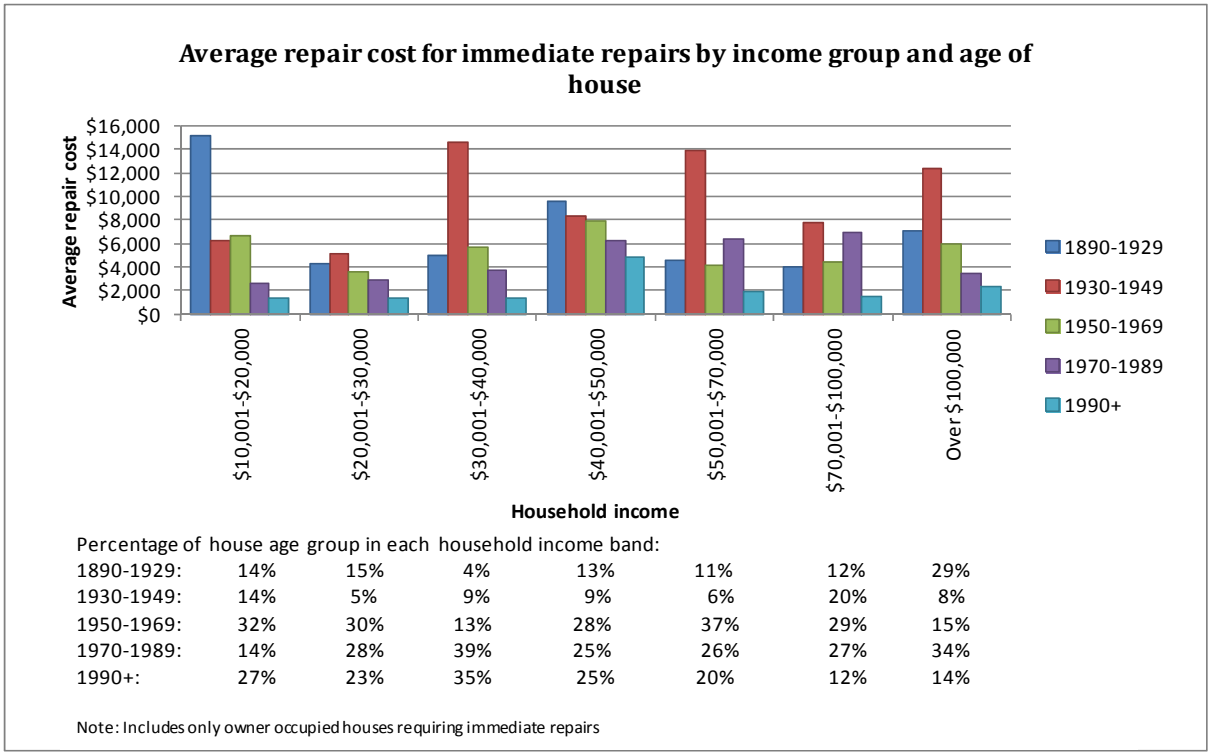
Both the household income and age of house have an impact on the average repair cost for immediate repairs.
Figure 18 looks at the difference in repair costs in each household income group by the age of house.

In general, the $40,001-$50,000 household income group had comparatively high average immediate repair costs for each age of house category than the other income groups. They were particularly high compared to the other household income groups for houses built since 1950. The majority of owners in this income group were occupying houses built since 1950, with 28% of them occupying houses built between 1950 and 1969, 25% in houses built between 1970 and 1989, and 25% in houses built since 1990.

The income group with the lowest average immediate repair costs (the $20,001-$30,000 income group) had comparatively low repair costs across the different house

age categories. The highest average immediate repair cost for the income group was for houses built between 1930 and 1949, which only represented 5% of the houses occupied by the group.

