



Addressing the New Madrid Seismic Zone Earthquake Protection Gap

Insights into
Homeowners and
Renters Earthquake
Insurance Uptake
from Comprehensive
Primary Data

November 1, 2022

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FINAL RESEARCH REPORT

November 1, 2022

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Executive Summary

The New Madrid Seismic Zone (NMSZ), located in the central U.S., is an area of significant earthquake risk. From a historical perspective, three major earthquakes estimated to have been a magnitude of 7.0–7.5 on the Modified Mercalli Intensity (MMI) scale occurred from December 1811 to February 1812 and were centered in the Missouri Bootheel region of the NMSZ. There have been several studies aimed at projecting what the losses of such a similar 1811–1812 magnitude earthquake event would be if it were to occur in the NMSZ region today, with estimates ranging from \$110 billion to \$290 billion of total insured losses. Importantly, the earthquake risk in the NMSZ is not a remnant of the past. Since 1974, the NMSZ monitoring network has recorded more than 4,000 earthquakes, and scientific estimates provide the probability of an earthquake of magnitude 6.0 or greater occurring in the next 50 years in the NMSZ to be from 25% to 40%.

Despite this earthquake threat, a substantial and growing residential property earthquake insurance coverage protection gap also exists in the area. Annually, the Missouri Department of Commerce and Insurance (DCI) produces estimates of detailed residential earthquake coverage in its state—the center of the historical earthquake events. In its latest 2021 coverage report, the DCI finds that in 91 of Missouri’s 115 counties, only 20% or less of residences have earthquake insurance coverage. On average, 24% of residential dwellings (i.e., homeowners, farms, and mobile homes) across the state have earthquake coverage, representing a drop of nearly 20% on average across the state since 2000.

Given the significant earthquake risk in the NMSZ, what is driving the earthquake insurance coverage protection gap? Of course, the cost of earthquake insurance is a key factor in its uptake. In Missouri, concurrent with the decline in earthquake insurance coverage over time, the Missouri DCI finds that since 2000, the cost of earthquake insurance has risen on average by 352% across the entire state. Ostensibly, the rising cost of earthquake insurance coverage in the NMSZ is a key factor in the corresponding decline of coverage, as well as an ever-present and growing concern of the Missouri DCI in regulating its insurance marketplace. However, what is also apparent from the Missouri DCI data is that while the percentage of residences with earthquake insurance coverage has declined over time in every county across the entire state since 2012, the price of earthquake coverage has not increased in every county during this same time frame.

Thus, an increasing cost of earthquake insurance coverage is not the only factor determining declining earthquake insurance uptake. Other potential factors that can influence the decision to purchase earthquake insurance include: the price and design of earthquake insurance coverage; household demographics and income constraints; risk perceptions, including catastrophe experience; messaging by insurers, governments, and media; whether a culture of preparedness exists; expectation of post-disaster relief; and investments in mitigation.

To understand the reasons for this earthquake insurance coverage protection gap for both homeowners and renters, we conducted a comprehensive mixed-method study of NMSZ residents. This study included primary data collected through interviews, focus groups, and two surveys. We began with formative qualitative research (focus groups and interviews) to gain insight into the ways that NMSZ residents think about earthquake risk and protective actions, including purchasing earthquake insurance. Our results confirm that many NMSZ residents do not have earthquake insurance and, importantly, highlighted that they are not aware that traditional renters and homeowners insurance coverage does not cover earthquake damage and loss. Many participants in our interviews and focus groups were also not clear on the actual costs of earthquake insurance.

Given the significant earthquake risk in the NMSZ, what is driving the earthquake insurance coverage protection gap?

To understand the reasons for this earthquake insurance coverage protection gap for both homeowners and renters, we conducted a comprehensive mixed-method study of NMSZ residents.

Leveraging the insights from our qualitative analysis, we then designed and conducted a large survey across the NMSZ eight-state region that included questions on various factors related to earthquakes: susceptibility; severity; emotion; experience; preparedness; engagement and awareness; insurance; information use and information sufficiency; and demographics. From our survey data, we use descriptive analysis and statistical modeling to identify the factors that are most important for influencing decisions to purchase earthquake insurance in the NMSZ region. Overall, we find that the top three predictors of earthquake insurance uptake in the NMSZ are: 1) using insurance agents to help make insurance decisions; 2) talking to friends and family about

earthquakes; and 3) consumer confidence in having enough information about earthquakes. Specifically, homeowners who used an insurance agent to make insurance decisions were 2.84 times more likely to have earthquake insurance than those who did not. Renters who used an insurance agent to make insurance decisions were 11.87 times more likely to have earthquake insurance than those who did not. Regarding talking with others about earthquakes, as this increased, homeowners were 1.63 times more likely to have earthquake insurance. Approximately one-quarter of homeowners and renters who had earthquake insurance indicated that family or friends recommending insurance was a reason why they had purchased the insurance. Lastly, as the amount of information sufficiency increased (that is, as people reported greater belief that they had the information they needed to stay safe), the likelihood of having earthquake insurance increased 2.22 times for homeowners and 4.42 times for renters.

Overall, we find that the top three predictors of earthquake insurance uptake in the NMSZ are: 1) using insurance agents to help make insurance decisions; 2) talking to friends and family about earthquakes; and 3) consumer confidence in having enough information about earthquakes.

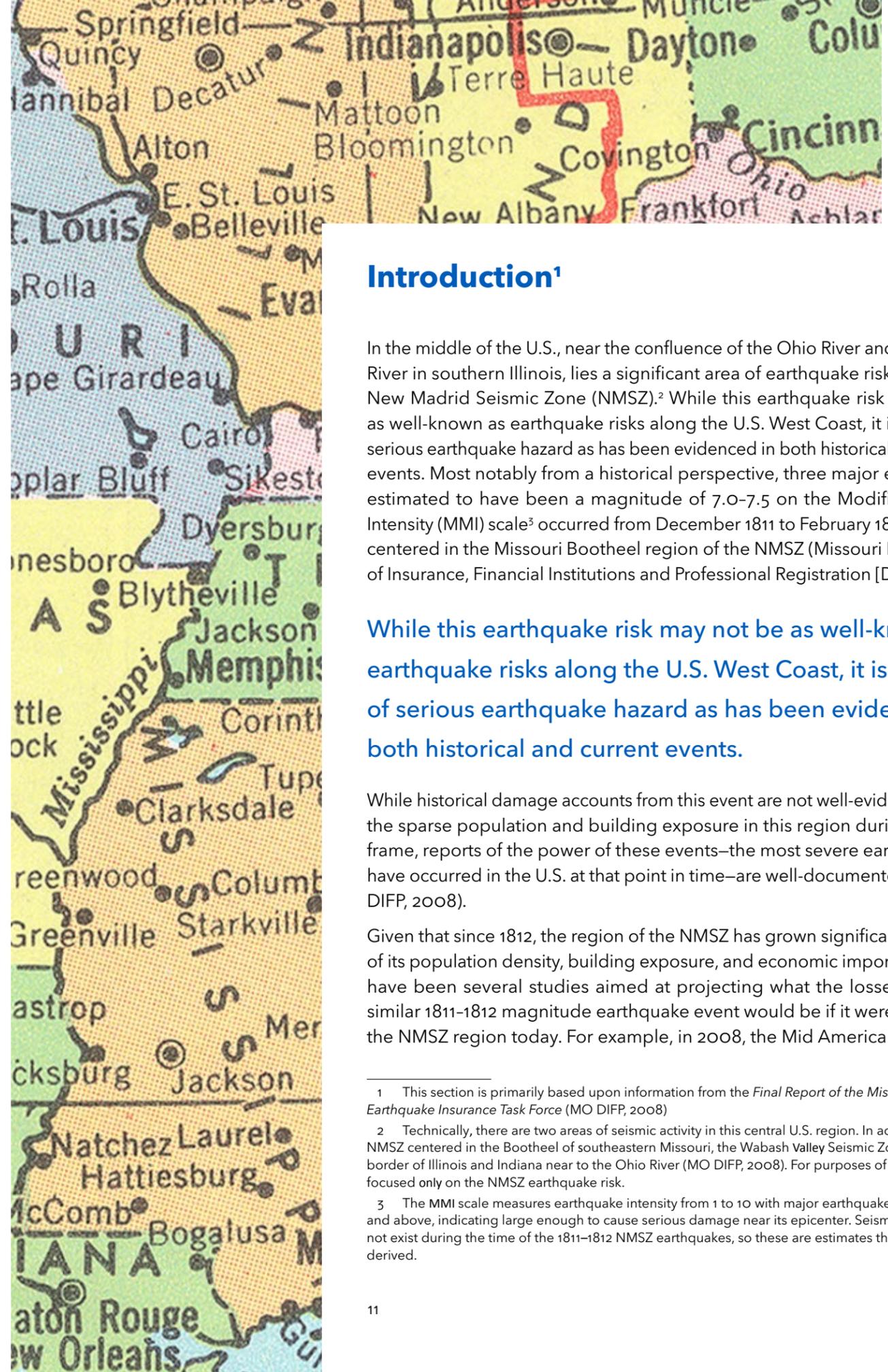
Importantly, given the level of engagement by NMSZ residents for all three of these factors, there is potential for improvement and, hence, related potential opportunities to close the earthquake insurance coverage gap. For example, 34% of homeowners and 76.7% of renters reported that they did not use an insurance agent to make insurance purchasing decisions, indicating the potential to increase connections between residents and insurance agents related to insurance decisions. Opportunities to promote community conversations about earthquakes, including some discussion of earthquake insurance, could ultimately increase earthquake insurance uptake rates too—especially as we found that most of our participants *never or rarely* had conversations with family and friends about earthquakes (59.3%), shared information with family and friends about earthquakes (60.4%), discussed earthquakes with neighbors and coworkers (65.2%), or attended meetings or community events about earthquakes (73.3%). Regarding information sufficiency, a minority of survey participants (45.6%) believed they had enough information to understand earthquake insurance coverage. Overall then, it appears that as individuals gain more information about earthquakes, they are likely to encounter information about earthquake insurance, which contributes to deciding to purchase that insurance. In addition to media sources, the

information may come from insurance agents or talking with friends, family, and neighbors about earthquakes.

Finally, we also included a case study of an earthquake preparedness campaign (“Are You Ready?”) that the DCI implemented in Missouri directly using the results of our primary research. In February 2021, the Missouri DCI ran the “Are You Ready?” campaign in observance of Earthquake Awareness Month.

This case study example significantly illustrates the ways that data can be used to improve earthquake campaigns and potentially increase earthquake insurance uptake.

The purpose of this campaign was to promote earthquake preparedness among individuals in Missouri counties in the NMSZ. Using responses from Missouri residents in our main survey, we examined how aware of the “Are You Ready?” campaign survey respondents were and analyzed how exposure to the campaign was related to earthquake protective actions, including buying earthquake insurance. We had found that seeing the 2021 campaign was not related to participants knowing that renters and homeowners insurance do not cover earthquakes. Based on this insight, the DCI revised the “Are You Ready?” campaign for 2022 to more clearly indicate that renters and homeowners insurance do not cover earthquakes. The 2022 campaign materials also encouraged individuals to contact an insurance agent to find out about earthquake insurance, given our results that using an agent to make insurance decisions strongly predicted earthquake insurance uptake. We conducted a follow-up survey following the 2022 “Are You Ready?” campaign and found that seeing the campaign was related to survey participants engaging in a variety of additional earthquake preparedness behaviors, such as deciding to look for more earthquake information or deciding to review their renters or homeowners insurance. This case study example significantly illustrates the ways that data can be used to improve earthquake campaigns and potentially increase earthquake insurance uptake.



Introduction¹

In the middle of the U.S., near the confluence of the Ohio River and Mississippi River in southern Illinois, lies a significant area of earthquake risk named the New Madrid Seismic Zone (NMSZ).² While this earthquake risk may not be as well-known as earthquake risks along the U.S. West Coast, it is an area of serious earthquake hazard as has been evidenced in both historical and current events. Most notably from a historical perspective, three major earthquakes estimated to have been a magnitude of 7.0–7.5 on the Modified Mercalli Intensity (MMI) scale³ occurred from December 1811 to February 1812 and were centered in the Missouri Bootheel region of the NMSZ (Missouri Department of Insurance, Financial Institutions and Professional Registration [DIFP], 2008).

While this earthquake risk may not be as well-known as earthquake risks along the U.S. West Coast, it is an area of serious earthquake hazard as has been evidenced in both historical and current events.

While historical damage accounts from this event are not well-evidenced given the sparse population and building exposure in this region during this time frame, reports of the power of these events—the most severe earthquakes to have occurred in the U.S. at that point in time—are well-documented (Missouri DIFP, 2008).

Given that since 1812, the region of the NMSZ has grown significantly in terms of its population density, building exposure, and economic importance, there have been several studies aimed at projecting what the losses of such a similar 1811–1812 magnitude earthquake event would be if it were to occur in the NMSZ region today. For example, in 2008, the Mid America Earthquake

¹ This section is primarily based upon information from the *Final Report of the Missouri Earthquake Insurance Task Force* (MO DIFP, 2008)

² Technically, there are two areas of seismic activity in this central U.S. region. In addition to the NMSZ centered in the Bootheel of southeastern Missouri, the Wabash Valley Seismic Zone is along the border of Illinois and Indiana near to the Ohio River (MO DIFP, 2008). For purposes of our study, we focused only on the NMSZ earthquake risk.

³ The MMI scale measures earthquake intensity from 1 to 10 with major earthquakes being 6.0 and above, indicating large enough to cause serious damage near its epicenter. Seismographs did not exist during the time of the 1811–1812 NMSZ earthquakes, so these are estimates that have been derived.

Center at the University of Illinois modeled a worst-case scenario event for each of the eight NMSZ states—Alabama, Arkansas, Illinois, Indiana, Kentucky, Mississippi, Missouri, and Tennessee⁴ (Elnashai et al., 2008). Total modeled single-state economic losses from this event in 2008 dollars ranged from \$1.1 billion in Alabama to \$56.6 billion in Tennessee. (Refer to Table 1.) Five of the eight NMSZ states had losses of at least \$18.9 billion, which would be at least approximately equal to the \$18 billion in damages recorded from the 6.7 magnitude Northridge earthquake that occurred in 1994 in California.⁵ Other projected NMSZ total damages estimated from Swiss Re (2015), AIR Worldwide (2011), and Risk Management Solutions (RMS) (2011) were \$150 billion, \$110 billion, and \$115 billion to \$290 billion of insured losses, respectively, again highlighting the significant earthquake risk embedded in the NMSZ. For further context, the costliest natural catastrophe loss on record in the U.S., Hurricane Katrina in 2005, had total insured losses of \$89.6 billion in 2021 dollars.⁶

Table 1: 7.7 magnitude NMSZ earthquake “worst-case” state-by-state modeled scenarios (2008 dollars)

State	2008 Estimated Economic Loss
AL	\$1.1 billion
AR	\$18.9 billion
IL	\$34.1 billion
IN	\$1.4 billion
KY	\$46.0 billion
MO	\$38.7 billion
MS	\$9.5 billion
TN	\$56.6 billion

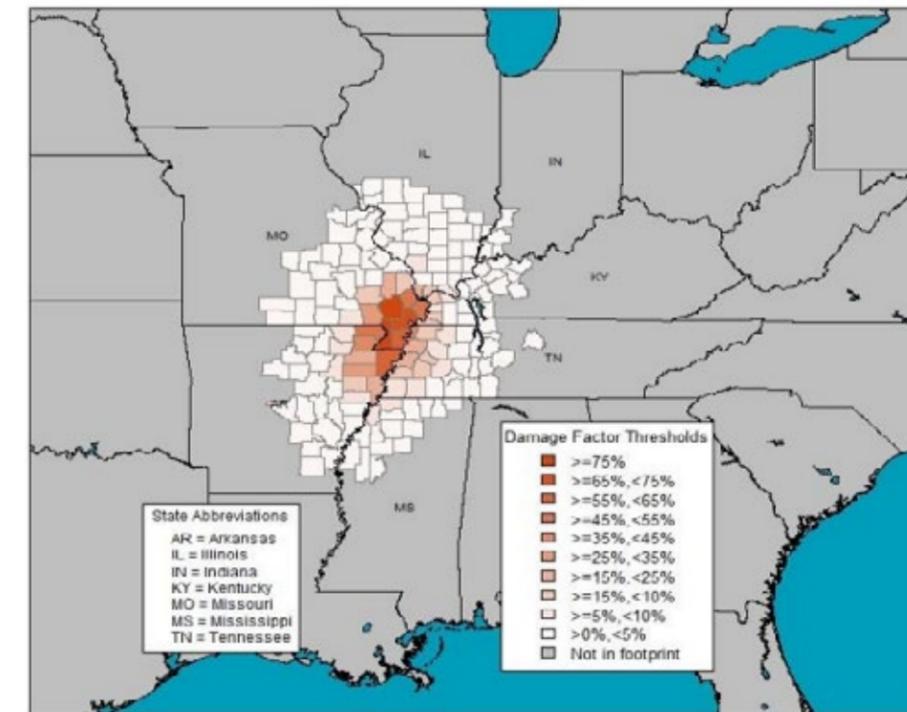
Source: *Final Report of the Missouri Earthquake Insurance Task Force* (MO DIFP, 2008).

Importantly, the earthquake risk in the NMSZ is not a remnant of the past. Since 1974, the NMSZ monitoring network has recorded more than 4,000 earthquakes, with the largest of these being a 5.4 magnitude quake occurring in 1968 in Illinois.⁷ In fact, close to the writing of this report in the spring of 2022, a 2.8 magnitude earthquake was recorded in the St. Louis, MO, area, with reports of consistent New Madrid seismic activity on a frequent basis.⁸ Scientific estimates provide the probability of an earthquake of magnitude 6.0 or greater occurring in the next 50 years in the NMSZ to be from 25%

⁴ This involved moving the modeled 7.7 magnitude earthquake along the length of the NMSZ to the point where it would produce the highest damages for the state in question.
⁵ Note that property losses are only a portion of the overall modeled loss estimates. For example, in Missouri, of the \$38.7 billion in losses, \$11.8 billion of this was for buildings.
⁶ <https://www.iii.org/fact-statistic/facts-statistics-us-catastrophes>
⁷ https://en.wikipedia.org/wiki/New_Madrid_Seismic_Zone
⁸ <https://101theeagle.com/see-a-swarm-of-7-earthquakes-on-the-new-madrid-fault-this-week/>

to 40% (MO DIFP, 2008). Moreover, the existing NMSZ earthquake risk is known and accounted for by the insurance industry. For example, Lloyd’s of London annually has its syndicates run various realistic disaster scenarios (RDS) on their portfolios and include an RDS for the NMSZ (Lloyd’s, 2022). Figure 1 from the Lloyd’s NMSZ RDS highlights the plausible extent of damage for such an event that its insurers must contend with in their underwriting risk management. The modeled NMSZ event results in “an estimated USD44bn Industry Property Loss (shake and fire following), after taking into account take-up rates but before applying policy terms. Demand surge is included.” (Lloyd’s, 2022, pg. 29)

Figure 1: 2022 Lloyd’s realistic disaster scenario footprint and residential, ground-up shake damage levels for a New Madrid earthquake event



Source: Lloyd’s, 2022.

