

SUPPLEMENTAL MATERIALS

ASCE Natural Hazards Review

Homeowners' Perceptions of Seismic Building Performance and Implications for Preparedness in New Zealand

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Supplemental material - Questionnaire

Please, note that not all questions have been analysed in this paper, and other which are not relevant for this particular paper were not included as those questions will be included in future research.

Section 1: Personal experiences

1. Please, indicate any previous experience you have had with earthquakes (tick all that apply)

I have personally felt an earthquake before	<input type="checkbox"/>
I have felt strong shaking (i.e. MM6 - where people and animals are alarmed.. Walking steadily is difficult. Furniture and appliances may move on smooth surfaces, and objects fall from walls and shelves. Glassware and crockery break. Slight non-structural damage to buildings may occur)	<input type="checkbox"/>
I have had family or friends experience damage or loss from an earthquake	<input type="checkbox"/>
I have personally observed damage or loss from local earthquakes (e.g. within my community)	<input type="checkbox"/>
I have observed earthquake damage or loss via media (e.g. television, internet)	<input type="checkbox"/>

2. What was the structural performance of your house during the last seismic event caused by the shaking?

Undamaged	Minimal	Minor	Moderate	Major	Extreme	Not applicable
	Internal hair-line cracks in walls, which would have been solved by painting over	Cladding or stucco fell, or some windows were broken	Some walls were replaced or fixed up. The chimney fell. Cracks in floors or damage to foundations	The house didn't collapse, but it was inhabitable afterwards	Total collapse	
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. If so, please indicate what earthquake caused that damage.

	14 November 2016 Kaikoura
	21 July 2013 Seddon/Cook Strait
	16 August 2013 Lake Grassmere
	22 February 2011 Christchurch
	6 September 2010 Darfield
	Other. Please, indicate _____
	Not applicable

4. In the case where your house suffered some level of damage, where did you observe that damage?
(Tick all that apply)

- Basement
- First level
- Second level
- External walls
- Internal walls
- Connections between foundations and piles
- Connections between foundations and walls
- Connections of walls
- Slabs
- Roof
- Garage
- Chimney
- Other (please, specify) _____
- Not applicable

5. Were you living in your current home during the last earthquake event?

- Yes
- No (please, specify what town you were) _____
- Not applicable

Section 2: House Enhancement

We would like to let you know that there are ways of improving the structural performance of your house which will reduce the damage during an earthquake. These techniques can be applied to different components of your house such as foundations, walls, roof, etc.

6. Were you aware that there were strengthening techniques capable of improving the structural performance of your house during an earthquake?

- Yes
- No

7. If you were aware of these strengthening techniques, have you applied any to your house?

- Yes
- No
- No applicable (I didn't know that there are strengthening techniques)

If you have **not undertaken any** strengthening techniques **go to question number 14**, otherwise continue with question number 8

8. **If you have undertaken strengthening techniques** and an earthquake with a shaking level of MM8 occurs (i.e. where you will feel difficulty in standing, general alarm will cause panic and the whole town will be able to feel the shaking), what level of structural damage do you think your house would have suffered **without** these improvements?

	Undamaged	Minimal Internal hair-line cracks in walls, which would have been solved by painting over	Minor Cladding or stucco fell, or some windows were broken.	Moderate Some walls were replaced or fixed up. The chimney fell. Cracks in floors or damage to foundations.	Major The house didn't collapse, but it would have been inhabitable afterwards	Extreme Total collapse
Without improvements	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. **With the strengthening undertaken**, what level of structural damage do you think your house will suffer under the same earthquake of a shaking level of MM8?