Figure 5 illustrates that houses built between 1930 and 1949 had the highest average immediate repair cost. One-fifth of the houses owned by households with household income between $70,001 and $80,000 occupied houses built in this timeframe. Houses built in this timeframe also account for the majority of the spikes shown in Figure 18 for the different household income groups.



Percentage of house age group in each household income band:

1890-1929:	14%	15%	4%	13%	11%	12%	29%
1930-1949:	14%	5%	9%	9%	6%	20%	8%
1950-1969:	32%	30%	13%	28%	37%	29%	15%
1970-1989:	14%	28%	39%	25%	26%	27%	34%
1990+:	27%	23%	35%	25%	20%	12%	14%

Note: Includes only owner occupied houses requiring immediate repairs

Figure 18 Average repair cost by income group and age of house

The ratio of immediate repairs cost to annual household income provides a good indication of the affordability of the immediate repairs, see Figure 19. With higher levels of household income, it is expected that the ease with which the immediate repairs can be afforded would increase.

The 0-0.05 ratio category is for the immediate repairs which would have cost less than 5% of the average annual household income for each household income band. On the whole, as income increased, the proportion of owners that would have had to spend less than 5% of their annual household income on the immediate repairs increased.

However, as Figure 4 illustrates, the $40,001-$50,000 income group was slightly against trend. It had a much higher average immediate repair cost to household income ratio at 0.33 than its predecessor at only 0.24, and as Figure 19 shows, had a higher percentage of owners requiring more than a whole year's household income to pay for immediate repairs than both the $20,001-$30,000 and $30,001-$40,000 income bands.

