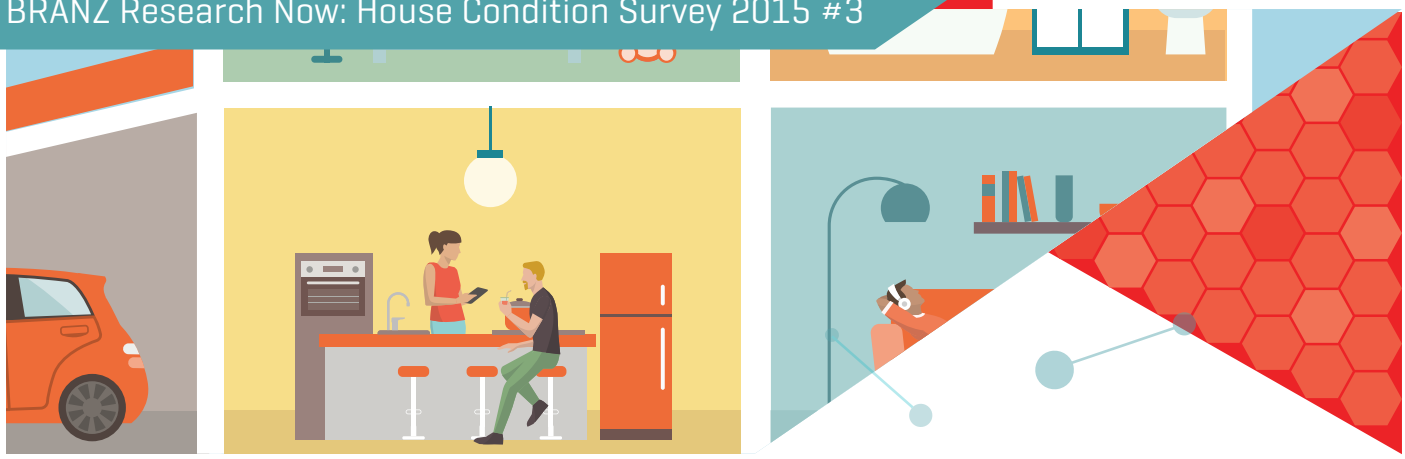


The state of our subfloors

The subfloor areas of New Zealand houses are too often in poor repair. The results of the BRANZ House Condition Survey 2015 matched the findings of earlier surveys, showing a need in particular to clear subfloor vents to allow effective ventilation and replace missing or corroded fixings and fasteners.

BRANZ has surveyed the condition of a sample of New Zealand houses approximately every 5 years since 1994. The 2015 sample of 560 houses was designed to be broadly representative of the national housing stock and included both owner-occupied and rental houses.

Building components were assessed and the presence of defects and the general state of repair and maintenance recorded. Ratings were given according to condition:

- Excellent - no defects; as-new condition.
- Good - very few defects; near-new condition.
- Moderate - will need attention within the next 2 years.
- Poor - needs attention within 3 months.
- Serious - health and safety implications; needs immediate attention.

FINDINGS

The subfloor findings were that:

- 45% of foundations were in moderate or worse condition in owner-occupied homes and 52% in rented homes
- 48% of fasteners were in moderate or worse condition in owner-occupied homes and 61% in rented homes
- 47% of subfloor vents were in moderate or worse condition in owner-occupied homes and 52% in rented homes
- 36% of joists/bearers were in moderate or worse condition in owner-occupied homes and 41% in rented homes.

Other defects found included piles not being vertical, unsafe excavation, timber decay, common borer, inadequate bracing and missing/insecure ties to bearers.

Of all the external house components, the two with the highest percentages assessed as serious or poor - needing attention within 3 months - were both under the floor, and they were subfloor vents and fasteners.

The trend for components was that their condition was generally poorer in rental homes than owner-occupied homes, but it was the opposite for vents and fasteners in serious or poor condition:

- For subfloor vents, 13% in owner-occupied homes were in serious or poor condition, and 10% in rental homes. (In the 2010 survey, owner-occupied houses were more than twice as likely to have blocked subfloor vents as rentals.)
- With fasteners, 11% in owner-occupied homes were in serious or poor condition and 6% in rental homes.

Work by house owners - creating new paved driveways or paths beside the house or building new garden beds below house walls

Subfloor vents are one of the house components most likely to be assessed as being in poor or serious condition.

- is likely to be a major cause of subfloor vent blockages.

Other studies have mirrored the BRANZ survey findings of subfloor components being in poor condition. A Victoria University of Wellington study in 2007 looked at the adequacy of the foundations in 80 Wellington houses compared to what was required under the standard that applied at the time, NZ 3604:1999 *Timber framed buildings*. Three-quarters of the foundations were found to have fixings that were corroded, incorrect or just missing, and 39% had inadequate subfloor bracing.