While a significant earthquake risk in the NMSZ exists, unfortunately there is evidence of a substantial and growing residential property earthquake insurance coverage protection gap. Annually, the Missouri Department of Commerce and Insurance (DCI) produces estimates of detailed residential earthquake coverage in its state. In its latest 2021 coverage report (Missouri DCI, 2022A), the Missouri DCI finds that in 91 of Missouri’s 115 counties (79% of counties), only 20% or less of residences have earthquake insurance coverage. On average, 24% of residential dwellings (i.e., homeowners, farms, and mobile homes) across the state have earthquake coverage, representing a drop of nearly 20% on average across the state since 2000. More pointedly, in

the six-county New Madrid region of Missouri—the highest earthquake risk geographic area of the state—the number of residences with earthquake coverage has declined by 49% between 2000 and 2021, from 60.2% to 11.4%. While the other seven states of the NMSZ do not have the same level of detailed insurance coverage data as Missouri, four surveys that the Insurance Information Institute (III) conducted from 2015 to 2020 found that only an estimated 7% to 16% of homeowners in the Midwest region reported having earthquake insurance (III, 2020). We also find that these overall earthquake market penetration rates in the NMSZ of 25% or less are in line with statewide premium data serving as a proxy for such rates. Refer to Appendix A for our analysis of earthquake market penetration rates for all the states in the NMSZ using NAIC statewide earthquake premium data as a proxy for earthquake insurance uptake.

Given the significant earthquake risk in the NMSZ, what is driving the earthquake insurance coverage protection gap? Of course, the cost of (disaster) insurance is a key factor in its uptake (Kelly et al., 2020; CREW, 2021). In Missouri, concurrent with the decline in earthquake insurance coverage over time, the Missouri

On average, 24% of residential dwellings across the state have earthquake coverage, representing a drop of nearly 20% on average across the state since 2000.

DCI (2022A) finds that since 2000, the cost of earthquake insurance has risen on average by 352% across the entire state and by 816% in the New Madrid counties alone. Ostensibly, the rising cost of earthquake insurance coverage in the NMSZ is a key factor in the corresponding decline of coverage, as well as an ever-present and growing concern of the Missouri DCI in regulating its insurance marketplace.

But while the detailed 2021 Missouri coverage report illustrates that the percentage of residences with earthquake insurance coverage has declined over time in every county across the entire state since 2012, according to its data, the price of earthquake coverage (for \$110,000-\$140,000 coverage limits) has not increased in every county during this same time frame. In fact, seven of the 115 counties saw an earthquake cost of coverage decrease since 2012, ranging from 2% to 28% reduction in cost (Missouri DCI, 2022A). Furthermore, the largest declines in coverage are not limited to the counties that have seen the largest cost increases. For example, the three counties experiencing the largest cost of earthquake insurance coverage increases since 2012 at 93%, 94%, and 109% (Bates, Butler, and Mercer counties, respectively), had corresponding earthquake coverage decreases of 2.2%, 15.8%, and 3.4%, respectively (Missouri DCI, 2022A). Butler County's coverage

decrease percentage is large but not in the top five in the state, and the other two counties are in the 27th percentile or less.

Clearly then, an increasing cost of earthquake insurance coverage is not the only factor determining declining earthquake insurance uptake. For example, Kelly et al. (2020) identify several potential factors in addition to cost that influence the decision to purchase earthquake insurance, including: the price and design

Clearly then, an increasing cost of earthquake insurance coverage is not the only factor determining declining earthquake insurance uptake.

of earthquake insurance coverage; household demographics and income constraints; risk perceptions, including catastrophe experience; messaging by insurers, governments, and media; whether a culture of preparedness exists; expectation of post-disaster relief; and investments in mitigation. Consequently, the primary purpose of this research project was to understand the potential determinants of earthquake insurance uptake in the NMSZ via a comprehensive mixed-method primary data collection strategy. Crucially too, we focus not only on homeowners in the region, but also renters, who make up a significant portion of the at-risk population and are often an afterthought in insurance protection coverage.

We began with formative qualitative research (focus groups and interviews) to gain insight into the ways that NMSZ residents think about earthquake risk and protective actions, including purchasing earthquake insurance. Leveraging the insights from our qualitative analysis, we then designed and conducted a large survey across the NMSZ eight-state region and use descriptive analysis and statistical modeling to identify the factors that are most important for influencing decisions to purchase earthquake insurance in the NMSZ region. Overall, we find that the top three predictors of earthquake insurance uptake in the NMSZ are: 1) using insurance agents to help make insurance decisions; 2) talking to friends and family about earthquakes; and 3) consumer confidence in having enough information about earthquakes.

Finally, we also included a case study of an earthquake preparedness campaign ("Are You Ready?") that the DCI implemented in Missouri directly using the results of our primary research. Specifically, using responses from Missouri residents in our main survey plus a smaller Missouri-only follow-up survey, we examined how aware of the "Are You Ready?" campaign survey respondents were and analyzed how exposure to the campaign was related to earthquake protective actions, including buying earthquake insurance. Our analysis indicated that seeing the 2021 "Are You Ready?" campaign was associated with survey participants taking a variety of protective actions to prepare for earthquakes. However, seeing the 2021 campaign was not related to participants

knowing that renters and homeowners insurance do not cover earthquakes. Based on this insight, the DCI revised the “Are You Ready?” campaign for 2022 to more clearly indicate that renters and homeowners insurance do not cover earthquakes. The 2022 campaign materials also encouraged individuals to contact an insurance agent to find out about earthquake insurance, given our results that using an agent to make insurance decisions strongly predicted earthquake insurance uptake. We conducted a follow-up survey following the 2022 “Are You Ready?” campaign and found that seeing the campaign was related to survey participants engaging in a variety of additional earthquake preparedness behaviors.

Details of our primary data collection methodology, analyses, and findings are presented in the report below and are structured as follows. We first discuss what earthquake insurance coverage is and provide a brief literature review of its key purchase determinants. We next describe our comprehensive primary data research methodology, which explains how and when data were collected.

Using survey responses we examined how aware of the “Are You Ready?” campaign survey respondents were.

We then provide results from our qualitative analysis, which included focus groups and interviews. Next, we present results from our main survey across the eight-state NMSZ region. We begin our presentation of our main survey results with basic descriptive results on issues of the insurance coverage status (homeowners then renters), other earthquake insurance attitudes, earthquake risk perceptions and experience, earthquake information and communication, earthquake preparedness and awareness, housing type, and demographics. We then present our main regression modeling results. In these regression models, we include factors potentially important in determining who does and does not have earthquake insurance to identify the factors that are most important. The factors we include in our models were identified from previous research on earthquake preparedness in other areas and through our focus groups and interviews. Finally, we present the results of our case study that examines the impact of the “Are You Ready?” earthquake awareness and preparedness campaign in Missouri.

Earthquake Insurance Coverage and a Brief Literature Review on Earthquake Coverage Demand

Earthquake Insurance Coverage⁹

In the U.S., there is no one base policy for property insurance that can cover all disaster perils. Instead, policyholders typically need to purchase an additional endorsement or even a separate insurance policy to cover certain natural disasters, such as earthquakes and floods (Zhang et al., 2021). For the flood peril in those geographic areas that are determined to be at high risk (i.e., the Special Flood Hazard Area [SFHA]), insurance coverage may be mandatory if certain requirements are met, such as having a federally backed mortgage. However, there is no similar mandatory coverage requirement for those living in high-risk earthquake areas. Therefore, purchasing earthquake insurance is completely voluntary on the part of homeowners and renters. Lastly, the coverage that is purchased for natural disasters typically comes with separate deductibles and coverage limits.

Policyholders typically need to purchase an additional endorsement or even a separate insurance policy to cover certain natural disasters, such as earthquakes.

If an earthquake affects one’s property, earthquake insurance covers repairs needed because of earthquake damage to one’s dwelling and may cover other structures not attached to one’s house, like a garage. Repairing one’s property from earthquake damage may be a costly and time-consuming effort. Therefore, the coverage can account for: increased costs to meet current building codes and costs to stabilize the land under one’s home; the cost to remove debris; and any extra living expenses one may have while their home is being rebuilt or repaired. However, earthquake insurance coverage typically will not include certain types of problems that might occur proximate in time to an earthquake event, such as fire, land openings, and external water damage, nor does it cover damage to vehicles. Additionally, for both

⁹ This section is primarily based upon information from the *Missouri Earthquake Insurance Shopping Guide* (Missouri DCI, 2022B) and *A Consumer’s Guide to Earthquake Insurance* (NAIC, 2022).

Earthquake deductibles—or the amount homeowners are responsible for on each earthquake damage claim—are usually 10% to 20% of the coverage limit

homeowners and renters, it insures their personal property (e.g, furniture, clothes, appliances, etc.) against damage from an earthquake.

In highly hazard-prone areas of the U.S., catastrophic perils (even those included in a standard homeowners policy, such as wind and hail) are subjected to separate deductibles that are generally a percent of the insured value of the home; i.e., the coverage limit. Earthquake deductibles—or the amount homeowners are responsible for on each earthquake damage claim—are usually 10% to 20% of the coverage limit. For coverage and content limits approaching \$200,000 or higher, this deductible amount can be a significant cost for significant damage, even with insurance coverage in place.¹⁰ There may also be separate deductibles for different covered structures and contents coverage.

Earthquake Insurance Coverage Demand

In its recent earthquake insurance snapshot, the Cascadia Region Earthquake Workgroup (CREW) discussed why people do or do not buy earthquake insurance (CREW, 2021). It found that the No. 1 reason people do not purchase earthquake insurance coverage is because “earthquake insurance is expensive” (CREW, 2021, pg. 7). As discussed in the introduction, the Missouri DCI finds that on average, 24% of residential dwellings (i.e., homeowners, farms, and mobile homes) across the state have earthquake coverage. This represents a drop of nearly 20% on average across the state since 2000. It also finds that since 2000, the cost of earthquake insurance has risen on average by 352% across the entire state. Ostensibly, the rising cost of earthquake insurance coverage in the NMSZ represented through the detailed Missouri market data is a key factor in the corresponding decline of coverage.

However, a closer look at the 2021 Missouri market data indicates that an increasing/high cost of earthquake insurance coverage is not the only factor determining declining earthquake insurance uptake. Table 2 presents the average earthquake coverage premium, the average percentage point change (2013-2021) of dwellings with earthquake coverage, and the average percentage point change of the annual cost of earthquake coverage (2013-2021) for \$110,000-\$140,000 coverage limits split across counties classified by their earthquake risk from 6 (lowest) to 10 (highest).

¹⁰ The NAIC (2022) provides an example of a \$32,000 deductible amount for property damage of \$180,500 with coverage limits of \$160,000.

Table 2 Earthquake risk, premium cost, and change in coverage from 2013 to 2021

Earthquake Risk	Number of Counties	Average Premium, \$110K-\$140K	% Point Change of Dwellings With Earthquake Coverage	% Point Change of the Annual Cost of Earthquake Coverage
6	67	\$47.55	-4.4%	31.5%
7	32	\$61.23	-9.0%	24.9%
8	10	\$91.20	-13.4%	41.2%
9	3	\$323.33	-17.2%	60.3%
10	3	\$337.00	-9.9%	44.0%

Source: Missouri DCI (2022A) - authors' calculations.

This data illustrate that as the earthquake risk increases, so too does the cost of coverage as would be expected, with average premiums being nearly seven times higher in the highest risk zones (9 and 10) compared to the lowest. The data also illustrate that over time, the largest percentage point change in coverage dropped on average—a 17.2% decrease—occurred where the largest cost of coverage premium increase transpired on average—a 60.3% increase in the three counties classified as 9 earthquake risk. However, these average values mask what is happening in any one individual county. For example, and as noted in the introduction, seven of the 115 counties experienced an earthquake cost of coverage *decrease* since 2012, ranging from 2% to 28% less (Missouri DCI, 2022A). Furthermore, the largest declines in coverage are not limited to the counties that have seen the largest cost increases. For example, Table 2 illustrates nearly identical decreases in coverage in the earthquake risk zones of 7 and 10 over time (9% and 9.9% decreases, respectively), despite average cost increases of 24.9% and 44%, respectively. In fact, cost increases in earthquake risk zone 6 were higher on average than zone 7 (31.5% vs. 24.9%), yet zone 7 had almost two times more decrease in coverage.

So, if cost of coverage is not the only factor driving earthquake insurance uptake, what else matters? Kelly et al. (2020) investigate the market penetration differences in the western Washington state area compared with the lower mainland of British Columbia, which both face the same earthquake risk of the Cascadia subduction zone. They discuss several potential factors in addition to cost that influence the decision to purchase earthquake insurance, including: the price and design of earthquake insurance coverage; household demographics and income constraints; risk perceptions, including catastrophe experience; messaging by insurers, governments, and media; whether a culture of preparedness exists; expectation of post-disaster relief; and investments in mitigation. They conclude that the expectations of post-disaster relief funding, as well as whether a national culture of preparedness exists, are the two main drivers of lower earthquake insurance uptake in the western Washington state area compared with the lower mainland of British Columbia. They do note that primary survey data related to all potential factors driving earthquake

insurance uptake should be collected and analyzed in more depth as we do here for the NMSZ.

In addition to the cost of coverage, CREW (2021) discusses several other primary reasons it found that people do not purchase earthquake insurance coverage, including: earthquakes happen rarely, minimizing their perception of the hazard/risk; the deductible is considered too high; they believe their home is in a low-hazard area; they are unaware of the earthquake hazard and possible damage; competing perils/costs (e.g., wildfire, hail) increase overall expense, so they are less able to afford additional coverage; and they do not realize their homeowners policy excludes earthquakes. Possible other suggestions CREW discusses include: people feel overwhelmed by the hazard/risk and avoid thinking about it; agents do not explicitly offer earthquake insurance to consumers; earthquake insurance is difficult to get (i.e., few carriers in highest-risk areas); insurers will not write a policy if the structure is not adequately braced; people think that because their buildings were not damaged by previous earthquakes, they will not be damaged by the next one; people consider the structure's value too low to justify the cost of coverage; and there is no incentive (e.g., it is not required for a mortgage).

Conversely, CREW (2021) also discusses the primary reasons that people do purchase earthquake insurance coverage around the ability to purchase coverage, as well as high-awareness of the earthquake risk or recent experience. Specifically, it indicates people are motivated to buy earthquake insurance coverage because: their attention was captured and concern stimulated by a recent earthquake or other natural disaster, and they have higher-than-average awareness of earthquake hazards and a high level of risk aversion. Other suggestions include: people are aware of their particular property's high earthquake risk; they are offered flexibility/choice among policies (e.g., premium costs/deductibles); insurance agents educate consumers when they buy residential policies; they want to protect an asset (e.g., they are close to paying off their mortgages); home mitigation lowered the premium cost; and they have read about, or participated in conversations about, earthquake preparedness.

Like earthquake insurance coverage, policyholders typically need to purchase an additional endorsement or even a separate insurance policy to cover flood damage. Flood insurance coverage also faces a persistent and growing flood insurance protection gap, and a number of reasons have been well-documented as to what limits flood insurance uptake through the National Flood Insurance Program (NFIP), the primary provider of flood insurance coverage in the U.S. (Government Accountability Office [GAO], 2014a; 2014b; Michel-Kerjan et al., 2015). These include:

- An inaccurate perception of flood risk—both hazard and impact components—especially connected to the occurrence or lack of occurrence of a flood event in a recent year.

- Geographical characteristics, such as being near to the shoreline, which influences salience of the flood hazard.
- A mistaken belief that flood is covered under their regular homeowners insurance.
- A lack of enforcement of purchase requirements by banks at mortgage origination.
- Expectations of government disaster relief after a flood event.
- A false sense of security tied to community mitigation (e.g., existence of a barrier or levee even though it might be fairly old and ineffective) substituting for the need for insurance.
- Price and affordability concerns.
- Other budget priorities
- A lack of flexibility in the quantity of insurance someone can purchase (product design).

From the above flood insurance rationales, what should be clear is that these rationales are similar to key themes highlighted regarding earthquake insurance coverage demand. Moreover, these reasonings highlight that there are certain aspects associated with a standard “rationale” economic purchase decision process (e.g., product price) informed through deliberative thinking, as well as other aspects affecting the flood purchase decision that are more intuitive in nature (National Research Council [NRC], 2015). These intuitive decision processes rely on quick rules of behavior that are often more nonfinancial-oriented, such as an availability bias related to flood experience or emotions (or a lack of) concerned about flooding and trust in local flood protection.

Meyer and Kunreuther (2017) highlight three such intuitive behavioral bias processes that lead to low insurance uptake: 1) optimism—the likelihood of quake-related damage is below their threshold level of concern; 2) inertia—why change from current behavior given unconcern with future damage from earthquakes; and 3) simplification—no attention paid to damage from a severe earthquake because perceived likelihood of an earthquake affecting their house is so low. While intuitive reasoning has its purpose in many choices, more deliberative thinking is likely necessary when dealing with choices concerning low-probability, high-consequence events that individuals have little experience with, such as purchasing flood and earthquake insurance. Consequently, both intuitive and deliberative aspects of the flood and earthquake insurance choice should be accounted for in developing strategies to encourage increases in future flood and earthquake insurance purchases. For flood insurance coverage, the NRC (NRC, 2015) suggests some related potential avenues, including the use of choice architecture such as multiyear flood policies, that provide coverage and price stability.

Lastly, Zhang et al., (2021) touch upon the inherent complexity of purchasing natural disaster insurance coverage. They discuss that disaster peril of flood

Homeowners need to acquire a significant amount of information and knowledge to understand the insurance policies and make informed decisions about their coverage choices.