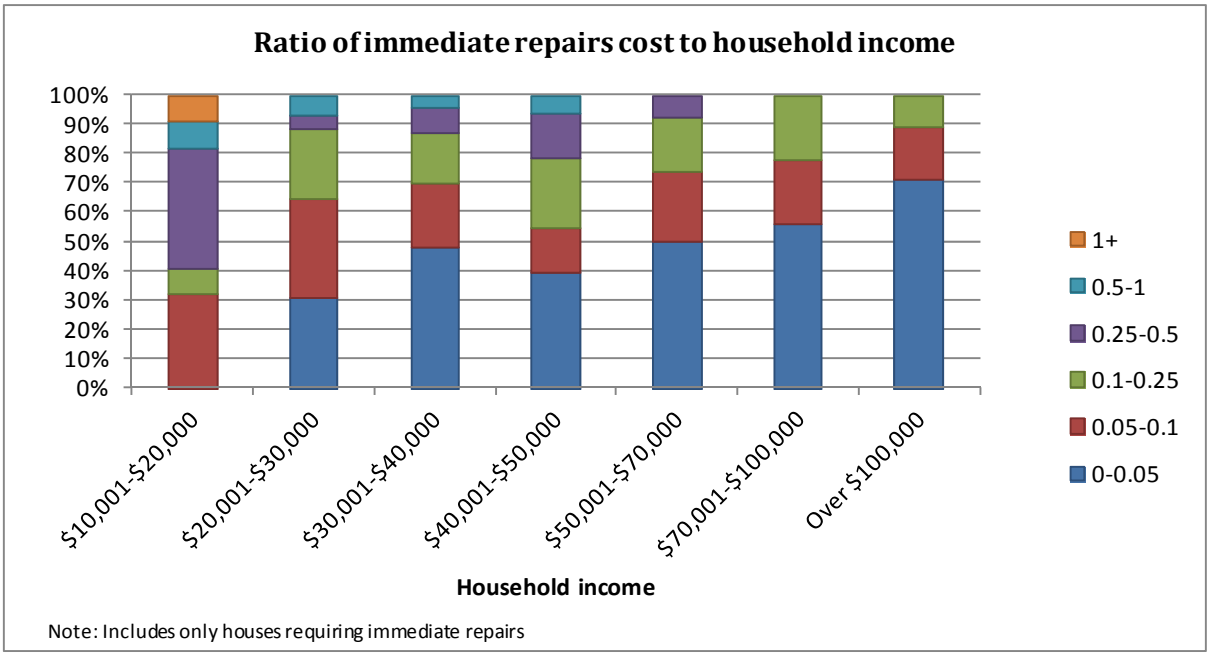


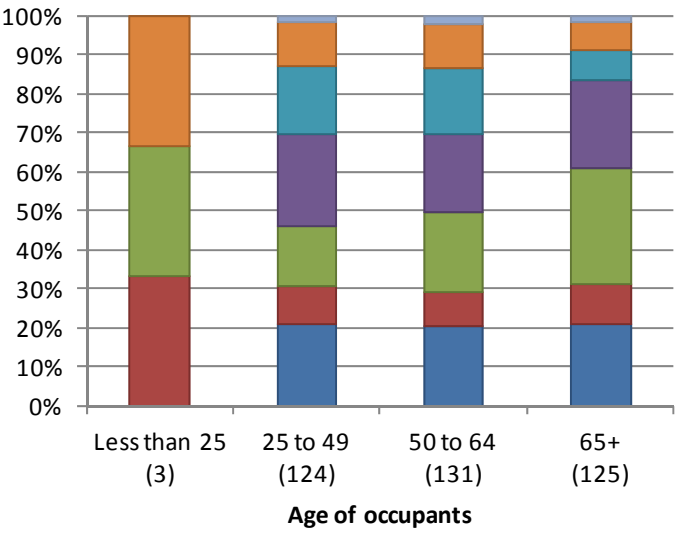
Figure 19 Ratio of immediate repairs cost to household income

Figure 20 illustrates the average cost and a further indication of affordability of immediate repairs by the age of the occupants.

All of the houses surveyed that were owned by occupants aged 25 or under required immediate repairs. However, the sample size of three people is very small and therefore should be used with caution. The surveyed houses owned by this age group were generally in fairly good condition. The average immediate repair cost was $4478. This age group had the highest average household income and therefore it would have only taken approximately 4% of the average household income to make the immediate repairs required.

The 50 to 64 age group had the highest average repair cost at $5530. Almost 70% of the houses for this age group required immediate repairs that cost less than $5000.

Finally, the 65 and over age group had the highest ratio of average repairs to household income at 0.1. The average repair costs are lower than for the 25 to 49 and 50 to 64 age groups. However, they have a lower average household income.



Percentage requiring immediate repair:	100%	79%	79%	79%
Average immediate repair cost:	$4,478	$5,374	$5,530	$4,075
Average household income:	$115,000	$85,000	$73,548	$39,186
Ratio of average repairs to income:	0.04	0.06	0.08	0.10