	Undamaged	Minimal Internal hair-line cracks in walls, which will be solved by painting over	Minor Cladding or stucco fell, or some windows were broken.	Moderate Some walls were replaced or fixed up. The chimney fell. Cracks in floors or damage to foundations.	Major The house will not collapse, but it will be inhabitable afterwards	Extreme Total collapse
Now – with improvements	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. Where did you apply the strengthening techniques? (Tick all that apply)

- Basement
- External walls
- Internal walls
- Connections between foundations and piles
- Connections between foundations and walls
- Connections of walls
- Slabs
- Roof
- Garage
- Chimney
- Other (please, specify) _____
- Not applicable

11. Where did you originally get information about strengthening techniques from?

- Friends
- Council guidelines
- Earthquake Commission (EQC)
- News
- Social Media
- Expert Engineering consultant
- Builders
- Other (please, specify) _____

12. **If you have undertaken some strengthening techniques**, do you think you need to undertake even more to ensure no or minimal damage to your house during a future seismic event?

Definitely yes	2	3	4	Definitely not
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

13. We would like you to imagine that tomorrow you are in your house and an earthquake occurs. This earthquake will have a shaking level of intensity MM8 where you will have difficulty standing and the whole town will be able to feel the shaking. Would you feel safe at home?

Extremely Safe	2	3	4	Extremely Unsafe
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Once you have answered question 13, please go to question number 21

14. If you were previously **not aware of strengthening techniques** and now you are, would you consider undertaking strengthening?

Definitely yes	2	3	4	Definitely not
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

15. If you have **not** undertaken strengthening, what level of structural damage do you think your house would suffer in an earthquake with a shaking level of MM8, where you will have difficulty standing and the whole town will be able to feel the shaking?

Undamaged	Minimal	Minor	Moderate	Major	Extreme
	Internal hair-line cracks in walls, which will be solved by painting over	Cladding or stucco will fall, or some windows broken.	Some walls will need to be replaced or fixed up. The chimney would fall. Cracks in floors or damage to foundations.	The house will not collapse, but it will be inhabitable afterwards	Total collapse
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

16. We would like you to imagine that you have undertaken strengthening, what level of structural damage do you think your house would suffer under the same earthquake of shaking level MM8?

Undamaged	Minimal	Minor	Moderate	Major	Extreme
	Internal hair-line cracks in walls, which will be solved by painting over	Cladding or stucco will fall, or some windows broken.	Some walls will need to be replaced or fixed up. The chimney would fall. Cracks in floors or damage to foundations.	The house will not collapse, but it will be inhabitable afterwards	Total collapse
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

17. We would like you to imagine that you have undertaken strengthening techniques. Where would you apply these? (Tick all that apply)

- Basement
- External walls
- Internal walls
- Connections between foundations and piles
- Connections between foundations and walls
- Connections of walls
- Slabs
- Roof
- Garage
- Chimney
- Other (please, specify) _____
- I do not know

18. If you have **not** undertaken strengthening, but now you are aware that there are strengthening techniques to improve the performance of your house, where would you look for further information?

- Friends
- Council guidelines
- Earthquake Commission (EQC)
- News
- Social Media
- Expert Engineering consultant
- Builders
- Other (please, specify) _____
- Unsure

19. If you have **not** undertaken strengthening, what would be the main reason?

- I think these structural actions are too expensive
- I don't spend much time in my house
- I don't trust the proposed methods
- I am unsure about the cost/benefit
- I did not know it was possible to improve the structural performance of my house
- I have insurance which will cover any structural damage to my house
- I don't have a clear idea of what to do
- Other (please, specify) _____

20. We would like you to imagine that tomorrow you are in your house and an earthquake occurs. This earthquake will have a shaking level of intensity MM8 where you will have difficulty standing and the whole town will be able to feel the shaking. Would you feel safe at home?

Extremely Safe	2	3	4	Extremely Unsafe
○	○	○	○	○

21. How much do you agree with the following statements?

	Strongly agree	2	3	4	Strongly disagree
I trust the information about strengthening techniques provided by the City Council	○	○	○	○	○
I trust the information about strengthening techniques provided by EQC	○	○	○	○	○
I trust the information about strengthening techniques provided by an expert engineering consultant	○	○	○	○	○
I trust the information about strengthening techniques provided by a construction worker	○	○	○	○	○