The Missouri DCI insurance coverage data and the existing literature illustrate that there are a multitude of factors that potentially drive earthquake insurance coverage demand . . . to better assess these aspects, it is recommended that the collection of primary survey data related to these potential factors driving earthquake insurance uptake should be undertaken.

and wind may be excluded from a regular insurance policy. Thus, homeowners need to purchase a separate policy for that risk often with separate deductibles and coverage limits. As a result, homeowners need to acquire a significant amount of information and knowledge to understand the insurance policies and make informed decisions about their coverage choices. They introduce and empirically demonstrate the nature of that complexity in insurance coverage choices for flood and wind, with their findings being applicable in the earthquake coverage decision making context, as well.

All told, the Missouri DCI insurance coverage data and the existing literature illustrate that there are a multitude of factors that potentially drive earthquake insurance coverage demand. Moreover, to better assess these aspects, it is recommended that the collection of primary survey data related to these potential factors driving earthquake insurance uptake should be undertaken (Kelly et al., 2020). Consequently, the primary purpose of this research project is to understand the potential determinants of earthquake insurance uptake in the NMSZ via a comprehensive mixed-method primary data collection strategy. Crucially too, we focus not only on homeowners in the region, but also renters, who make up a significant portion of the at-risk population and are often an afterthought in insurance protection coverage.



Research Methodology

We collected NMSZ homeowner and renter data through three different primary data collection project components: 1) focus groups and interviews; 2) a main survey; and 3) a follow-up survey. We conducted focus groups and interviews with Missouri adults living in towns in the NMSZ (Cape Girardeau, New Madrid, Sikeston, and Charleston). We implemented a main survey with 1,258 adults living in eight states in the NMSZ, as well as a follow-up survey of 522 adults living in Missouri counties that are part of the NMSZ. We describe each of these components in more detail below.

Qualitative Focus Groups and Interviews

We began with formative qualitative research (focus groups and interviews) to gain insight into the ways that NMSZ residents thought about earthquake risk and protective actions including purchasing earthquake insurance. Focus groups and interviews allowed us to have more confidence that our next step of data collection (a large survey in the region) would be properly designed to capture the issues that were important to individual insurance decisions in this area. We conducted 1-hour focus groups and 10- to 30-minute individual interviews with adult residents in Missouri. Participants were recruited via University of Missouri Extension offices, social media and flyers posted in key community locations (e.g., library, YMCA).

We conducted two in-person focus groups in July 2021 in two Missouri towns at high risk for a New Madrid earthquake (New Madrid and Cape Girardeau). Nine adults participated in the focus groups. We also conducted individual interviews with Missouri residents living in counties at high risk for a New Madrid earthquake. We conducted these interviews by Zoom, by phone, and in-person. We conducted the Zoom and phone interviews between September 2021 and February 2022, and we conducted the in-person interviews on-site in Sikeston and Charleston in January 2022. Twenty-six adults participated in interviews.

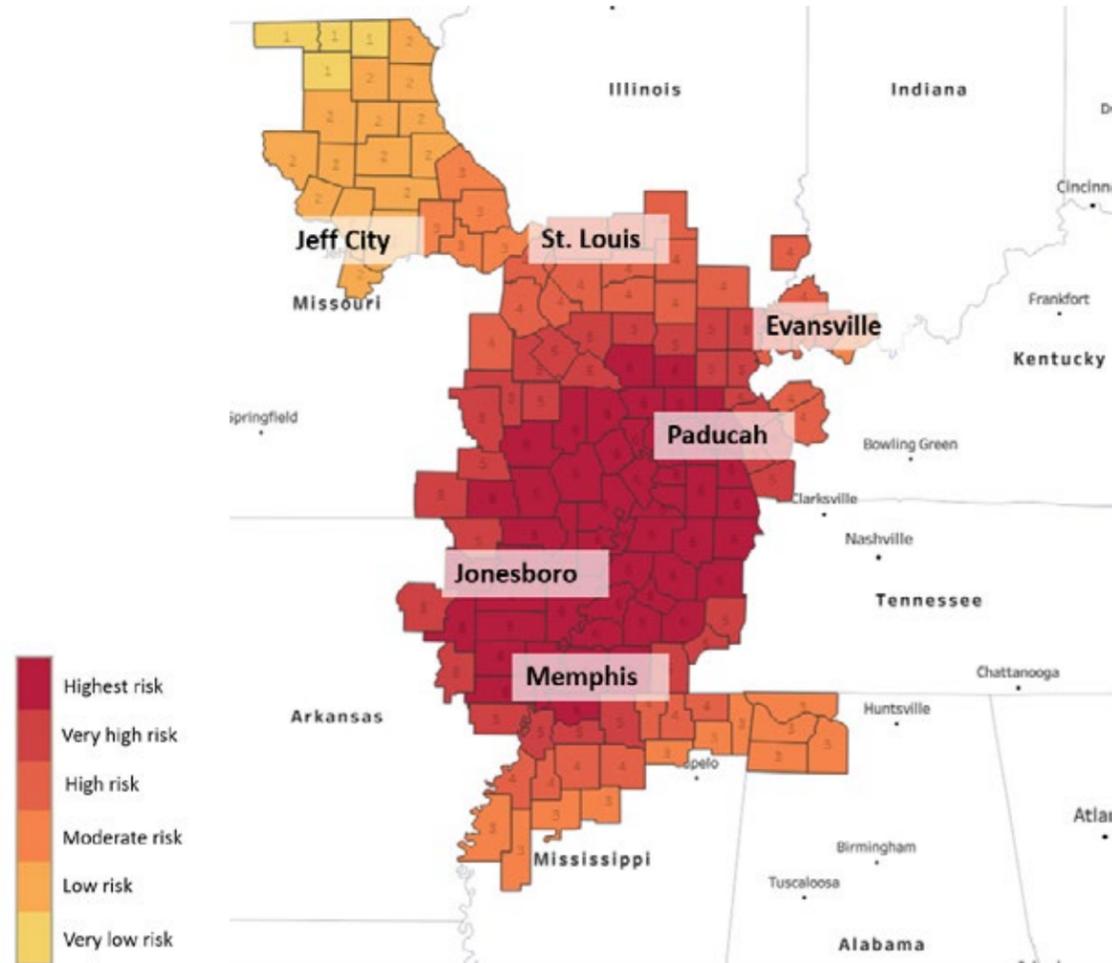
Main Survey

We used Qualtrics to recruit a survey sample of 1,258 adults aged 25 years and older who lived in counties at risk for earthquakes in the NMSZ. To determine the objective earthquake risk of each county, we used an NMSZ earthquake county-by-county risk identification based upon a 2018 U.S. Geological Survey

(USGS) simplified earthquake hazard map that the Central U.S. Earthquake Consortium (CUSEC) shared with us.¹¹ The USGS map identifies areas of highest, very high, high, moderate, low, very low, and lowest earthquake risks in the NMSZ, and CUSEC intersected this polygon-based map in a geographic information system (GIS) to all NMSZ counties to determine their objective risk (i.e., highest, very high, high, moderate, low, very low, and lowest), rounding to the higher risk for a county if two or more polygons were present within its borders.

Refer to Figure 2 for an overview of counties included in the survey and the earthquake risk level for each county where we did not have survey data collected for those counties in the determined lowest risk category. Refer to Table 3 and Table 4 for the number of participants per state and per level of county risk for an earthquake. Approximately 85% of our survey respondents were in NMSZ counties deemed high, very high, or the highest earthquake risk.

Figure 2. Location of survey participants and risk level by county



¹¹ <https://www.arcgis.com/home/webmap/viewer.html?webmap=3cfc969f044ca3a3099190b8bd9328>

Table 3 State of residence for survey participants

State	Frequency	Percent
Arkansas	102	8.1
Illinois	103	8.2
Kentucky	102	8.1
Mississippi	122	9.7
Missouri	623	49.5
Tennessee	102	8.1
Alabama	52	4.1
Indiana	52	4.1
Total	1,258	100.0

Table 4 Risk level for survey participants' county of residence

	Frequency	Percent
Very low risk	4	0.3
Low risk	72	5.7
Moderate risk	117	9.3
High risk	472	37.5
Very high risk	119	9.5
Highest risk	474	37.7
Total	1,258	100.0

Survey data were collected between Oct. 8, 2021, and Nov. 16, 2021. Almost half of the sample (49.5%, $n = 623$) were recruited from Missouri. For our case study that is presented later, we oversampled participants from Missouri to evaluate the "Are You Ready?" earthquake preparedness campaign that the Missouri DCI conducted in February 2021.

From the literature and the Missouri data described above, we know that there are a number of possible factors outside of cost to determine earthquake insurance uptake. Importantly, we then designed our survey to account for these factors. We included questions on:

- Earthquake susceptibility.
- Earthquake severity.
- Earthquake emotion.
- Earthquake experience.
- Earthquake preparedness.
- Earthquake engagement and awareness.

- Home ownership and earthquake insurance (homeowners and renters).
- Earthquake information use.
- Information sufficiency.
- Awareness of the Missouri DCI earthquake campaign (for Missouri participants only).
- Demographics.

Follow-Up Survey

We conducted a second survey with 522 adults 25 years or older who lived in the Missouri counties indicated in Figure 2. This survey was fielded April 14-18, 2022. The survey's purpose was to evaluate the 2022 version of the "Are You Ready?" earthquake preparedness campaign that the Missouri DCI conducted.



Qualitative Focus Group and Interview Results

To assist in properly designing our main survey, we conducted focus groups and interviews with Missourians living in the NMSZ to develop insights into earthquake risk perceptions and protective behaviors in the region, as well as to capture issues important to individual decisions. We used the same semi-structured scripts for our focus groups and interviews. In these scripts, we asked focus group and interview participants about earthquake perceptions, earthquake preparedness, earthquake insurance, and earthquake information. For earthquake perceptions, we asked participants to discuss how severe they thought an earthquake would be if one occurred. For earthquake preparedness, we asked participants what they would do if an earthquake did occur and if they had engaged in earthquake protective actions, such as having a disaster kit or making plans for evacuation. We asked participants if they had earthquake insurance and why they did or did not have insurance. We also asked them to discuss whether they thought earthquake insurance would be useful following an event and what they would do if they experienced a damaging earthquake and did not have insurance. Finally, we asked participants whether they discussed earthquakes with friends and family and if they were aware of information that was available about earthquakes.

Out of 35 total participants in our focus groups (9 participants total) and interviews (26 participants total), 29 completed a demographic survey provided at the end of the focus group and/or interview discussion. Of those, 17 were female, and 12 were male. Twenty-one (21) identified as white, and 8 identified as Black or African American. The average age was 55. Regarding education, 6 participants were high school graduates; 16 reported having an associate degree, bachelor's degree, or some college; and 7 had a graduate degree. 21 participants said they have experienced an earthquake, while 8 had not. Respondents reported living in their current home for an average of nearly 15 years. 11 participants reported having homeowners earthquake insurance, 13 said they do not have it, and 3 were unsure.

Qualitative Data Analysis Emergent Themes

Focus group conversations and the interviews were recorded, and transcripts were developed. We used NVivo software to analyze focus group transcripts and to identify major themes, and we used a general inductive approach

to identify emergent themes. We developed codes through independent parallel coding. Two members of the research team created codes from the interview and focus group transcripts, and then they met to merge their codes. After this, the two researchers independently coded the transcripts. We grouped emergent themes into three overall categories: 1) personal earthquake perceptions; 2) place perceptions; and 3) insurance perceptions.

Personal Earthquake Perceptions

Four main themes emerged related to personal earthquake perceptions:

- Earthquake history.
- Earthquake beliefs.
- Earthquake preparedness.
- Assets.

Earthquake history refers to a participant's personal earthquake experience, whether in the NMSZ or elsewhere. Some participants remembered a statewide earthquake panic in 1990, when climatologist Iben Browning predicted that a major earthquake could devastate the region.¹² Others mentioned having knowledge or an interest in earthquakes or the earthquake history of the area.

Earthquake beliefs refer to what participants said they *could* and *would* do in the event of a major earthquake, as well as how bad they believe a worst-case scenario earthquake would be. Although many participants indicated they did not dwell on the possibility of experiencing a major earthquake where they lived, most said that a worst-case scenario could devastate their communities.

Participants described varying degrees of *earthquake preparedness*. Elements of preparedness included home activities such as strapping down a water heater, having a disaster or evacuation plan, having a household emergency kit or supplies, and knowing what to do in case of a disaster. In general, participants were unlikely to have taken many steps to prepare for an earthquake, though many of them had stockpiles of supplies on hand that could be used after an earthquake, even if they were not gathered specifically for that purpose.

Finally, participants described vastly different circumstances in terms of assets, such as housing, financial resources, and family ties, either locally or elsewhere. Some participants suggested that these factors could influence whether they have the ability or motivation to remain in the community after a disaster, meaning that participants with fewer assets thought they would have difficulty recovering if a significant earthquake occurred.

¹² https://www.stltoday.com/news/archives/the-day-iben-browning-predicted-the-big-one-would-rock-our-world/article_e02af96c-1583-11ea-a681-6f732f142df7.html

Earthquake Place Perceptions

Two main themes emerged related to place perception:

- Setting.
- Community.

Participants described some of the unique features of their *setting* in Missouri's Bootheel that would amplify the effects of a major earthquake and hamper relief efforts. They referenced the NMSZ; the levees, bridges, sandy soil, and rocks that shape its geology and topography; the frequency of other natural hazards, such as flooding, tornados, ice storms, and wind; and the isolation of living in a rural, remote area.

Related to *community*, participants described who they believe would help in the event of an emergency; where they get earthquake information and where they could look for such information; and social structures that support or undermine disaster preparedness, including community engagement and cohesion, building codes, class, and social power. Residents of the smaller towns expressed concern about being forgotten in the event of an emergency but described tight-knit communities that would band together for mutual aid.

Earthquake Insurance Perceptions

Five main themes emerged related to insurance perceptions:

- Awareness.
- Cost and efficacy.
- Availability.
- Multiple perils.
- Personal recommendations.

EARTHQUAKE INSURANCE AWARENESS

Several focus group and interview participants indicated they were not aware that earthquake insurance is not included as part of regular homeowners insurance or were not sure whether they had earthquake insurance. One female from Charleston said:

"I think in my insurance policy, I have to be honest with you, I haven't read that part that has, I think it has, earthquake. Because I pay quite a bit. Yeah, now that you mention it, I'm gonna pull it out. Look at it real good."

A few participants learned from our discussions that earthquake coverage is not included in their homeowner's policy. One said, *"No, it's not included in our insurance?"*

EARTHQUAKE INSURANCE COST AND EFFICACY

Participants often discussed the cost of insurance, citing instances when it was too expensive, while others described situations where they were able to secure affordable coverage. Participants also discussed the efficacy of earthquake insurance, which is the idea that earthquake insurance would help if an earthquake occurred. Individuals had differing opinions as to whether earthquake insurance would be useful after an event.

For example, several participants said they had earthquake insurance previously, but the cost had become prohibitive, or their insurance company no longer offered it. One said, *“But I know we had it; we had earthquake insurance initially with our home. We were cancelled. It was with a company out of St. Louis.”*

At the same time, when cost was identified as a barrier for purchasing earthquake insurance, it was not always clear if participants had actually sought quotes. One participant said, *“Probably the only way to make it affordable is to have a huge deductible.”*

A focus group participant in Cape Girardeau considered earthquake insurance too expensive and difficult to obtain. He said:

“I think if there was an earthquake and if it was sufficient size and it would destroy my home, I think I would just walk away from the mortgage, because without earthquake insurance ... just walk away and start anew. That’s terrible. But even if [earthquake insurance] was offered, are you willing to spend \$600 a month on something that may not happen?”

In contrast, a homeowner in Charleston shopped around for an affordable policy. He said the company that writes his homeowners insurance *“offered an earthquake policy, but it was pretty expensive. And I did a little looking around and found another company, and it looked OK when I read the policy.”*

After some consideration, this participant reduced his deductible, raising his premium cost:

“The first year I had it, I had a 20% deductible,” he said. “When I analyzed it this year, I determined that a two-and-a-half percent deductible makes the most sense to me. Because for the 20% deductible, you’d have to have, like, a 7.4 earthquake before you had a claim. And the likelihood of a 7.4 damage hitting us is much smaller than, like, a 6.7. So, you drop your deductible, to cover the more likely bet. The premium difference over 10 years was only \$4,000 difference. So, what the heck? That two and a half percent is as low as it would go. And it just made sense, risk-benefit analysis. That made sense to me.”

Ultimately, this homeowner considered earthquake insurance a reasonable value. *“For the modest costs of, say I was paying 400 bucks a year. That’s covering a low-probability, high-impact situation at what to me is a modest cost,”* he said. *“It’s not all that significant compared to what you’re protecting.”*

Given that there has not been a major earthquake in the NMSZ in more than 200 years, another participant questioned the high prices of insurance. She said:

“I’m curious why insurance for earthquakes has gone up so much. I mean, we can still afford flood insurance, but why the rise? Is it because they’re paying? Usually, your insurance goes up if you have claims. And since we haven’t had any claims ... I don’t think anybody in town has ever made an earthquake claim.”

Several participants referenced the NFIP, which offers flood coverage subsidized by federal government, and suggested that perhaps a similar program could subsidize earthquake coverage so more people could afford it. A female homeowner in New Madrid said:

“I feel like maybe the state should help people in the earthquake area and at least give them, help them afford the insurance, because if you already built a house here and you’re stuck here, they should have something to help people.”

A homeowner in Cape Girardeau expressed doubt that insurance carriers would remain solvent and pay out in the event of a major earthquake. She said:

“I kind of imagine that if my house is damaged in an earthquake, most people’s house is damaged in an earthquake. It’s not like a tornado, where it just might be one street; it’s gonna affect everybody. And we’re probably going to be a disaster area. It seems like even if you had earthquake insurance, if a major earthquake happens, I don’t know that the insurance would pay out. They might just go bankrupt. It wouldn’t be an isolated thing. It would be such a big area that there would probably be some assistance from the government.”