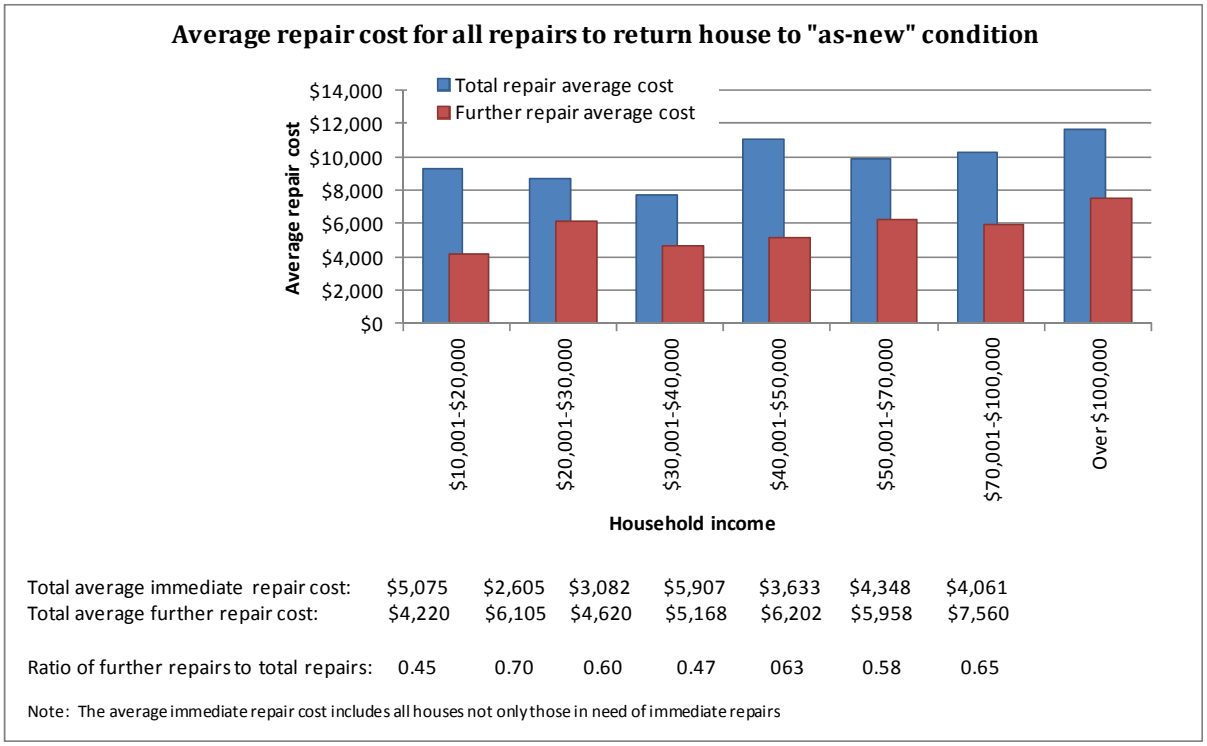
Note: All average costs include only houses requiring immediate repairs
Numbers in brackets are the sample size

Figure 20 Average cost of immediate repairs by age of occupants

6.3 Further repair costs to get the housing stock to "as-new" condition for owner-occupiers

The above has mainly discussed the so-called immediate repairs. Condition 3 and 4 repairs are less urgent but are needed to get the total housing stock back to as-new condition. Figure 21 shows the average cost for all repairs necessary, including the further repairs shown in Figure 2 by "Cond=3 and "Cond=4". The further repairs are the cost of all repairs, minus the cost of the immediate repairs, for all houses surveyed.

The further repair costs are lower than the immediate repair costs. The average further repair costs are larger for the $20,001-$30,000 and over $100,000 income groups. It is less than half immediate repairs for both the $10,001-$20,000 and $40,001-$50,000 income groups.