A PROBLEM FOR DECADES

The importance of subfloor ventilation has been recognised in New Zealand for a century or more. It was referred to in the 1924 New Zealand State Forest Service building conference recommendations and included in the model building bylaw of the New Zealand Institute of Standards in 1944, yet the state of our subfloors has been poor for a long time:

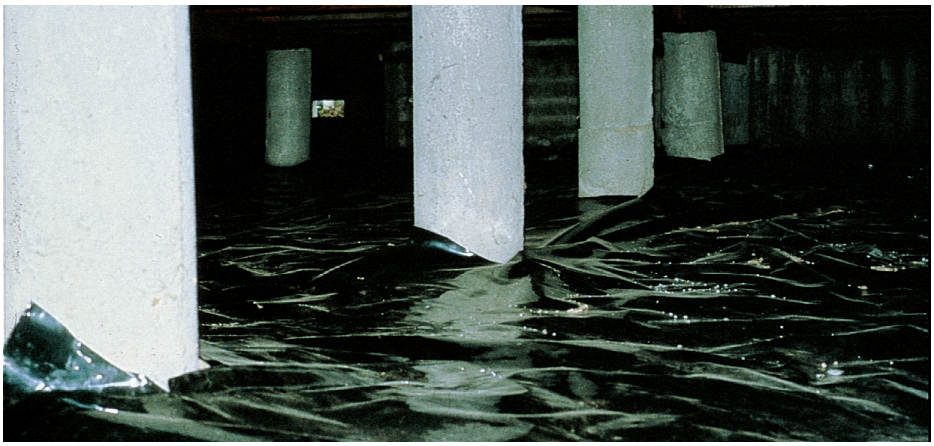
- In the first BRANZ House Condition Survey in 1994, the main defects included inadequate or blocked subfloor vents, damp subfloors, inadequate foundation bracing, insufficient clearance from ground to cladding, corroded and inadequate fixings, missing piles and unsafe excavations.
- Conducted in 1998/99, the second survey found subfloor vents were the house component in the poorest condition, with 75% rated serious or poor. Inadequate ground clearance to cladding was ranked third in severity, with corroded/inadequate fixing and other foundation problems also making the list.
- The third survey in 2004/05 again found that very common defects included poor subfloor ventilation, inadequate clearance of wall claddings from the ground and poor or missing subfloor fasteners, stating that, "Cladding clearance deficiencies have increased with each successive survey, and are particularly apparent in houses built after the 1960s."
- Carried out in 2010, the fourth survey found that over a quarter of owner-occupied houses had subfloor vents in poor or serious condition - again, the building envelope component in the worst condition. Foundations, ground clearance and fasteners also made the list of defects with the highest percentages rated poor or serious.

One reason for the continuing problem may simply be that the subfloor area is out of sight and the owners/occupants are not prompted to consider the need for repair or maintenance.

Another reason may be that owners and renters often view their homes through rose-tinted glasses and may not see the need to do any work. In the 2015 survey, 37% of owner-occupiers and 30% of renters considered their home to be in excellent condition, while trained surveyors assessed just 12% and 6% of these homes as excellent. When house owners were asked in 2010 why they hadn't carried out maintenance, almost one-fifth said that they believed the maintenance was not serious.

Cost is the most common reason given for not carrying out repairs or maintenance. BRANZ work confirms there is some logic supporting this. The expected benefit of work such as strengthening subfloors with bracing is marginal or negative if the owner is in the house for only a short period. Often the additional strengthening work is not reflected in the resale price, so the owner has little financial incentive to undertake it.

Poor subfloor ventilation can lead to problems with excess moisture.



Installing a polythene ground cover under a house can reduce subfloor moisture levels.

In the 2010 survey, the component with the lowest proportion spent on repairs was foundation piles, with just 1% of households spending on this.

Strengthening subfloors for earthquake loads is only cost-effective in the longer term in regions at high risk for earthquake and for owners who know they will own the house for a long time. Many older homes fell off their foundations in the Canterbury earthquakes of 2010 and 2011.

A lot of subfloor repairs and maintenance can be done without a building consent, but replacing more than just a few piles under a house requires a consent from the local building consent authority.

LOWER-COST OPTIONS

While some subfloor repairs and maintenance can be comparatively costly, there are a few options that are not:

- Clearing away garden plants, mulch or soil blocking subfloor vents and reducing the soil level if necessary.
- Clearing away materials stored under the house that may be blocking vents or preventing good ventilation.
- Installing a vapour barrier on the ground beneath the house to reduce subfloor moisture levels.
- Installing missing fixings or replacing corroded fixings on piles and bearers/joists.

Resources

BRANZ has a number of resources for dealing with subfloor problems in New Zealand houses:

- Good Repair Guide *Damp Subfloors* - www.branz.co.nz/damp-subfloors
- Good Repair Guide *Subfloor Timber* - www.branz.co.nz/subfloor-timber
- Good Repair Guide *Leaking Basement Walls* - www.branz.co.nz/leaking-basement-walls
- Seismic Resilience - www.seismicresilience.org.nz
- Maintaining My Home - www.maintainingmyhome.org.nz
- Study Report SR354 *Managing subfloor moisture, corrosion and insulation performance (2016)*

Other resources in this area include:

- Wellington City Council information on strengthening your home - www.wellington.govt.nz/services/rates-and-property/earthquake-prone-buildings/strengthen-your-home
- Packing house piles step-by-step video guide - www.building.govt.nz/building-code-compliance/b-stability/b1-structure/packing-house-piles-video
- Below-floor work - Canterbury builder guide - www.building.govt.nz/building-code-compliance/canterbury-rebuild/below-floor-work-canterbury-builder-guide

More information

BRANZ Research Now: House Condition Survey 2015 #1 *Energy efficiency in the New Zealand housing stock*

BRANZ Research Now: House Condition Survey 2015 #2 *Maintenance and deferred maintenance in New Zealand houses*

Strengthening piled foundations, *Build* 121, 1 December 2010

BRANZ study reports
These can be downloaded from www.branz.co.nz/study_reports

SR372 *Warm, dry, healthy? Insights from the 2015 House Condition Survey on insulation, ventilation, heating and mould in New Zealand houses* (2017)

SR370 *BRANZ 2015 House Condition Survey: Comparison of house condition by tenure* (2017)

SR285 *House repair priorities*

BRANZ websites
www.branz.co.nz/hcs