Similarly, a homeowner in New Madrid said this type of expectation explains the lack of insurance coverage. He said, *“I think what we’re banking on is that if it’s a big one, the federal government’s going to have to help us out. It’s a small one, it’s no big deal.”*

A participant in Charleston expressed a similar belief. *“I have seen where FEMA comes in for stuff,”* she said, *“so I’m hoping that in our little small area, they would come in and help us as well.”*

EARTHQUAKE INSURANCE AVAILABILITY

Participants mentioned availability as another barrier to accessing earthquake insurance. One participant in Cape Girardeau tied lack of availability to his specific house. He said:

"We can't get earthquake insurance, mainly because we have a slate tile roof. They won't insure that. In fact, our insurance agent said, 'Well, if you take off your slate tile roof and put on a more conventional roof, we'll get you insurance.' We said, 'Do you know how long slate tile roofs last? They're going to last longer than the house underneath it.'"

A participant also mentioned that in his previous career as a pastor, two of his churches were unable to secure earthquake insurance because church buildings were perceived as being too difficult to cover. He said:

"Nobody would sell it to us because the loss would be so catastrophic if an earthquake hit a church. I distinctly remember an insurance meeting that was held for clergy. We had an insurance person who said, 'Sorry, guys. It's not available. It used to be but not anymore.'"

Other participants said they were only able to find insurance from companies outside the area. A participant in Charleston said that his local agent helped him find coverage from a company based in California. Another participant said he did not feel comfortable buying insurance from a company with no local ties. He said:

"The last time we were quoted on it was, I think, 2016, maybe 2017. Really none of the major U.S. carriers were offering coverage in the area. I think they grandfathered in the existing customers. The only quote we could get was from Lloyd's of London. And we didn't feel super comfortable getting coverage through them. We didn't know how we will be able to collect."

MULTIPLE INSURANCE PERILS

Multiple natural hazard risks exist in the NMSZ, such as tornados, ice storms, damaging winds, and flooding. Accordingly, some participants said that flooding, in particular, was a more serious concern in terms of insurance. One female participant in New Madrid said, *"You don't hear about [earthquake insurance]. Here, we hear about flood insurance all the time."*

Others expressed concern about insurance coverage for secondary perils that would arise from a severe earthquake, such as fires or floods if levees on the nearby Mississippi River were damaged by shaking.

One female participant said:

"If the earthquake causes a flood, which it will if there's a large earthquake, there will be a flood. And if it floods your home, does your flood insurance have to cover that? Or will the earthquake insurance cover that? There's lots of questions that nobody seems to be able to answer."

The same participant wondered, *"If the earthquake causes a fire, will my homeowners cover that? Or will they say, 'Well, no, you didn't have earthquake insurance.'"*

EARTHQUAKE INSURANCE PERSONAL RECOMMENDATIONS

Participants reported receiving advice about earthquake insurance from others, including family members and insurance agents. One female participant said, *"Our insurance agents have always recommended it."*

Despite living in the NMSZ, some participants said their insurance agents did not recommend earthquake coverage; they had to specifically ask about it. In some cases, this may be because the insurance agent does not offer earthquake coverage. A male participant in Cape Girardeau said, *"I don't really honestly remember how it all went, but they just told me straight up they didn't have it."*

Another participant said their agent suggested that earthquake insurance is pointless:

"I was always told by insurance people that an earthquake here, it's going to be so bad that there's no point having the insurance. He just said because we're on the fault line, it'll be so devastating that it's nothing to be scared of. He said, you know, it was gonna be so devastating. We'd all be underwater."



Key Insights From Focus Groups and Interviews

Many participants were unaware that earthquakes were not covered in standard homeowners and renters insurance. Some participants were not sure if they had earthquake insurance. Participants differed in their opinions about whether earthquake insurance would be useful or worth the cost. Some participants perceived the investment to be worthwhile. Others thought the cost was not worth the slim risk of something happening (even if they believed the impact of a major earthquake would be severe, while others thought the federal government would be available to help if a major earthquake occurred).

Although many of the participants had experienced an earthquake before and were aware of earthquake risk in the area, most considered other risks to be more worthy of concern, especially flooding. Those participants who did report having earthquake insurance affirmed that costs have risen dramatically and/or that their policies had been cancelled. Several participants reported that insurance agents had recommended earthquake insurance, which was important in their personal decisions for making that purchase. At the same time, other participants indicted that insurance agents had discouraged the purchase of earthquake insurance or suggested it was unavailable.

We developed survey questions to address the primary themes that emerged from our qualitative data: personal earthquake perceptions; place perceptions; and insurance perceptions.

Using the Qualitative Results to Develop Our Main Survey

We used the results from our interviews and focus groups to help develop the main survey that is described in the following section. Specifically, we developed survey questions to address the primary themes that emerged from our qualitative data: personal earthquake perceptions; place perceptions; and insurance perceptions.

For personal earthquake perceptions and place perceptions, we developed survey questions that assessed previous earthquake experience, perceptions of earthquake risk (i.e., how likely an earthquake is where an individual lives and how damaging an earthquake would be if it occurred), negative emotional reactions related to an earthquake (e.g., anxiety and fear), and earthquake preparedness behaviors. For insurance perceptions, we assessed if participants had earthquake insurance, explored reasons why they did or did not have this insurance, examined if participants were aware that renters and homeowners insurance did not cover earthquakes, and asked participants if they believed the federal government would provide support following a major earthquake. We provide results from our main survey in the following section.



Main Survey Results

In this section, we provide results from our main survey, which included 1,258 adults 25 years and older who lived in counties at risk for earthquakes in the NMSZ. We begin our presentation of our main survey results with basic descriptive results on issues of the insurance coverage status (homeowners then renters), other earthquake insurance attitudes, earthquake risk perceptions and experience, earthquake information and communication, earthquake preparedness and awareness, housing type, and demographics. We then present our main statistical modeling results. In these statistical (i.e., regression) models, we include factors potentially important in determining who does and does not have earthquake insurance to identify the factors that are most important. The factors we include in our models were identified from previous research on earthquake preparedness in other areas and through our focus groups and interviews.

Insurance Coverage Status

The primary research question of what determines earthquake insurance uptake starts with who has and does not have insurance—homeowners and renters. We asked participants if they owned or rented their current residence. A majority (67.9%) of participants owned their homes, while 32.1% rented their residence. (Refer to Table 5.)

Table 5 Housing status for survey participants

	Frequency	Percent
Own housing	854	67.9
Rent housing	404	32.1
Total	1,258	100.0

Homeowners Insurance

We asked homeowners ($n = 854$) if they had regular homeowners insurance. Most (87%) reported that they did have regular homeowners insurance. (Refer to Table 6.)

Table 6 Homeowners insurance uptake for survey participants who are homeowners

	Frequency	Percent
Do not have/not sure if they have homeowners insurance	111	13.0
Have homeowners insurance	743	87.0
Total	854	100.0

In order to understand how aware homeowners were about the need for separate earthquake insurance, we asked homeowners ($n = 854$) if they knew that regular homeowners insurance did not cover damage and loss caused by an earthquake. A majority (56.6%) reported that they knew homeowners insurance did not cover damage and loss caused by an earthquake. However, many homeowners (43.4%) were not aware that homeowners insurance did not cover earthquake damage and loss. (Refer to Table 7.)

Table 7 Awareness of survey participants who are homeowners that homeowners insurance does not cover damage and loss caused by an earthquake

	Frequency	Percent
NOT aware that homeowners insurance does not cover earthquake damage and loss	370	43.4
AWARE that homeowners insurance covers earthquake damage and loss	483	56.6
Total	853	100.0

We asked homeowners ($n = 854$) if they had home earthquake insurance. Most homeowners (64.9%) did not have or were not sure if they had homeowners earthquake insurance, while 35.1% of homeowners reported having earthquake insurance. (Refer to Table 8.) This percent is relatively in line with the Missouri earthquake insurance coverage data from the Missouri DCI presented earlier.

Table 8 Homeowners earthquake insurance uptake for survey participants who are homeowners

	Frequency	Percent
Do not have/not sure if they have homeowners earthquake insurance	554	64.9
Have homeowners earthquake insurance	299	35.1
Total	853	100.0

For homeowners who indicated they had earthquake insurance ($n = 299$), we asked if their earthquake insurance was part of their regular policy through an endorsement or a separate, stand-alone policy. Most homeowners with earthquake insurance reported that it was part of their regular homeowners policy via an endorsement (66.6%). (Refer to Table 9.)

Table 9 Type of homeowners earthquake insurance policy for survey participants who have this insurance

	Frequency	Percent
Part of regular homeowners policy (endorsement)	199	66.6
Separate, stand-alone policy	85	28.4
Not sure	15	5.0
Total	299	100.0

For homeowners who indicated they had earthquake insurance ($n = 299$), we asked approximately how much their earthquake insurance premium cost. Nearly 60% indicate paying at least \$1,000 annually for earthquake insurance coverage. (Refer to Table 10.)

Table 10 Approximate annual homeowners earthquake insurance premium cost for survey participants who have this insurance

	Frequency	Percent
Less than \$1,000 per year	65	21.8
\$1,000 to \$2,000 per year	71	23.8
\$2,001 to \$4,000 per year	90	30.2
More than \$4,000 per year	29	9.7
Not sure	44	14.5
Total	299	100.0

For homeowners who indicated they had earthquake insurance ($n = 299$), we asked what percentage of their coverage limit was their earthquake insurance deductible. Nearly 25% of respondents did not know their deductible level. Additionally, more than 10% of respondents reported a deductible level greater than 20% of their coverage limit. (Refer to Table 11.)

Table 11 Earthquake insurance deductible amount (as a percentage of insurance coverage limit) for survey participants who have this insurance

	Frequency	Percent
Deductible is 1%-5% of insurance coverage limit	14	4.7
Deductible is 6%-10% of insurance coverage limit	44	14.7
Deductible is 11%-15% of insurance coverage limit	74	24.7
Deductible is 16%-20% of insurance coverage limit	60	20.1
Deductible is 21% or more of insurance coverage limit	34	11.4
Not sure of deductible amount	73	24.4
Total	299	100.0

For homeowners who indicated they had earthquake insurance ($n = 299$), we asked respondents to indicate why they bought earthquake insurance. We provided six response options and instructed participants to select all reasons that applied. The top two reasons were related to earthquake risk. The next most frequent reasons selected were that an insurance agent or company (36.1%) or family or friend (26.1%) recommended it. (Refer to Table 12.)

Table 12 Reasons why survey participants purchased homeowners earthquake insurance

Indicated Reason For Purchase of Earthquake Insurance Coverage	Frequency	Percent
To manage the substantial damage and costs to my home if an earthquake were to occur.	178	59.5
I live in a place that has earthquakes.	146	48.8
Insurance agency/company recommended I get it.	108	36.1
Family/friends recommended I get it.	78	26.1
I owe a significant amount on my mortgage.	68	22.7
It is required.	41	13.7

Note: Participants selected all of the reasons that applied.

We also asked homeowners who indicated they did not have homeowners earthquake insurance ($n = 554$) why they did not have earthquake insurance. We provided several reasons for why individuals may not have earthquake insurance and instructed participants to choose all reasons that applied. The most common reason for not having earthquake insurance was that respondents had not heard of earthquake insurance before (31.6%). Many respondents also indicated that the premium was too expensive (23.6%) and that insurance for other risks was more important (21.1%). (Refer to Table 13.)

Table 13 Reasons why survey participants have not purchased homeowners earthquake insurance

Indicated Reason For Not Purchasing Earthquake Insurance Coverage	Frequency	Percent
I have not heard of it before.	175	31.6
The premium is too expensive.	131	23.6
Insurance for other risks like flood and fire is more important.	117	21.1
I don't need it.	84	15.2
The deductible is too much.	64	11.6
It is not worth it.	44	7.9
It is too hard to get.	39	7.0

Note: Participants selected all of the reasons that applied.

We asked homeowners who indicated they did not have homeowners earthquake insurance ($n = 554$) if they had ever had earthquake insurance in the past. Only a few participants (9.8%) who did not have earthquake insurance currently reported having it in the past. (Refer to Table 14.)

Table 14 Number of survey participants without homeowners earthquake insurance currently who had, did not have, or were not sure they had this insurance in the past

	Frequency	Percent
Have not had homeowners earthquake insurance in the past	374	70.4
Not sure if they had homeowners earthquake insurance in the past	105	19.8
Had earthquake insurance in the past	52	9.8
Total	531	100.0

Renters Insurance

We asked renters ($n = 404$) if they had renters insurance. Most renters (60.6%) did not have or were not sure if they had renters insurance. (Refer to Table 15.)

Table 15 Renters insurance uptake for survey participants who are renters

	Frequency	Percent
Do not have/not sure they have renters insurance	245	60.6
Have renters insurance	159	39.4
Total	404	100.0

In order to understand how aware renters were about the need for separate earthquake insurance, we asked renters ($n = 404$) if they knew that regular renters insurance did not cover damage and loss caused by an earthquake. A majority (67.6%) reported that they did not know that renters insurance did not cover damage and loss caused by an earthquake. (Refer to Table 16.)

Table 16 Awareness of survey participants who are renters that renters insurance does not cover damage and loss caused by an earthquake

	Frequency	Percent
NOT aware that renters insurance does not cover earthquake damage and loss	273	67.6
AWARE that renters insurance covers earthquake damage and loss	131	32.4
Total	404	100.0

We asked renters ($n = 404$) if they had earthquake insurance for renters. Only a few renters (9.2%) reported having earthquake insurance for renters. (Refer to Table 17.)

Table 17 Renters earthquake insurance uptake for survey participants who are renters

	Frequency	Percent
Do not have/not sure if they have renters earthquake insurance	367	90.8
Have renters earthquake insurance	37	9.2
Total	404	100.0

For renters who had earthquake insurance ($n = 37$), we asked if their earthquake insurance was part of their regular renters policy through an endorsement or if it was a stand-alone policy. A majority of the renters with earthquake insurance (64.9%) reported that their insurance was part of their regular policy via an endorsement. (Refer to Table 18.)

Table 18 Type of renters earthquake insurance policy for survey participants who have this insurance

	Frequency	Valid Percent
Part of my regular renters policy (endorsement)	24	64.9
Separate, stand-alone policy	8	21.6
Not sure	5	13.5
Total	37	100.0

For renters who had earthquake insurance ($n = 37$), we asked how much their earthquake insurance cost per year. Almost half (48.6%) of renters indicate it cost less than \$250 per year. (Refer to Table 19.)

Table 19 Approximate annual renters earthquake insurance premium cost for survey participants who have this insurance

	Frequency	Valid Percent
Less than \$250 per year	18	48.6
\$251 to \$500 per year	5	13.5
\$501 to \$1,000 per year	8	21.6
More than \$1,000 per year	5	13.5
Not sure	1	2.7
Total	37	100.0

We asked renters who had earthquake insurance ($n = 37$) why they bought that insurance. We presented four reasons for buying earthquake insurance and instructed participants to select all of the reasons that applied. The most common reasons for buying earthquake insurance were that an insurance agent or company recommended it (43.2%) and to manage the damage and cost of an earthquake if it occurred (40.5%). (Refer to Table 20.)

Table 20 Reasons why survey participants purchased renters earthquake insurance

Indicated Reason for Purchase of Earthquake Insurance Coverage	Frequency	Percentage
Insurance agent/company recommended I get it.	16	43.2
To manage the substantial damage and costs to my possessions if an earthquake were to occur.	15	40.5
I live in a place that has earthquakes.	10	27.0
Family/friends recommended I get it.	9	24.3

Note: Participants selected all of the reasons that applied.

We also asked renters who did not have earthquake insurance ($n = 245$) why they did not have that insurance. We presented seven reasons for not having earthquake insurance and instructed participants to select all that applied. The most common reason that renters reported not having earthquake insurance was because they had not heard of it before (47.1%). (Refer to Table 21.)

Table 21 Reasons why survey participants have not purchased renters earthquake insurance

Indicated Reason for Not Purchasing Earthquake Insurance Coverage	Frequency	Percentage
I have not heard of it before.	173	47.1
The premium is too expensive.	82	22.3
I don't need it.	67	18.3
Insurance for other risks like flood and fire is more important.	53	14.4
The deductible is too much.	29	7.9
It is not worth it.	29	7.9
It is too hard to get.	20	5.4

Note: Participants selected all of the reasons that applied.

We asked renters who did not have earthquake insurance ($n = 245$) if they had earthquake insurance in the past. Only a few renters without earthquake insurance reported having this insurance in the past (3.9%). (Refer to Table 22.)

Table 22 Number of survey participants without renters earthquake insurance currently who had, did not have, or were not sure they had this insurance in the past

	Frequency	Percent
Have not had renters insurance or not sure if they had earthquake insurance in the past	348	96.1
Had earthquake insurance in the past	14	3.9
Total	362	100.0

In summary, for our main survey NMSZ sample, we find that 35% of homeowners surveyed have earthquake insurance coverage, and only 9% of renters do. For both homeowners and renters, we see relatively significant levels of confusion on whether earthquake insurance coverage is part of an existing homeowners/renters insurance policy, as well as simply of not hearing of coverage for the earthquake risk. While insurance coverage cost is a significant factor in not purchasing the coverage, it is outweighed by the earthquake coverage confusion. Conversely, we see that information/recommendations from agents and family/friends plays a key role in why those who have the coverage in fact purchased it in addition to the assistance the insurance coverage would provide given an earthquake were to occur; i.e., what it is designed for as a form of risk transfer.

For both homeowners and renters, we see relatively significant levels of confusion on whether earthquake insurance coverage is part of an existing homeowners/renters insurance policy, as well as simply of not hearing of coverage for the earthquake risk.

Other Earthquake Insurance Attitudes - Disaster Assistance and Building Codes

We asked all participants ($N = 1,258$) three additional questions about their earthquake insurance perceptions. First, we asked participants if their home and possessions were destroyed by an earthquake, would they expect the federal government to compensate them for at least part of the cost of that damage. A similar number of respondents thought the government definitely or probably would provide compensation for loss (36.6%) and definitely or probably would not provide compensation (33.8%). (Refer to Table 23.)

Table 23 Survey participants' perceived likelihood that the federal government would compensate them for at least part of their damage or losses if their home or possessions were damaged or destroyed by an earthquake in the future

	Frequency	Percent
Federal government would DEFINITELY compensate for some losses	214	17.0
Federal government would PROBABLY compensate for some losses	246	19.6
NOT SURE if federal government would compensate for some losses	372	29.6
Federal government would PROBABLY NOT compensate for some losses	326	25.9
Federal government would DEFINITELY NOT compensate for some losses	100	7.9
Total	1,258	100.0

Next, we asked participants if they believed implementing earthquake building codes where they lived was important. Most participants (71.1%) believed implementing earthquake building codes was moderately, very, or extremely important. (Refer to Table 24.)