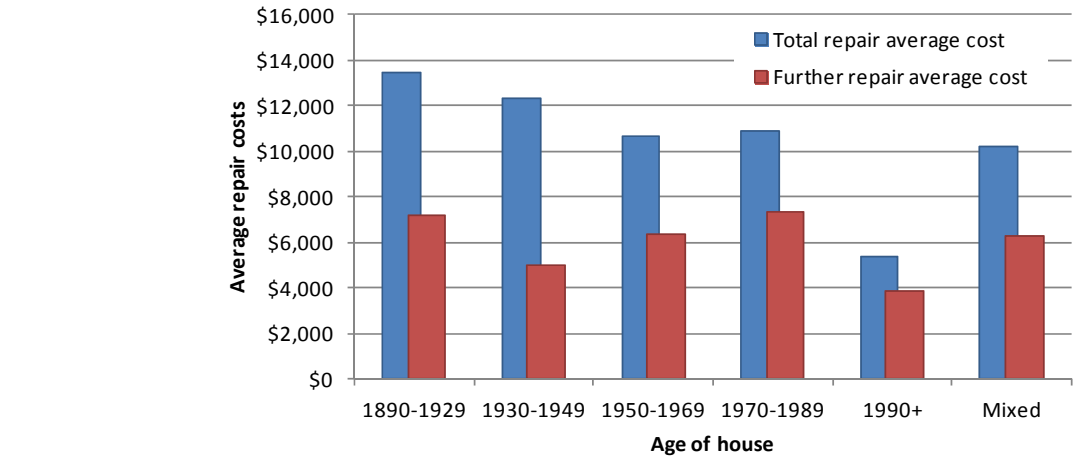


Total average immediate repair cost:	$5,075	$2,605	$3,082	$5,907	$3,633	$4,348	$4,061
Total average further repair cost:	$4,220	$6,105	$4,620	$5,168	$6,202	$5,958	$7,560
Ratio of further repairs to total repairs:	0.45	0.70	0.60	0.47	063	0.58	0.65

Note: The average immediate repair cost includes all houses not only those in need of immediate repairs

Figure 21 Total repair costs by income group

Average further repair costs were lowest for houses built since 1990 at $3890, see Figure 22. They also had the highest ratio of further repairs to total repairs at 0.72. This indicates that newer homes were generally in good condition and with the average further repair cost totalling 72% of the average total repair cost, the burden of the total cost to return the house to as-new condition immediately is not as great as older houses.



Total average immediate repair cost:	$6,290	$7,351	$4,293	$3,572	$1,484	$3,924
Total average further repair cost:	$7,162	$4,959	$6,330	$7,300	$3,890	$6,287
Ratio of further repairs to total repairs:	0.53	0.40	0.60	0.67	0.72	0.62

Note: The average immediate repair cost includes all houses not only those in need of immediate repairs

Figure 22 Total repair costs by age of house

6.3.1 Further repairs versus immediate repair costs

Figure 23 compares the immediate repair cost and further repair cost for each house in the sample by the age of house, household income and age of occupants. On the whole, it is apparent there are a large number of houses surveyed that had a large further repair cost but comparatively low immediate repair cost requirement. The major concern is for houses that had both high immediate repair cost and further repair cost.

Looking first at the breakdown by age of house, there seems to be a wide spread of data points for each house age group. This is particularly the case for earlier houses. Four of the seven houses with immediate repair costs greater than $20,000 were built between 1890 and 1929. Two of the other houses were built between 1970 and 1989, with the other built in 1930-1949.

For immediate repair costs between $5000 and $20,000, there is a high prevalence of houses built between 1930 to 1949 and 1950 to 1969. The houses built between 1930 and 1949 had the highest average immediate repair cost and the chart illustrates that many of the houses have immediate repair costs that are over $10,000, with very few houses having low immediate repair costs.

The houses built between 1950 to 1969 and 1970 to 1989 have a wide variance in repair costs. The prevalence of houses in these age groups with minimal repair costs cancel out the houses with high repair costs and the average repair costs are lower than for earlier houses.

Finally, very few houses built since 1990 had high immediate repair costs. They also had the greatest prevalence of houses with minimal immediate repair costs.

Houses built between 1970 and 1989 have a high prevalence in further repair costs greater than $15,000. The majority of these houses had low immediate repair costs.

Houses built since 1990 had the lowest average further repair cost. Houses built in this age group were not particularly prevalent in higher further repair costs and were dominant at the lower end.

Secondly, looking at the chart by household income, the two highest immediate repair costs were for households with household income between $40,001 and $50,000. This household income group had the highest average immediate repair cost and was fairly prevalent at the higher levels of immediate repair cost.

The over $100,000 household income group dominates the higher further repair costs. The majority of houses with further repairs totalling over $15,000 were owned by households with income greater than $100,000. This household income group also had a strong presence in the houses that have both high immediate repair costs and further repair costs.

Looking finally at the chart illustrating the age of occupants, the 50 to 64 age group had the largest average immediate repair cost. The immediate repair and further repair costs seem to be fairly spread out, especially compared to the 25 to 49 age group which appears to be much more compact.

Of the three houses with occupants less than 25 years old, two have very similar immediate and further repair costs. The other has comparatively high repair costs.