Table 24 Survey participants' belief that implementing earthquake-oriented building codes where they live is important

	Frequency	Percent
Implementing earthquake building codes is NOT AT ALL important.	99	7.9
Implementing earthquake building codes is SLIGHTLY important.	264	21.0
Implementing earthquake building codes is MODERATELY important.	368	29.3
Implementing earthquake building codes is VERY important.	310	24.6
Implementing earthquake building codes is EXTREMELY important.	217	17.2
Total	1,258	100.0

Finally, we asked participants if they believed that building codes in their community were sufficient to address the earthquake risk. Many participants were not sure about the sufficiency of local building codes (46.3%). See Table 25.

Table 25 Survey participants' perceptions that the building codes in their community are sufficient to address earthquake risk

	Frequency	Percent
Do not believe building codes in my community are sufficient	317	25.2
Not sure if building codes in my community are sufficient	583	46.3
Believe building codes in my community are sufficient	358	28.5
Total	1,258	100.0

Earthquake Risk Perceptions and Experience

We asked our main survey participants ($N = 1,258$) to answer questions about their perceptions of earthquake susceptibility, perceptions of earthquake severity, negative emotions related to earthquakes, and personal experience with earthquakes. These questions and the results are presented below.

Earthquake Susceptibility

We asked participants four questions to understand how susceptible they felt to the threat of being affected by an earthquake. Susceptibility refers to the likelihood that an individual thinks an earthquake could happen to them. The more that an individual agrees with each statement below, the more

susceptible that person feels they are to an earthquake. Excluding responses indicating "neither agree nor disagree," for all four questions there are stronger levels of susceptibility indicated by those who indicate "somewhat agree" or "strongly agree" as compared with those who indicated "somewhat disagree" or "strongly disagree" for any one of the four questions. For example, 46% of respondents indicate being concerned about an earthquake affecting their home ("somewhat agree" and "strongly agree") as compared with 37% who are less concerned ("somewhat disagree" and "strongly disagree"). Thus, it appears that there are relatively sufficient levels of susceptibility of earthquake risk from our NMSZ sample given the earthquake risk in the region. (Refer to Figures 3-6.)

Figure 3 The chance of an earthquake striking my home is high.

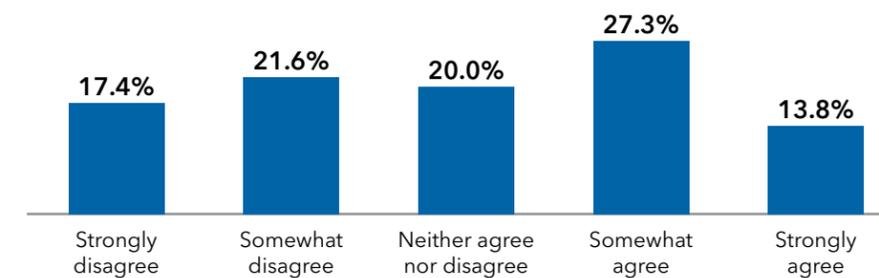


Figure 4 I am concerned about an earthquake affecting my home.

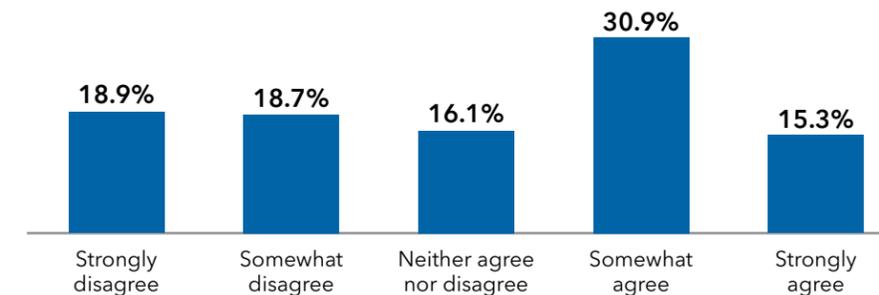


Figure 5 I feel vulnerable to earthquakes.

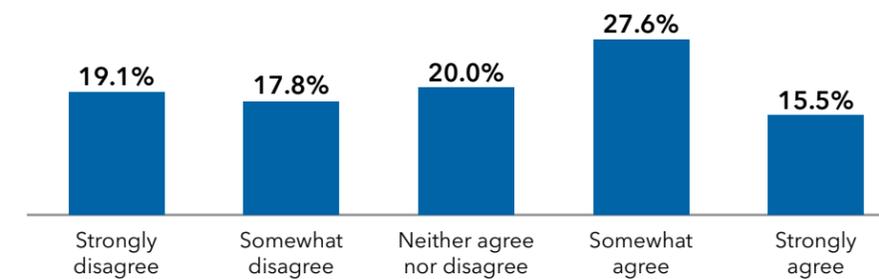
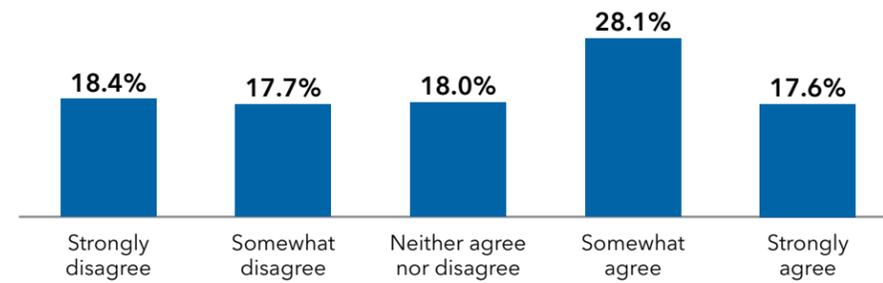


Figure 6 Earthquakes pose a threat to my household.



Earthquake Severity

We asked participants three questions about how severe they thought an earthquake would be if one occurred. More severe earthquakes cause more damage and destruction. The more that individuals agree with the statements below, the more severe they believe an earthquake will be if one happens. As with our susceptibility question results above, again we see relatively high levels of earthquake severity awareness. For example, 74% of respondents believe that if an earthquake occurs, it will cause major damage and destruction in the community (“somewhat agree” and “strongly agree”) compared with only 15% who do not believe this (“somewhat disagree” and “strongly disagree”). (Refer to Figures 7-9 .)

Figure 7 An earthquake could cause major damage and destruction in my community.

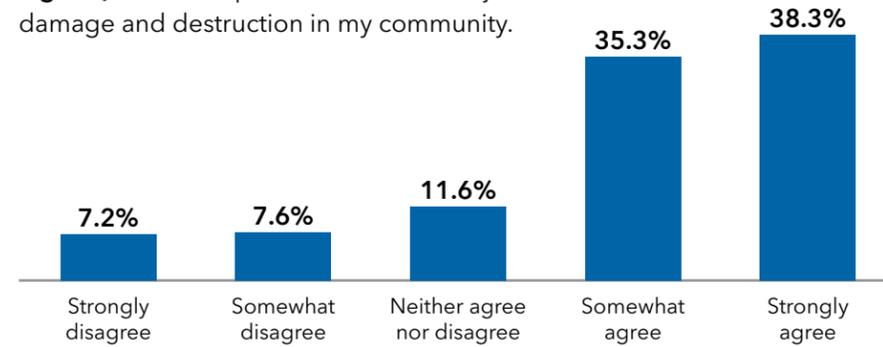


Figure 8 An earthquake could cause loss of power, water, phone, and other basic services in my community.

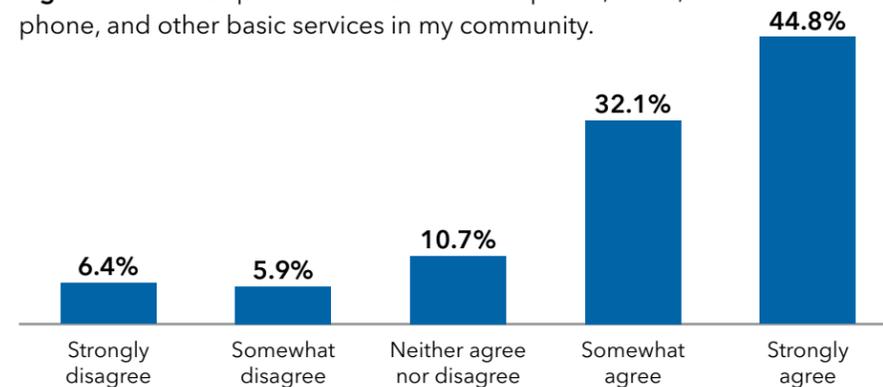
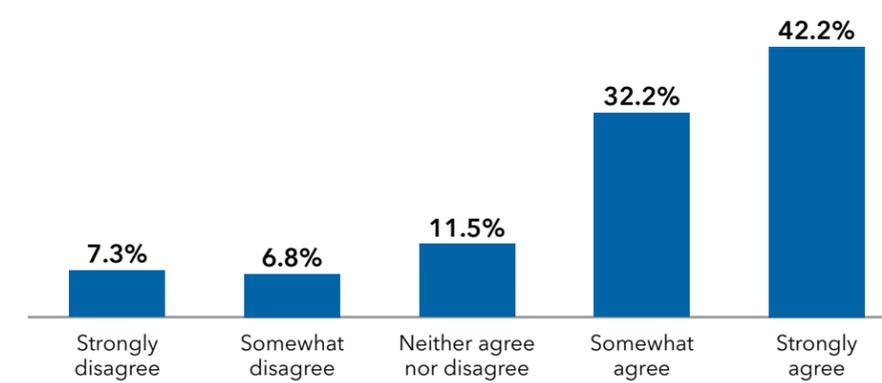


Figure 9 An earthquake could injure or kill people in my community.



Earthquake Negative Emotions

We asked participants about three negative emotions they might experience related to earthquakes: 1) fear; 2) anxiety; and 3) being overwhelmed. Participants indicated how much of each emotion they experienced when thinking about an earthquake in their community. Here we find that high levels of negative emotion are not as relatively strong as compared with susceptibility and severity measures. For example, only 31% of respondents indicate being very or extremely afraid of an earthquake occurring compared with 69% being moderately to not afraid at all. (Refer to Figures 10-12.)

Figure 10 When thinking about an earthquake occurring in your community, how afraid are you?

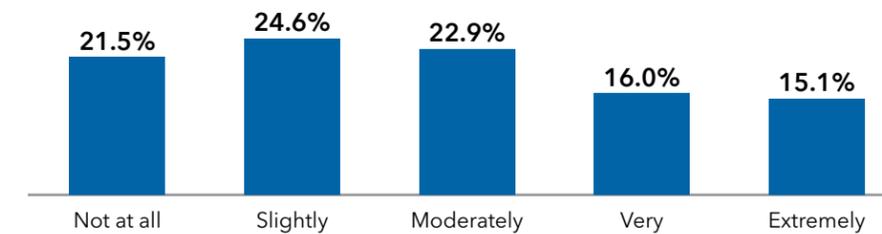


Figure 11 When thinking about an earthquake occurring in your community, how anxious are you?

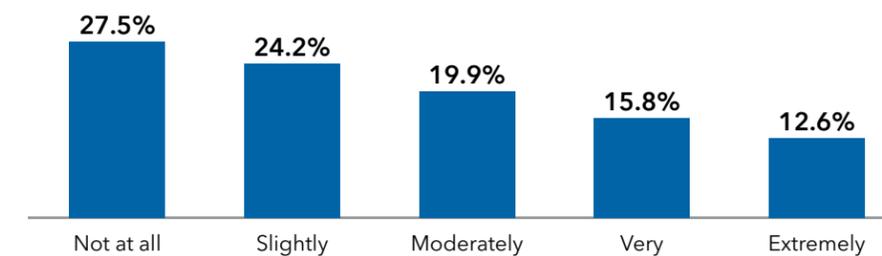
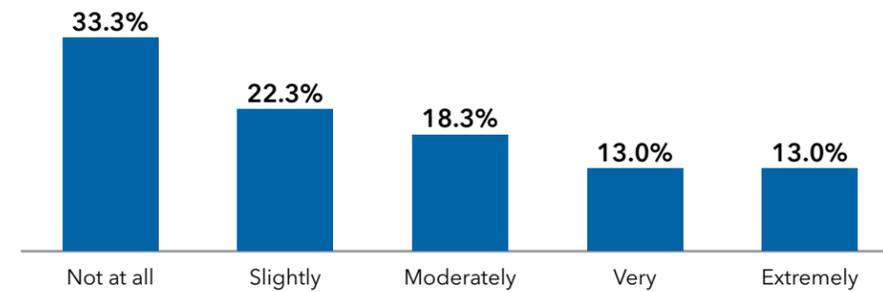


Figure 12 When thinking about an earthquake occurring in your community, how overwhelmed do you feel?



Earthquake Experience

We asked participants ($N = 1,258$) if they had personally experienced an earthquake. Just over half of our participants (51.1%) had experienced an earthquake. (Refer to Table 26.)

Table 26 Survey participants' previous earthquake experience

	Frequency	Percent
No, I have not experienced an earthquake before.	615	48.9
Yes, I have experienced an earthquake before.	643	51.1
Total	1,258	100.0

For the participants who reported they had experienced an earthquake ($n = 643$), we asked if they had experienced an earthquake that included any of the five impacts listed in Table 27. Participants selected all of the impacts that they had experienced. Less than half of participants had experienced an earthquake that resulted in damage, disruption, injury, or death.

Table 27 Specific earthquake experiences of survey participants who had been through an earthquake before

Have you experienced an earthquake that caused:	Frequency	Percent
Damage to property in the community where you lived.	273	42.5
Disruption to your power, water, phone, or other basic services.	257	40.0
Damage to your home.	221	34.4
Death or injury to people in the community where you lived.	162	25.2
Death or injury to family members.	101	15.7

We find that there are relatively sufficient levels of susceptibility of earthquake risk, as well as earthquake severity awareness, from our NMSZ sample.

Relationship of County-Level Earthquake Risk With Risk Perceptions, Emotions, and Experience

We used correlations to examine the relationships between the county earthquake risk level for where an individual lived and individual perceptions of earthquake risk (susceptibility and severity), negative emotions related to earthquakes, and earthquake experience. For this analysis, we summed and averaged all of the earthquake susceptibility, severity, and emotion questions to create one score for each item. We also summed the earthquake experience items to create one measure of personal earthquake experience. Refer to Table 28 for results.

Table 28 Correlations between earthquake perceptions, emotions, and experiences and the county level of risk for survey participants

	County Level of Earth-quake Risk
Individual perception of earthquake susceptibility	0.171**
Individual perception of earthquake severity	0.112**
Negative emotions related to earthquakes	0.091**
Individual experience of earthquakes	0.040

** $p < 0.001$

The relationships between the level of earthquake risk for the county where an individual lived and their perceptions of earthquake risk and negative emotions about earthquakes were statistically significant, but they were weak in terms of strength. This means that living in a county at more earthquake risk, while correlated, was not a strong correlate of people perceiving more earthquake risk. Additionally, living in a county at high risk for an earthquake was not related at all to whether individuals had personal experience with an earthquake.

All told, we find that there are relatively sufficient levels of susceptibility of earthquake risk, as well as earthquake severity awareness, from our NMSZ sample given the earthquake risk in the region. However, despite this feeling of relatively high earthquake susceptibility, this does not translate into similarly relatively high levels of negative emotion (fear, anxiety, etc.) toward the earthquake risk. Further, these subjective susceptibility feelings of earthquake risk and negative emotions were not strongly tied to the objective earthquake risk of the county.



Earthquake Information and Communication

We asked our main survey participants ($N = 1,258$) to answer questions about the sources of information they used to find out about earthquakes and earthquake insurance. These questions and the results are presented below.

Use of Insurance Agent

First, we asked our survey participants if they used an insurance agent to help make their homeowners/renters insurance decisions. A majority of homeowners (66%) indicated they used an insurance agent to make decisions about insurance, while only 23.3% of renters used an agent for this purpose. (Refer to Table 29.)

Table 29 Survey participants' use of an insurance agent to help make insurance decisions

Do you use an insurance agent to help make your homeowners/renters insurance decisions?							
Homeowners (n = 854)				Renters (n = 404)			
Yes		No/Not Sure		Yes		No/Not Sure	
Frequency	%	Frequency	%	Frequency	%	Frequency	%
564	66.0	290	34.0	94	23.3	310	76.7

Earthquake Information Sources

Next, we asked survey participants ($N = 1,258$) what information sources they used to find out about earthquakes in their area. We provided survey participants with a list of eight different earthquake information sources and asked them to select all the sources they used to find out about earthquakes. A majority of participants (62.2%) used television news to find out about earthquakes. Additionally, more than one-third of participants (39.1%) reported using social media sites to get earthquake information. (Refer to Table 30.)

Table 30 Survey participants' use of earthquake information sources

Over the past year, I have used the following information sources to get information about earthquakes in my area:	Frequency	Percent
Television news and their websites	783	62.2
Social media sites, such as Facebook, Twitter, Instagram, TikTok, and YouTube	492	39.1
Newspapers and their websites	344	27.3
Government agencies and websites	305	24.2
Radio stations and their websites	282	22.4
Emergency management officials	222	17.6
Community organizations like schools and libraries	197	15.7
Faith-based institutions like churches, synagogues, and mosques	92	7.3

Talk About Earthquakes

We asked participants ($N = 1,258$) how much they talked about earthquakes with others in their life. This included family, friends, neighbors, and community members. Most of our participants *never or rarely* had conversations with family and friends about earthquakes (59.3%), shared information with family and friends about earthquakes (60.4%), discussed earthquakes with neighbors and coworkers (65.2%), or attended meetings or community events about earthquakes (73.3%).

(Refer to Figures 13–16.)

Figure 13 How often do you have conversations with family and friends about earthquakes?

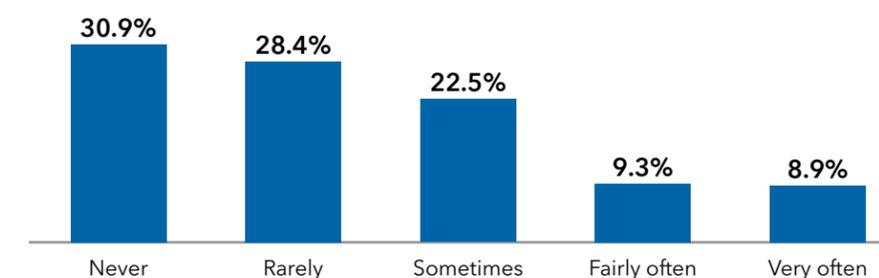


Figure 14 How often do you share information with family and friends about earthquakes?

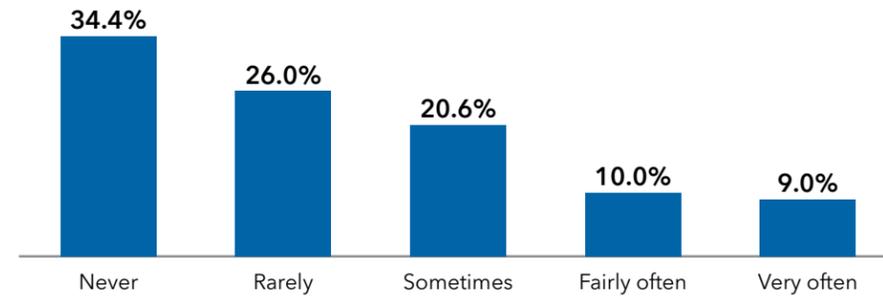


Figure 15 How often have you discussed earthquakes with neighbors and coworkers?

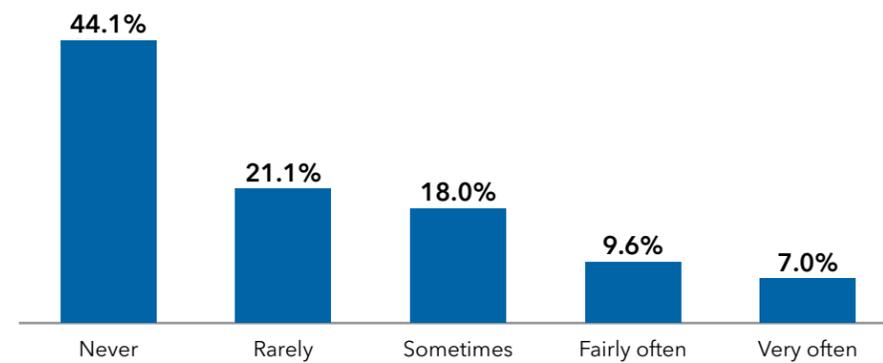
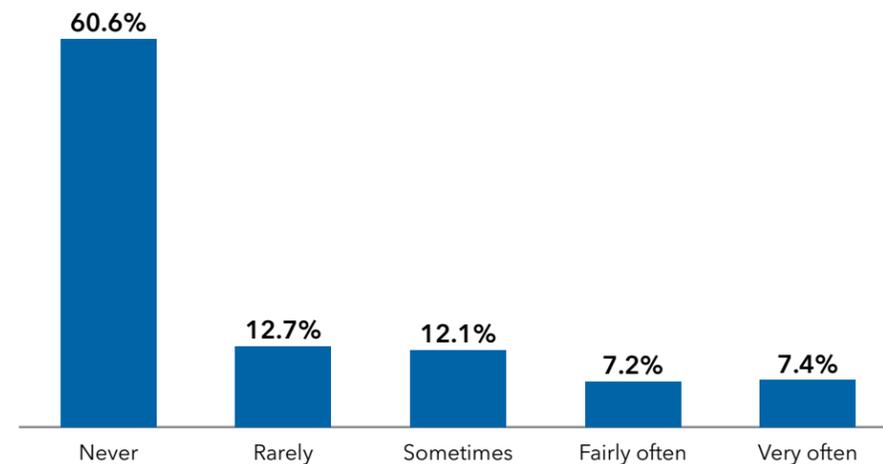


Figure 16 How often have you attended meetings or community events about earthquakes?



Earthquake Information Sufficiency

Earthquake information sufficiency is the idea that people believe they have enough information to stay safe if an earthquake occurs. We asked our participants ($N = 1,258$) if they had enough information or did not have enough information to do several things related to earthquakes.

Table 31 Survey participants' belief that they have enough earthquake information

I have enough information to ...	Frequency	Percentage
Know what to do during an earthquake	749	59.6
Stay safe during an earthquake	738	58.8
Prepare for an earthquake	697	55.5
Understand earthquake risk in your area	689	54.9
Help others during an earthquake	643	51.2
Cope with earthquake damage	581	46.3
Understand earthquake insurance coverage	573	45.6

A majority of our survey participants believed they had enough information to do several things, such as know what to do during an earthquake (59.6%) and prepare for an earthquake (55.5%). The item that the least amount of respondents (45.6%) felt like they had enough information for was understanding earthquake insurance coverage. (Refer to Table 31.)

Earthquake Preparedness and Awareness

We asked our main survey participants ($N = 1,258$) to answer questions about their earthquake preparedness and awareness.

Earthquake Preparedness

We asked our survey participants whether they had engaged in seven activities to help prepare themselves and their homes for an earthquake. For each earthquake preparedness item, we asked if participants had engaged in that activity, had not engaged in that activity, or had not engaged in that activity but planned to next year.

The earthquake preparedness activity engaged in by the most people (60%) was storing important documents in a safe place. This activity can help prepare individuals for earthquakes and other disasters (e.g., fire, tornado). A minority of participants had engaged in the other preparedness activities we asked about, with the lowest percentages represented by earthquake mitigation activities. (Refer to Table 32.)

Table 32 Survey participants' belief that they have enough earthquake information

Have you ...	Yes	No	No, but plan to in the next year
Stored important documents in a safe place?	60.0	25.8	14.1
Planned for how you would evacuate the area if necessary?	35.4	46.8	17.8
Prepared an earthquake/disaster kit with supplies including food and water, tools, and first aid equipment?	34.3	47.4	18.4
Developed a home inventory list of personal belongings?	30.4	47.1	22.5
Developed a family earthquake plan?	27.3	53.8	18.8
Fastened, secured, or bolted down heavy objects or utilities to the walls in your home?	25.8	56.4	17.9
Reinforced or retrofitted your home to protect against an earthquake (e.g., installed bracing, anchored foundation)?	20.7	63.6	15.7

Earthquake Preparedness and Insurance Uptake

We used correlation to examine how having earthquake insurance was related to other earthquake preparedness activities.

Table 33 Correlations between survey participants' earthquake preparedness actions and earthquake insurance uptake

	Have Homeowners Insurance	Have Renters Insurance
Secured heavy objects in home	0.379**	0.324**
Retrofitted or reinforced home	0.375**	0.350**
Prepared earthquake kit	0.275**	0.185**
Stored documents in safe place	0.139**	0.203**
Developed family earthquake plan	0.359**	0.269**
Developed inventory list of belongings	0.317**	0.289**
Planned for evacuation	0.307**	0.187**

**p < 0.001

In general, having earthquake insurance was moderately or weakly related to other preparedness activities. Having earthquake insurance was most strongly related to securing heavy objects in the home and retrofitting or reinforcing one's home for an earthquake. This result initially indicates that survey respondents in the NMSZ are not substituting self-protection activities

for market insurance risk transfer; rather, these two types of activities appear to be complementary as an insurer would hope to avoid the issue of moral hazard amongst the insured. (Refer to Table 33.)

Housing Type

We asked homeowners and renters several questions about their housing and living conditions.

Homeowner Housing Type Characteristics

We asked homeowners ($n = 854$) how long they lived in their current home and what year their home was built. Forty-four percent of respondents had been in their home for 10 years or less, with 70% of the homes built before the year 2000. (Refer to Table 34 and Table 35.)

Table 34 Length of home ownership for survey participants who are homeowners

	Frequency	Percent
0 to 5 years	192	22.5
6 to 10 years	182	21.3
11 to 15 years	170	19.9
16 to 20 years	124	14.5
More than 20 years	186	21.8
Total	854	100.0

Table 35 Year that home was built for survey participants who are homeowners

	Frequency	Percent
1969 or before	189	22.1
1970 to 1979	134	15.7
1980 to 1989	123	14.4
1990 to 1999	154	18.0
2000 to 2009	166	19.4
2010 to 2019	80	9.4
2020 or later	8	0.9
Total	854	100.0

We asked participants what type of home they lived in. Most homeowners lived in a single-family home (80.9%). (Refer to Table 36.)

Table 36 Type of home for survey participants who are homeowners

	Frequency	Percent
Single-family home	691	80.9
Multifamily home (e.g., duplex, fourplex)	48	5.6
Condominium or townhouse	79	9.3
Mobile home or trailer home	36	4.2
Total	854	100.0

We asked participants to provide information about the type of their home construction. Participants selected all construction types that applied to their home. Forty-six percent of respondents indicate living in masonry or brick veneer home construction type, which is more difficult to find earthquake insurance coverage for due to potential underwriting restrictions (Missouri DCI, 2022B). (Refer to Table 37.)

Table 37 Type of home construction for survey participants who are homeowners

Type of Construction	Percentage	Frequency
Wood frame	33.8	425
Masonry	25.9	326
Brick veneer	20.7	261
Prebuilt	7.2	90
Multistory	10.2	128

Note: Participants could select each type that applied.

We asked participants to provide the current market value of their home, with 55% percent indicating a home value of less than \$200,000. (Refer to Table 38.)

Table 38 Home value for survey participants who are homeowners

	Frequency	Percent
Less than \$100,000	171	20.0
\$100,000 to \$149,999	175	20.5
\$150,000 to \$199,999	122	14.3
\$200,000 to \$299,999	184	21.5
\$300,000 to \$399,999	98	11.5
\$400,000 or more	67	7.8
Not sure	37	4.3
Total	854	100.0

We asked participants how many people lived with them in their home. Refer to Table 39 for results.

Table 39 Number of people living in the home for survey participants who are homeowners

	Frequency	Percent
Respondent lives alone	133	15.6
Two people in the house	263	30.8
Three people in the house	193	22.6
Four people in the house	175	20.5
Five or more people in the house	90	10.5
Total	854	100.0

We asked participants if any children under the age of 18 lived with them in their home and if they were a caretaker for any adults living in their home. (Refer to Table 40 and Table 41 for results.)

Table 40 Number of homeowner survey participants who have children under the age of 18 in their home

	Frequency	Percent
Do not have children in the home	447	52.3
Have children in the home	407	47.7
Total	854	100.0

Table 41 Number of homeowner survey participants who are a caretaker for any adults living in the home

	Frequency	Percent
Are not a caretaker for adults living in the home	661	77.4
Are a caretaker for adults living in the home	193	22.6
Total	854	100.0

To understand if respondents' homes were built to handle an earthquake, we asked participants if their home could withstand an earthquake with heavy shaking. Only 27.8% of respondents believed their home could withstand a significant earthquake. (Refer to Table 42.)

Table 42 Belief of survey participants who are homeowners that their home is built to withstand an earthquake that shakes enough to move very heavy furniture

	Frequency	Percent
House is not built to withstand an earthquake	163	19.1
Not sure if house is built to withstand an earthquake	454	53.2
House is built to withstand an earthquake	237	27.8
Total	854	100.0

Renter Housing Type Characteristics

We asked renters ($n = 404$) how long they lived in their current residence and what type of residence they currently lived in. Seventy-five percent of renters have lived in their current residence for five years or less, with most living in a single-family home or an apartment. (Refer to Table 43 and Table 44.)

Table 43 Number of years lived in current residence for survey participants who are renters

	Frequency	Percent
Less than one year	73	18.1
1 to 2 years	119	29.5
3 to 4 years	88	21.8
4 to 5 years	24	5.9
More than 5 years	100	24.8
Total	404	100.0

Table 44 Type of residence for survey participants who are renters

	Frequency	Percent
Single-family home	198	49.0
Multifamily home (e.g., duplex, fourplex)	34	8.4
Condominium or townhouse	9	2.2
Apartment	151	37.4
Mobile home or trailer home	12	3.0
Total	404	100.0

We asked renters how much they currently paid for rent. Eighty percent pay less than \$1,000 a month for their rent. (Refer to Table 45.)

Table 45 Amount of rent paid monthly for survey participants who are renters

	Frequency	Percent
Less than \$500	126	31.2
\$500-\$999	198	49.0
\$1,000-\$1,499	60	14.9
\$1,500-\$1,999	10	2.5
\$2,000-more	6	1.5
Not sure	4	1.0
Total	404	100.0

We asked participants how many people lived with them in their home. Refer to Table 46 for results.

Table 46 Number of people living in the home for survey participants who are renters

	Frequency	Percent
Respondent lives alone	90	22.3
Two people in the house	149	36.9
Three people in the house	74	18.3
Four people in the house	51	12.6
Five or more people in the house	40	9.9
Total	404	100.0

We asked participants if any children under the age of 18 lived with them in their home and if they were a caretaker for any adults living in their home. Refer to Table 47 and Table 48 for results.

Table 47 Number of renter survey participants who have children under the age of 18 in their home

	Frequency	Percent
Do not have children in the home	250	61.9
Have children in the home	154	38.1
Total	404	100.0

Table 48 Number of renter survey participants who are a caretaker for any adults living in the home

	Frequency	Percent
Are not a caretaker for adults living in the home	343	84.9
Are a caretaker for adults living in the home	61	15.1
Total	404	100.0

We asked renters if their residence was built to withstand a strong earthquake. Only 14.4% of respondents believed their home could withstand a significant earthquake. (Refer to Table 49.)

Table 49 Belief of survey participants who are renters that their home is built to withstand an earthquake that shakes enough to move very heavy furniture

	Frequency	Percent
House is not built to withstand an earthquake	103	25.5
Not sure if house is built to withstand an earthquake	243	60.1
House is built to withstand an earthquake	58	14.4
Total	404	100.0

Demographics of Participants

Finally, we asked participants to report their race/ethnicity, gender, level of education, and household income. Eighty percent of our respondents identify as white, with 61% being female, 73% having at least some college education, and 80% making less than \$105,000 annually. (Refer to Tables 50-53.)

Table 50 Race/ethnicity of survey participants

	Frequency	Percent
Asian or Pacific Islander	19	1.5
Black or African American	170	13.5
Hispanic or Latino	39	3.1
Native American or Alaskan Native	11	0.9
White or Caucasian	1002	79.7
Multiracial or biracial	17	1.4
Total	1,258	100.0

Table 51 Gender of survey participants

	Frequency	Percent
Female	769	61.1
Male	479	38.1
Transgender or nonbinary	10	0.8
Total	1,258	100.0

Table 52 Survey participants' level of education

	Frequency	Percent
Grade school or less (kindergarten to 8th grade)	10	0.8
Some high school	43	3.4
High school diploma	285	22.7
Some college	282	22.4
Associates degree	175	13.9
Bachelor's degree	292	23.2
Graduate degree	171	13.6
Total	1,258	100.0

Table 53 Survey participants' household income

	Frequency	Percent
Less than \$15,000	145	11.5
\$15,000 - \$29,999	213	16.9
\$30,000 - \$44,999	207	16.5
\$45,000 - \$59,999	128	10.2
\$60,000 - \$74,999	108	8.6
\$75,000 - \$89,999	126	10.0
\$90,000 - \$104,999	81	6.4
\$105,000 - \$119,999	73	5.8
\$120,000 - \$134,999	42	3.3
\$135,000 or more	107	8.5
Not sure	28	2.2
Total	1,258	100.0



Homeowners and Renters Insurance Uptake Statistical Modeling

To better understand factors that predicted if homeowners or renters had earthquake insurance, we used logistic regression. We calculated one regression model for homeowners and one for renters. We entered four blocks of predictors into the regression models. The dependent variable for each model was whether a respondent had earthquake insurance (0 = No, 1 = Yes).

In terms of predictors, we first included individual characteristics (i.e., race, gender, education, income). Then we added earthquake risk perceptions and experience. These items included county-level earthquake risk and individual previous experience with earthquake, plus risk perceptions and emotions related to earthquakes as reported by our survey participants.

Next, we added items assessing individual amount of earthquake communication (e.g., using an insurance agent to make earthquake decisions, amount of earthquake information used) and perceptions that individuals had all the information they needed to stay safe during an earthquake (i.e., earthquake information sufficiency).

Lastly, we entered information about the individual's residence, such as how long they had lived in their current home, the size of their household, and whether they were a caretaker or had children in their home. Some of the items related to individual residence differed between homeowners and renters (e.g., to assess housing cost, we asked homeowners about the value of their home, and we asked renters how much they paid in rent).

The regression models (homeowners and then renters) are presented in Table 54 and Table 55.