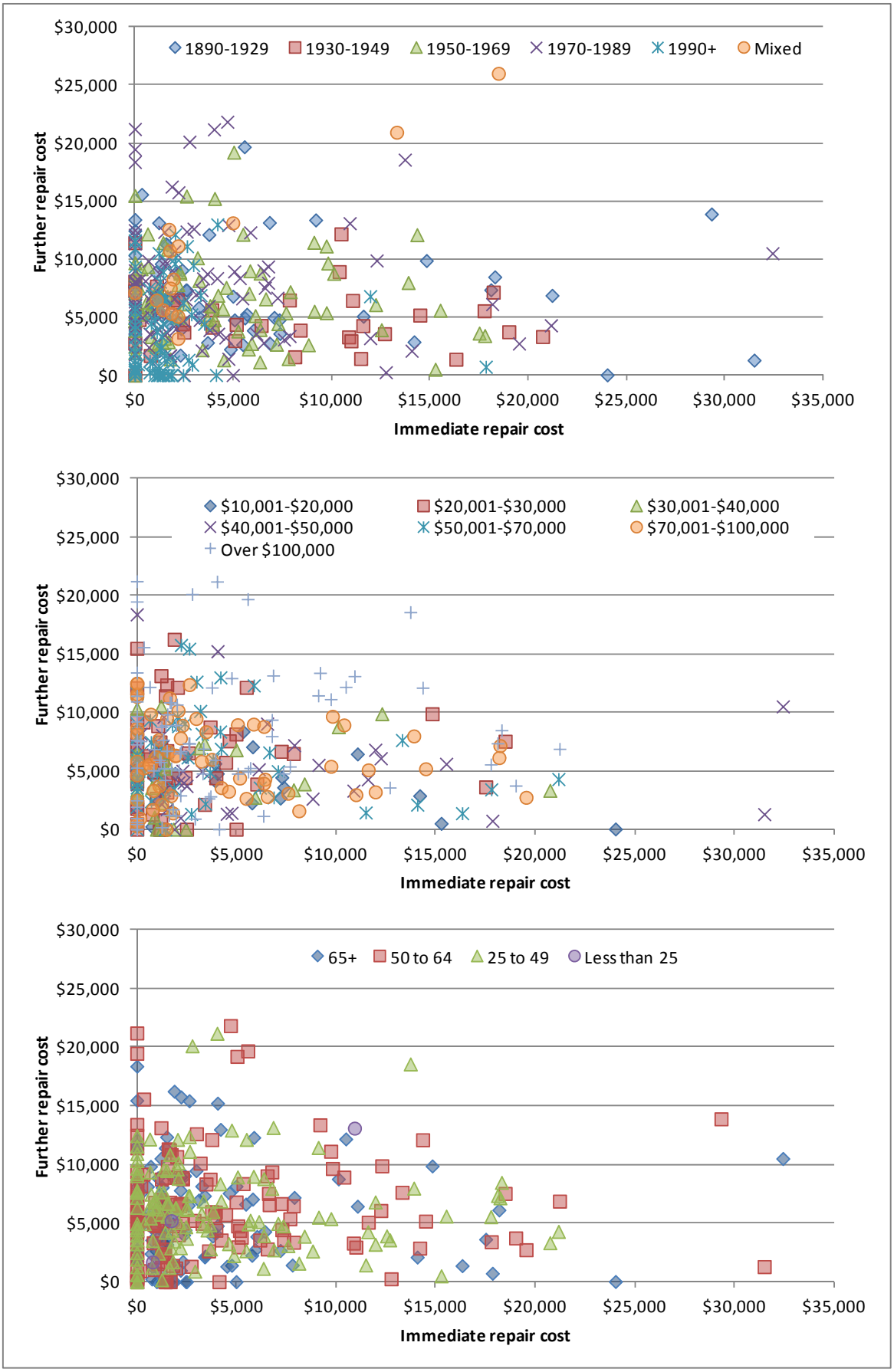


Figure 23 Immediate repairs vs further repairs by house age, income and occupant age

6.4 Household Economic Survey (HES)

Statistics NZ undertake this survey every year and record spending by households on a large variety of items. The 2010 survey was used in this report because it covers the time of the survey.