Table 54 Regression model of insurance uptake for survey participants who are homeowners

Homeowner Earthquake Insurance Uptake				
	B	OR	CI	α
Step 1: Homeowner Characteristics				
Race				
White (reference)	–	–	–	–
Black	-0.420	0.657	0.345-1.251	0.201
Hispanic	0.675	1.964	0.762-5.065	0.162
Asian, Native American, or multiracial	-1.092	0.336	0.121-0.932	0.036
Gender (male)	0.164	1.178	0.808-1.718	0.395
Education	0.002	1.002	0.876-1.146	0.974
Income	0.074	1.077	0.996-1.165	0.062
Step 1: Nagelkerke $R^2 = 0.158$				
Step 2: Earthquake Risk Perceptions and Experience				
County-level earthquake risk	0.024	1.024	0.885-1.185	0.752
Perceived susceptibility to earthquakes	0.228	1.256	0.999-1.578	0.051
Perceived severity of earthquakes	-0.020	0.980	0.784-1.225	0.861
Negative emotional reactions to earthquakes	-0.215	0.807	0.649-1.003	0.053
Previous earthquake experience	0.143	1.154	1.035-1.286	0.010
Step 2: Nagelkerke R^2 change = 0.131				
Step 3: Earthquake Information and Communication				
Use an insurance agent to make homeowner insurance decisions	1.044	2.842	1.888-4.279	<0.001
Number of earthquake information sources used	0.012	1.012	0.880-1.165	0.865
Amount of talk with others about earthquakes	0.611	1.841	1.447-2.344	<0.001
Earthquake information sufficiency	0.796	2.216	1.320-3.721	0.003
Step 3: Nagelkerke R^2 change = 0.113				
Step 4: Housing Characteristics				
Length of time living in home	0.165	1.180	1.034-1.345	0.014
Year home was built	0.010	1.010	0.965-1.057	0.657
Value of home	0.025	1.026	0.923-1.140	0.637
Household size	-0.066	0.936	0.779-1.124	0.478
Children in home	-0.006	0.994	0.613-1.613	0.982
Caretaker in home	0.328	1.388	0.879-2.191	0.159
Step 4: Nagelkerke R^2 change = 0.012				
-2LL = 792.079; Nagelkerke $R^2 = 0.414$; Chi-square = 301.52, $p < .001$				

Table 55 Regression model of insurance uptake for survey participants who are renters

Renter Earthquake Insurance Uptake				
	B	OR	CI	α
Step 1: Renter Characteristics				
Race				
White (reference)	--	--	--	--
Black	0.434	1.543	0.526-4.524	0.429
Hispanic	-0.883	0.414	0.031-5.498	0.504
Asian, Native American, or multiracial	-0.494	0.811	0.027-14.035	0.758
Gender (male)	-0.209	1.435	0.296-2.226	0.685
Education	0.361	1.111	0.954-2.160	0.083
Income	0.106	1.213	0.872-1.417	0.393
Step 1: Nagelkerke $R^2 = 0.077$				
Step 2: Earthquake Risk Perceptions and Experience				
County-level earthquake risk	0.193	1.213	0.829-1.776	0.320
Perceived susceptibility to earthquakes	0.213	1.238	0.710-2.158	0.452
Perceived severity of earthquakes	-0.254	0.776	0.471-1.277	0.318
Negative emotional reactions to earthquakes	0.279	1.321	0.855-2.043	0.210
Previous earthquake experience	0.277	1.319	1.022-1.702	0.034
Step 2: Nagelkerke R^2 change = 0.193				
Step 3: Earthquake Information and Communication				
Use an insurance agent to make homeowners insurance decisions	2.474	11.868	4.408-31.952	<0.001
Number of earthquake information sources used	-0.277	0.758	0.521-1.101	0.146
Amount of talk with others about earthquakes	0.485	1.625	0.933-2.829	0.086
Earthquake information sufficiency	1.487	4.422	1.165-16.776	0.029
Step 3: Nagelkerke R^2 change = 0.198				
Step 4: Housing Characteristics				
Length of time living in home	0.029	1.030	0.722-1.469	0.872
Amount paid for rent	0.003	1.003	0.634-1.588	0.988
Household size	-0.735	0.480	0.284-0.810	0.006
Children in home	0.775	2.170	0.661-7.125	0.201
Caretaker in home	1.085	2.959	0.929-9.421	0.066
Step 4: Nagelkerke R^2 change = 0.048				
-2LL = 138.221; Nagelkerke $R^2 = 0.516$; Chi-square = 108.212, $p < .001$				

Homeowners Insurance Uptake Regression Results

For homeowners, the strongest predictor of whether someone had earthquake insurance was using an insurance agent to make an insurance decision (OR = 2.842, CI = 1.888-4.279, $p < 0.001$), talking with others more about earthquakes (OR = 1.841, CI = 1.447-2.344, $p < 0.001$), reporting more earthquake insurance sufficiency (i.e., an individual believing they had enough information to stay safe during and after an earthquake; OR = 2.216, CI = 1.320-3.721, $p = 0.003$), and having previous experience with an earthquake (OR = 1.154, CI = 1.035-1.286, $p = 0.010$).

Living in a home for longer was also related to a greater likelihood of having earthquake insurance (OR = 1.180, CI = 1.034-1.345, $p = 0.014$). Regarding race, participants who were Asian, Native American, or multiracial were less likely than white homeowners to report having earthquake insurance (OR = 0.336, CI = 0.121-0.932, $p = 0.036$).

A few additional predictors trended toward statistical significance and thus may be important to consider. Participants who perceived more susceptibility to earthquakes trended toward a greater likelihood of having homeowners earthquake insurance (OR = 1.256, CI = 0.999-1.578, $p = 0.051$), while respondents who reported more negative emotions related to earthquake trended toward being less likely to have earthquake insurance (OR = 0.807, CI = 0.649-1.003, $p = 0.053$). Lastly, homeowners with a higher income trended toward a greater likelihood of having insurance (OR = 1.077, CI = 0.996-1.165, $p = 0.062$).

The strongest predictor of having homeowners/renters insurance in our regression models was using an insurance agent to make insurance decisions. Homeowners who used an insurance agent to make insurance decisions were 2.84 times more likely to have earthquake insurance than those who did not. Renters who used an insurance agent to make insurance decisions were 11.87 times more likely to have earthquake insurance than those who did not.

Renters Insurance Uptake Regression Results

For renters, the strongest predictor of whether someone had earthquake insurance was using an insurance agent to make an insurance decision (OR = 11.868, CI = 4.408-31.952, $p < 0.001$), reporting more earthquake insurance sufficiency (i.e., an individual believing they had enough information to stay

safe during and after an earthquake; OR = 4.422, CI = 1.165–16.776, $p = 0.029$), and having previous experience with an earthquake (OR = 1.319, CI = 1.022–1.702, $p = 0.034$).

Living in a household with more people was also related renters being less likely to have renters earthquake insurance (OR = 0.480, CI = 0.284–0.810, $p = 0.006$).

A few additional predictors trended toward statistical significance and, thus, may be important to consider. Participants who reported that they acted as a caretaker for another adult in their home trended toward a greater likelihood of having renters earthquake insurance (OR = 2.959, CI = 0.929–9.421, $p = 0.066$). Renters with a higher level of education also trended toward a greater likelihood of having earthquake insurance (OR = 1.111, CI = 0.954–2.160, $p = 0.083$). Lastly, participants who talked with others more about earthquakes also trended toward a greater likelihood of having earthquake insurance (OR = 1.625, CI = 0.933–2.829, $p = 0.086$).

Discussion of Key Findings

Results from our focus groups, interviews, and the main survey descriptive and statistical analyses point to several key findings that are described below.

Insurance Uptake Rates and Understanding of Earthquake Insurance

In our main survey of NMSZ residents across eight states, a minority of homeowners (35.1%) and renters (9.2%) reported having earthquake insurance. Additionally, many homeowners (43.4%) and renters (67.6%) did not know that earthquakes were not covered by regular homeowners/renters insurance.

In fact, the most common reason that homeowners (31.6%) and renters (47.1%) without earthquake insurance cited for not having purchased this insurance was that they had not heard of it before. In our focus groups and interviews, we heard from many participants who were not aware that homeowners/renters insurance did not cover earthquakes. Additionally, a minority of survey participants (45.6%) thought they had enough information to understand earthquake insurance coverage.

Thus, there is a low rate of earthquake insurance uptake in the NMSZ region, and many people are not aware that earthquake insurance is needed or do not have enough information to understand earthquake insurance.

Importance of Insurance Agents

The strongest predictor of having homeowners/renters insurance in our regression models was using an insurance agent to make insurance decisions. Homeowners who used an insurance agent to make insurance decisions were 2.84 times more likely to have earthquake insurance than those who did not. Renters who used an insurance agent to make insurance decisions were 11.87 times more likely to have earthquake insurance than those who did not. The most common reason cited by renters with earthquake insurance for purchasing the insurance was because an insurance agent or company recommended it (43.2%). While not the No. 1 reason cited for homeowners, 36.1% indicated the role of their insurance agent as a key reason for having earthquake insurance coverage. Some of our focus group and interview participants indicated that their insurance agents had recommended purchasing earthquake insurance.

At the same time, 34% of homeowners and 76.7% of renters reported that they did not use an insurance agent to make insurance purchasing decisions, indicating the potential to increase connections between residents and

insurance agents related to insurance decisions. Additionally, some of our focus group and interview participants reported that insurance agents had discouraged them from purchasing earthquake insurance or indicated that the insurance was unavailable.

Talking With Others About Earthquakes

For homeowners, talking with others like family, friends, and neighbors was a strong predictor of having earthquake insurance. As the amount of talking with others about earthquakes increased, residents were 1.63 times more likely to have earthquake insurance. The relationship between talk and insurance also trended toward statistical significance for renters. Approximately one-quarter of homeowners and renters who had earthquake insurance indicated that family or friends recommending insurance was a reason why they had purchased the insurance. Opportunities to promote community conversations about earthquakes, including some discussion of earthquake insurance, could ultimately increase earthquake insurance uptake rates—especially as we found from the descriptive statistics that most of our participants *never or rarely* had conversations with family and friends about earthquakes (59.3%), shared information with family and friends about earthquakes (60.4%), discussed earthquakes with neighbors and coworkers (65.2%), or attended meetings or community events about earthquakes (73.3%).

Information Sufficiency

In our research, information sufficiency is the idea that people believe they have enough information to stay safe before, during, and after an earthquake. As amount of information sufficiency increased (that is, as people reported greater belief that they had the information they needed to stay safe), the likelihood of having earthquake insurance increased 2.22 times for homeowners and 4.42 times for renters. Thus, the information sufficiency level was an important predictor for earthquake insurance uptake. As with understanding earthquake coverage, interacting with insurance agents, and talking with family and friends, there appears to be an integrated opportunity to improve information sufficiency and potentially increase uptake rates as again; a minority of survey participants (45.6%) thought they had enough information to understand earthquake insurance coverage. That is, it appears that as individuals gain more information about earthquakes, they are likely to encounter information about earthquake insurance, which contributes to deciding to purchase that insurance. In addition to media sources, the information may come from insurance agents or talking with friends, family, and neighbors about earthquakes.

Earthquake Experience and Living in Areas of High Risk

As homeowners had more earthquake experience, they were 1.15 times more likely to have earthquake insurance, while as renters had more earthquake experience, they were 1.32 times more likely to have earthquake insurance.

Approximately half (51.1%) of participants reported having experienced an earthquake.

However, while more personal earthquake experience predicted buying earthquake insurance, living in a county in the NMSZ at a greater risk for an earthquake did not. Additionally, living in a more at-risk county was only weakly related to individual perceptions of how likely an earthquake was to occur, how damaging an earthquake would be if it did occur, and experiencing negative emotions (worry, fear) related to an earthquake. Thus, it appears that more education about earthquake risk in high-risk NMSZ counties is needed.

Earthquake Insurance Cost

In Missouri, concurrent with the decline in earthquake insurance coverage over time, the Missouri DCI (2022A) finds that since 2000, the cost of earthquake insurance has risen on average by 352% across the entire state and by 816% in the New Madrid counties alone. Many of our Missouri-based focus group and interview participants reported that the cost of earthquake insurance prevented them from buying earthquake insurance or caused them to drop the insurance. However, it was not always clear if these perceptions were the result of receiving actual estimates for insurance coverage or if they were based on cost assumptions. In our survey, which was broader than Missouri and covered all eight states in the NMSZ, 23.6% of homeowners and 22.3% of renters who did not have earthquake insurance cited cost as a reason for not purchasing insurance. And 11.6% of homeowners and 7.9% of renters without earthquake insurance reported high deductibles as a reason for not having insurance. Thus, there is some evidence in our main survey that rate or deductible cost was a reason for a minority of those without earthquake insurance in making that decision.

Unfortunately, we were not able to include cost as a variable in our regression models. We asked participants who had earthquake insurance how much they paid annually for that insurance, so we have a measure of insurance cost for those with insurance. However, we did not ask those without earthquake insurance how much they thought earthquake insurance would cost them annually. Had we included this question, we could have combined those responses and included a cost estimate variable (real and perceived) in the regression. Not having this variable is a limitation of this project.

We did include measures of household income and housing cost in our regression models. These are not measures of insurance cost, but they do provide an opportunity to understand how financial resources affect insurance decisions. For homeowners, household income trended ($p = 0.062$) toward a statistically significant relationship with earthquake purchasing decisions, though it did not for renters. And housing cost did not matter for homeowners or renters. Thus, there is some evidence that economic resources matter in NMSZ earthquake insurance purchasing decisions, but those resources are not a major driver in earthquake insurance purchasing decision overall.

Case Study: "Are You Ready?" Campaign

In February 2021, the Missouri DCI ran the "Are You Ready?" campaign in observance of Earthquake Awareness Month. It joined forces with additional partners, such as the Missouri State Emergency Management Agency (SEMA), to increase the reach of the campaign to the target audience. The purpose of this campaign was to promote earthquake preparedness among individuals in Missouri counties in the NMSZ. The campaign included messages that DCI staff designed, and they used an advertising agency to distribute via broadcast radio, press releases, social media, and websites. The messages encouraged earthquake preparedness and recommended that individuals visit www.centralusquake.org for more information. Refer to Figure 17.

Below we describe a case study of the Missouri "Are You Ready?" earthquake preparedness campaign that the DCI implemented in Missouri directly using the results of our primary research. Specifically, using responses from Missouri residents in our main survey in 2021 plus a smaller Missouri-only follow-up survey in 2022, we examined how aware of the "Are You Ready?" campaign survey respondents were and analyzed how exposure to the campaign was related to earthquake protective actions, including buying earthquake insurance.

2021 "Are You Ready?" Campaign

As part of our main survey, we asked Missouri residents ($n = 623$) questions to assess their recollection of the "Are You Ready?" campaign. Specifically, we asked them if they recalled seeing "Are You Ready?" ads on websites, social media, television, or radio. We also asked participants if they visited the www.centralusquake.org website. Additionally, we calculated if individuals reported seeing the campaign on any of the sources we asked about. Overall, 23.1% of Missouri survey participants recalled seeing the "Are You Ready?" campaign. (Refer to Table 56.)

GETTING READY
Planning for your recovery before an earthquake occurs

"The southeastern quadrant of Missouri includes the New Madrid Seismic Zone, which experiences around 200 small earthquakes per year. Yet, the most at-risk consumers don't seem to know their homeowners or renters policies don't cover earthquake damage. We are concerned and want consumers to know where they stand before a major earthquake occurs. Do you know if you're covered?"

— Chlora Lindley-Myers
Director, Missouri Department of Commerce and Insurance

100 BILLION DOLLARS

If a major earthquake happens, are you prepared?

Although Missouri may not immediately come to mind when thinking about earthquakes, a major fault line runs through the southeastern corner of the state. A study by the U.S. Geological Survey estimates the probability of a magnitude 7.5 or greater earthquake in the New Madrid zone over the next 50 years is 7-10 percent. The probability of an earthquake exceeding magnitude 6 over the same period is 25-40 percent. A joint assessment by the Mid-America Earthquake Center of the University of Illinois and the Federal Emergency Management Agency predicts the New Madrid event could constitute the highest total economic loss of any natural disaster in U.S. history.

No matter what type of disaster Missourians face, it is critical that every family has a plan for both readiness and financial recovery following that event. Whatever that plan may be, it's important for consumers to know about what options they may have and what issues need to be considered to adequately prepare for an earthquake. **Your homeowners policy does not cover damage from an earthquake. Earthquake coverage must be purchased as separate coverage, called an "endorsement" or as a stand-alone policy. Check with your insurance agent to see if you have this coverage in place.**

Are you ready? Do you have a plan? If not, you may want to explore the information provided to determine what you need in order to be prepared.

Missouri DCI Earthquake Insurance Report | DCI Earthquake Insurance Information | SEMA Earthquake Resources

The Importance of Earthquake Insurance

AVERAGE ANNUAL EARTHQUAKE PREMIUM by county

County	2000	2018
Scott	~\$100	~\$400
Mississippi	~\$100	~\$400
Dunkin	~\$100	~\$400
New Madrid	~\$100	~\$400
Pettis	~\$100	~\$400

60%

Figure 17. 2021 "Are You Ready?" campaign website

Table 56 Survey participants' awareness of the 2021 "Are You Ready?" campaign

	Frequency	Percent
Participants who saw the "Are You Ready?" campaign on ...		
Websites	104	16.7
Social media	96	15.4
Television	91	14.6
Radio	81	13.0
Participants who visited the centralusquake.org website		
	79	12.7
Participants who saw the "Are You Ready?" campaign via any source		
	144	23.1

We also conducted correlation analysis to determine if seeing the "Are You Ready?" campaign on any format was associated with having earthquake insurance, earthquake insurance knowledge, or other earthquake preparedness behaviors. Refer to Table 57.

Table 57 Correlations between seeing the "Are You Ready?" campaign and other earthquake preparedness behaviors

	Seeing the "Are You Ready?" Campaign on Any Format
Having earthquake insurance	0.207**
Knowing that renters/homeowners insurance does not cover earthquakes	0.068
Fastening, securing, or bolting down heavy objects to walls	0.251**
Reinforcing or retrofitting your home	0.345**
Preparing an earthquake/disaster kit	0.229**
Storing documents in a safe place	0.036
Developing a family earthquake plan	0.298**
Developing a home inventory list of personal belongings	0.255**
Planning for how to evacuate	0.299**

**p < 0.001

Among Missouri homeowner/renter survey participants, seeing the "Are You Ready?" campaign was related to having earthquake insurance, but not to knowing that regular renters/homeowners insurance does not cover

earthquakes. Seeing the campaign was generally related to other earthquake preparedness behaviors. Relationships were generally weak or moderate.

2022 "Are You Ready?" Campaign

Based on insights from the 2021 main survey, DCI made several changes to the "Are You Ready?" campaign for February 2022. First, because those who saw the 2021 campaign were not more likely to know that regular homeowners/renters insurance does not cover earthquake risk, messaging was added to address this issue. Refer to Figure 18 for an example of an ad that states "all perils are not covered by your homeowners insurance" to help raise awareness that homeowners insurance does not cover damage from earthquakes.

Figure 18 Examples of 2022 "Are You Ready?" campaign messages



Additionally, because our main survey analysis indicated that those who used an agent to make insurance decisions were more likely to have earthquake insurance, the DCI revised messaging to recommend contacting an insurance agent for assistance. Refer to Table 58 for an example of a revised radio script.

Table 58 Radio script from the 2022 “Are You Ready?” campaign

Radio Script
Earthquakes don’t just happen in California. They can happen right here, at any time and with no warning. The chance of a major Missouri earthquake in the next fifty years is as high as forty percent and could cause up to three hundred billion dollars in damage. Are you prepared? Most homeowner’s policies don’t cover earthquakes. Are you covered? Earthquake insurance can help protect you and your family. Call your insurance agent or visit Central US Quake dot org....that’s central us quake dot org. Remember, it’s not IF ... it’s WHEN .

In our follow-up survey (*N* = 522) of Missouri residents, we asked participants if they recalled the 2022 “Are You Ready?” campaign with the same questions used for the previous year’s campaign. Specifically, we asked participants if they recalled seeing “Are You Ready?” ads on websites, social media, television, or radio. We also asked participants if they visited the www.centralusquake.org website. Additionally, we calculated if individuals reported seeing the campaign on any of the sources we asked about. For the follow-up survey, 25% of participants saw/heard the campaign, compared with 23% for the first survey. This is an increase in campaign exposure of 8%. (Refer to Table 59.)