Table 2 illustrates spending on housing-related items and is the average weekly amount only for those households undertaking spending in each category. Less than 100% of households spend on most categories and Table 6 shows these percentages. While almost 100% of households spend on energy, property maintenance and contribution to savings percentages are somewhat lower.

Table 6 Household spending percentages

Percent of households that spend on particular items by household income in 2010											
	Decile	1	2	3	4	5	6	7	8	9	10
		Under $20,000	$20,000 to $28,899	$28,900 to $39,699	$39,700 to $51,399	$51,400 to $63,199	$63,200 to $76,099	$76,100 to $92,199	$92,200 to $110,799	$110,800 to $147,699	$147,700 and over
Actual rentals for housing		43	42	38	44	42	35	34	35	26	22
Home ownership (1)		16	10	18	26	29	40	46	47	53	54
Property maintenance (2)		30	28	34	35	38	45	44	52	55	65
Property rates and related services		62	63	68	68	64	69	78	79	83	85
Household energy		94	97	96	96	98	99	98	99	97	99
Other housing expenses		3	2	1	1	2	2	2	1	1	1
Total housing		98	100	100	99	100	100	100	100	100	100
Interest payments (3)		24	34	31	41	49	47	60	59	62	54
Contributions to savings		6	11	12	19	25	33	37	36	47	42
(1) Home ownership is 67% principal mortgage repay, 33% alterations/additions to home											
(2) Property maintenance is mainly contractors rather than DIY											
(3) Interest payments are both mortgage and consumer credit, mainly the former except in the lower four deciles											

The number of houses affected by the need for urgent repairs is illustrated in Table 7. It is a BRANZ estimate based on results from the HES and HCS. The total of 845,000 houses represents approximately 80% of all owner-occupied housing. If only immediate repairs to the envelope are considered (i.e. claddings, windows and foundations) then 33% of owner-occupied housing is affected or 359,000 houses.

Table 7 Number of houses needing immediate repairs

Number of owner-occupier houses needing immediate repairs									
Annual household income	$10,001 to $20,000	$20,001 to $30,000	$30,001 to $40,000	$40,001 to $50,000	$50,001 to $70,000	$70,001 $100,000	Over $100,000	Total	
Ownership rate % (1)	62%	63%	68%	68%	66%	78%	82%		
Number owner-occupied	91,792	93,726	101,016	101,314	147,619	219,350	317,182	1,072,000	
% needing immediate repairs	88%	75%	74%	87%	73%	82%	77%	79%	
Number needing immediate repairs	80,777	70,295	74,948	87,983	107,876	179,795	243,689	845,362	
Average immediate repair cost	$ 5,683	$ 3,437	$ 4,121	$ 6,641	$ 4,968	$ 5,305	$ 5,174		
Total immediate repairs $million	459	242	309	584	536	954	1,261	4,344	
							Average n	$ 5,139	
% needing immediate envelope repairs	44%	23%	23%	47%	29%	39%	30%	33%	
Number immediate envelope repairs	40,389	21,758	22,810	47,991	42,582	86,302	96,702	358,533	
Average immediate envelope repair cost	$ 4,907	$ 4,076	$ 5,399	$ 5,175	$ 4,938	$ 5,824	$ 6,141		
Total immediate envelope repairs $m	198	89	123	248	210	503	594	1965	
							Average needing immediate envelope repair =	$ 5,481	
(1) Ownership rate is from the Household Economic Survey 2010									
Number of owner-occupied houses =	1.07 million			BRANZ estimate includes unoccupied homes					