Table 59 Survey participants’ awareness of the 2022 “Are You Ready?” campaign

	Frequency	Percent
Participants who saw the “Are You Ready?” campaign on ...		
Websites	72	13.8
Social media	82	15.7
Television	62	11.9
Radio	57	10.9
Participants who visited the centralusquake.org website	40	7.7
Participants who saw the “Are You Ready?” campaign via any source	130	24.9

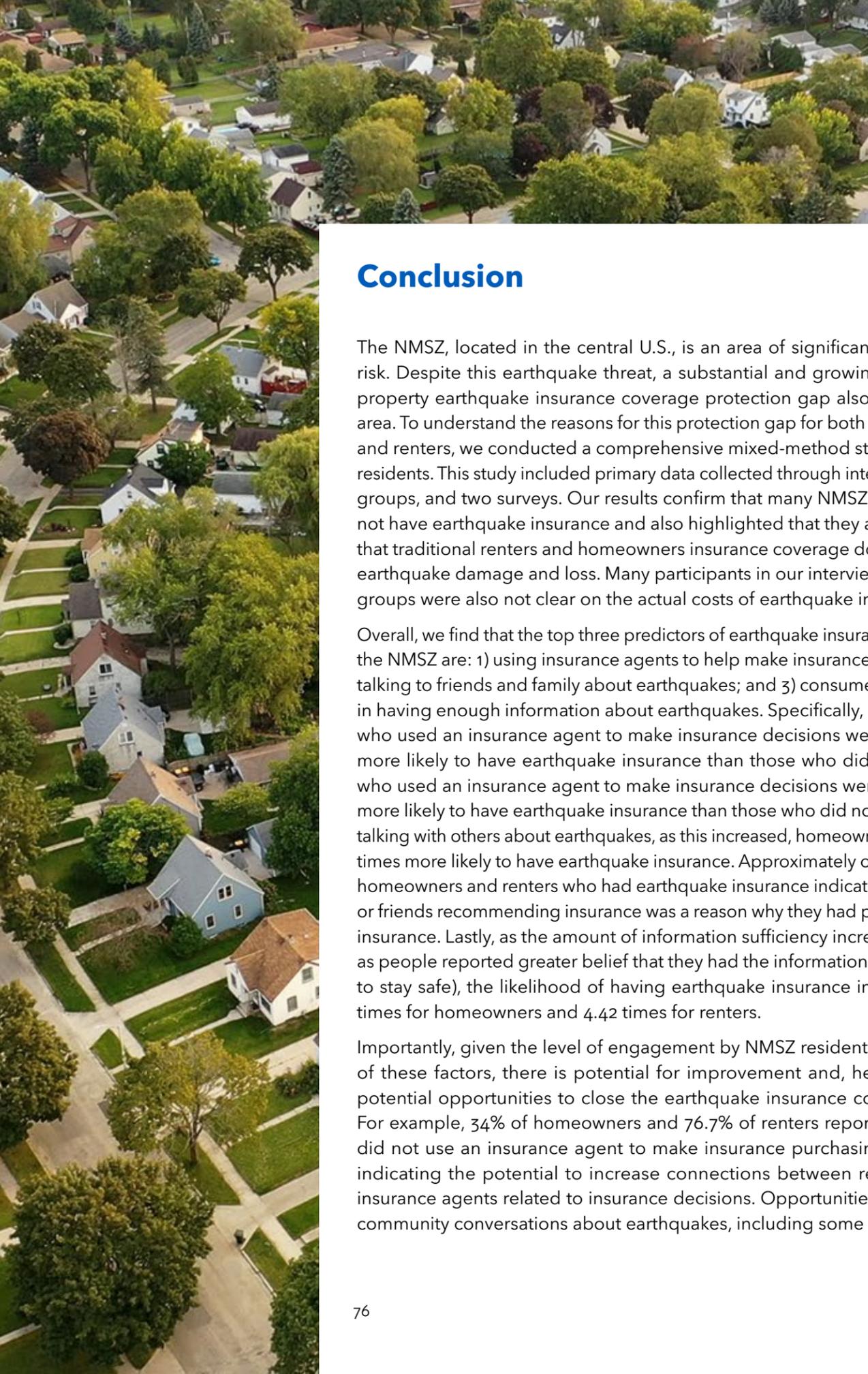
We also asked respondents who reported seeing the campaign in any format (*n* = 130) if they had engaged in any of nine behaviors as a result.

Most participants (74.6%) indicated that the campaign made them more aware of earthquake risk in their area. A majority of participants decided to look online for earthquake insurance information (56.9%) or talk to friends, family, or neighbors about earthquake insurance (54.6%). As described in our previous results, talking with others about earthquakes was an important predictor of having earthquake insurance, so the campaign’s effect on the promotion of earthquake talk is useful.

More than 40% (41.5%) of those who saw the campaign learned that earthquakes are not covered by regular insurance. Thirty-three percent of those who saw the campaign decided to talk to an insurance agent about earthquake insurance, another important predictor of having earthquake insurance. Finally, 20% of those who saw the campaign thought about purchasing earthquake insurance, and 13.1% decided to purchase insurance. (Refer to Table 60.)

Table 60 Earthquake-related decisions and behaviors prompted by seeing the 2022 “Are You Ready?” campaign

Decision/Behavior	Frequency	Percentage
I became more aware of the earthquake risk in my area.	97	74.6
I decided to look online for information about earthquake insurance.	74	56.9
I decided to talk to friends, family, or neighbors about earthquake insurance.	71	54.6
I decided to review my renters or homeowners insurance.	61	46.9
I learned that earthquakes are NOT covered by regular renters or homeowners insurance.	54	41.5
I decided to share the earthquake information I saw on social media with others.	47	36.2
I decided to talk to an insurance agent about earthquake insurance.	43	33.1
I thought about purchasing earthquake insurance.	26	20.0
I decided to purchase earthquake insurance.	17	13.1



Conclusion

The NMSZ, located in the central U.S., is an area of significant earthquake risk. Despite this earthquake threat, a substantial and growing residential property earthquake insurance coverage protection gap also exists in the area. To understand the reasons for this protection gap for both homeowners and renters, we conducted a comprehensive mixed-method study of NMSZ residents. This study included primary data collected through interviews, focus groups, and two surveys. Our results confirm that many NMSZ residents do not have earthquake insurance and also highlighted that they are not aware that traditional renters and homeowners insurance coverage does not cover earthquake damage and loss. Many participants in our interviews and focus groups were also not clear on the actual costs of earthquake insurance.

Overall, we find that the top three predictors of earthquake insurance uptake in the NMSZ are: 1) using insurance agents to help make insurance decisions; 2) talking to friends and family about earthquakes; and 3) consumer confidence in having enough information about earthquakes. Specifically, homeowners who used an insurance agent to make insurance decisions were 2.84 times more likely to have earthquake insurance than those who did not. Renters who used an insurance agent to make insurance decisions were 11.87 times more likely to have earthquake insurance than those who did not. Regarding talking with others about earthquakes, as this increased, homeowners were 1.63 times more likely to have earthquake insurance. Approximately one-quarter of homeowners and renters who had earthquake insurance indicated that family or friends recommending insurance was a reason why they had purchased the insurance. Lastly, as the amount of information sufficiency increased (that is, as people reported greater belief that they had the information they needed to stay safe), the likelihood of having earthquake insurance increased 2.22 times for homeowners and 4.42 times for renters.

Importantly, given the level of engagement by NMSZ residents for all three of these factors, there is potential for improvement and, hence, related potential opportunities to close the earthquake insurance coverage gap. For example, 34% of homeowners and 76.7% of renters reported that they did not use an insurance agent to make insurance purchasing decisions, indicating the potential to increase connections between residents and insurance agents related to insurance decisions. Opportunities to promote community conversations about earthquakes, including some discussion of

earthquake insurance, could ultimately increase earthquake insurance uptake rates too—especially as we found that most of our participants *never or rarely* had conversations with family and friends about earthquakes (59.3%), shared information with family and friends about earthquakes (60.4%), discussed earthquakes with neighbors and coworkers (65.2%), or attended meetings or community events about earthquakes (73.3%). Lastly, regarding information sufficiency, a minority of survey participants (45.6%) thought they had enough information to understand earthquake insurance coverage. Overall then, it appears that as individuals gain more information about earthquakes, they are likely to encounter information about earthquake insurance, which contributes to deciding to purchase that insurance. In addition to media sources, the information may come from insurance agents or talking with friends, family, and neighbors about earthquakes.

Importantly, given the level of engagement by NMSZ residents for all three of these factors, there is potential for improvement and, hence, related potential opportunities to close the earthquake insurance coverage gap.

Using results from our main survey, the Missouri DCI made changes to the 2022 “Are You Ready?” campaign in an effort to increase earthquake preparedness and insurance uptake in the NMSZ. We had found that seeing the 2021 campaign was not related to participants knowing that renters and homeowners insurance do not cover earthquakes. Based on this insight, the DCI revised the “Are You Ready?” campaign for 2022 to more clearly indicate that renters and homeowners insurance do not cover earthquakes. The 2022 campaign materials also encouraged individuals to contact an insurance agent to find out about earthquake insurance, given our results that using an agent to make insurance decisions strongly predicted earthquake insurance uptake. We also conducted a 2022 campaign follow-up survey that showed exposure to this campaign resulted in individuals taking a variety of earthquake preparedness actions, such as deciding to look for more earthquake information or deciding to review one’s renters or homeowners insurance. This case study example significantly illustrates the ways that data can be used to improve earthquake campaigns and potentially increase earthquake insurance uptake.

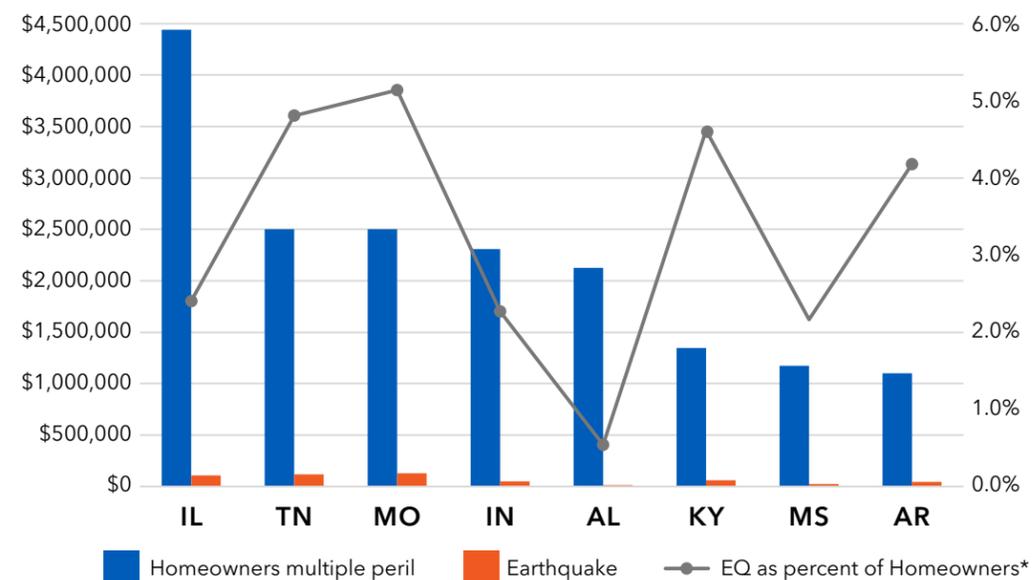
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Appendix A - NMSZ State by State Earthquake Premium Data

To get a sense of the overall earthquake coverage in the eight states of the NMSZ, we pulled National Association of Insurance Commissioner (NAIC) state-level premium data by coverage type. Given that earthquake coverage is not included in a homeowner's policy, we pulled both homeowners multiple peril and earthquake premiums written. We know from the detailed data that the Missouri DCI collected that in 2021, on average 24% of residential exposures across the entire state had earthquake coverage (Missouri DCI, 2022A). Therefore, we assume that Missouri's 5% of homeowners premium in 2021 (Figure A1) is a proxy for this average 24% Missouri earthquake market penetration rate. If we assume this total premium percentage to market penetration proxy holds for the other seven NMSZ states, then all the states in the NMSZ would have lower assumed earthquake market penetration rates than Missouri given earthquake premium as a percent of total homeowners premium in these states, which ranges from 0.54% in Alabama to 4.81% in Tennessee. (Refer to Figure A1.)

Figure A1 New Madrid States Homeowners and Earthquake 2021 Premium (\$000)



*EQ includes both residential and commercial premiums. Source: NAIC data.

Appendix B - Main Survey Instrument

Consent to Participate in a Research Study

Project Title: *Perceptions of Earthquake Risk, Preparedness, and Insurance*

Principal Investigator/Researcher: *J. Brian Houston*

IRB Reference Number: 2064082

You are being invited to take part in a research project. You must be 25 years of age or older. Your participation is voluntary, and you may stop being in this study at any time. The purpose of this research project is to understand how adult homeowners in portions of Arkansas, Illinois, Kentucky, Mississippi, Missouri, and Tennessee think about earthquake risk and preparedness. You are being asked to participate in an online survey about earthquake risk and preparedness. Your participation should last 10-15 minutes. The information you provide will be anonymous.

If you have questions about this study, you can contact the University of Missouri researcher at 573-882-9868 or houstonjb@missouri.edu. If you have questions about your rights as a research participant, please contact the University of Missouri Institutional Review Board (IRB) at 573-882-3181 or muresearchirb@missouri.edu. The IRB is a group of people who review research studies to make sure the rights and welfare of participants are protected. If you want to talk privately about any concerns or issues related to your participation, you may contact the Research Participant Advocacy at 888-280-5002 (a free call) or email muresearchrpa@missouri.edu. You can ask the researcher to email you a copy of this consent for your records. We appreciate your consideration to participate in this study.

Q3 By clicking the "I agree" button below, you are agreeing to participate in this study under the conditions described. You have not given up any of your legal rights or released any individual or institution from liability for negligence. You have been given an opportunity to ask questions

The information in the above consent form has been explained to me and I understand it. I agree to participate in this study.

- I agree
- I disagree

End of Block: Consent

Start of Block: Screeners

We care about the quality of our data. In order for us to get the most accurate measures of your opinions, it is important that you thoughtfully provide your best answers to each question in this survey.

Do you commit to thoughtfully provide your best answers to each question in this survey?

- I commit to giving my best answers
- I don't commit to giving my best answers
- I can't commit either way

Skip To: End of Block If We care about the quality of our data. In order for us to get the most accurate measures of your... = I don't commit to giving my best answers

Skip To: End of Block If We care about the quality of our data. In order for us to get the most accurate measures of your... = I can't commit either way

Q4 What is your age?

- Under 25
- 25 - 34
- 35 - 44
- 45 - 54
- 55 - 64
- 65 - 74
- 75 - 84
- 85 or older

Skip To: End of Block If What is your age? = Under 25

Q6 What state do you live in?

- Alabama
- Arkansas
- Illinois
- Indiana
- Kentucky
- Mississippi
- Missouri
- Tennessee
- A state that is not listed here

Skip To: End of Block If What state do you live in? = A state that is not listed here

Display This Question:

If What state do you live in? = Arkansas

Q7 What county do you live in?

- Clay
- Craighead
- Crittenden
- Cross
- Greene
- Independence
- Jackson
- Lawrence
- Lee
- Mississippi
- Poinsett
- Randolph
- Saint Francis
- Woodruff
- A county not listed here

Skip To: End of Block If What county do you live in? = A county not listed here

Display This Question:

If What state do you live in? = Illinois

Q8 What county do you live in?

- Alexander
- Bond
- Clinton
- Fayette
- Franklin
- Gallatin
- Hamilton
- Hardin
- Jackson
- Jefferson
- Johnson
- Lawrence
- Madison
- Marion
- Massac
- Monroe
- Perry
- Pope
- Pulaski
- Randolph
- Saint Clair
- Saline
- Union
- Washington
- Wayne
- White
- Williamson
- A county that is not listed here

Skip To: End of Block If What county do you live in? = A county that is not listed here

Display This Question:

If What state do you live in? = Kentucky

Q9 What county do you live in?

- | | |
|----------------------------------|--|
| <input type="radio"/> Ballard | <input type="radio"/> Hopkins |
| <input type="radio"/> Caldwell | <input type="radio"/> Livingston |
| <input type="radio"/> Calloway | <input type="radio"/> Lyon |
| <input type="radio"/> Carlisle | <input type="radio"/> Marshall |
| <input type="radio"/> Crittenden | <input type="radio"/> Trigg |
| <input type="radio"/> Fulton | <input type="radio"/> Webster |
| <input type="radio"/> Graves | <input type="radio"/> A county that is not listed here |
| <input type="radio"/> Hickman | |

Skip To: End of Block If What county do you live in? = A county that is not listed here

Display This Question:

If What state do you live in? = Mississippi

Q10 What county do you live in?

- | | |
|----------------------------------|--|
| <input type="radio"/> Alcorn | <input type="radio"/> Sunflower |
| <input type="radio"/> Benton | <input type="radio"/> Tallahatchie |
| <input type="radio"/> Bolivar | <input type="radio"/> Tate |
| <input type="radio"/> Coahoma | <input type="radio"/> Tippah |
| <input type="radio"/> Desoto | <input type="radio"/> Tishomingo |
| <input type="radio"/> Lafaeyette | <input type="radio"/> Tunica |
| <input type="radio"/> Marshall | <input type="radio"/> Union |
| <input type="radio"/> Panola | <input type="radio"/> Yalobusha |
| <input type="radio"/> Prentiss | <input type="radio"/> A county that is not listed here |
| <input type="radio"/> Quitman | |

Skip To: End of Block If What county do you live in? = A county that is not listed here

Display This Question:

If What state do you live in? = Missouri

Q11 What county do you live in?

- | | |
|--------------------------------------|--|
| <input type="radio"/> Adair | <input type="radio"/> Montgomery |
| <input type="radio"/> Audrain | <input type="radio"/> New Madrid |
| <input type="radio"/> Bollinger | <input type="radio"/> Oregon |
| <input type="radio"/> Boone | <input type="radio"/> Pemiscot |
| <input type="radio"/> Butler | <input type="radio"/> Perry |
| <input type="radio"/> Cape Girardeau | <input type="radio"/> Pike |
| <input type="radio"/> Carter | <input type="radio"/> Putnam |
| <input type="radio"/> Charlton | <input type="radio"/> Ralls |
| <input type="radio"/> Clark | <input type="radio"/> Randolph |
| <input type="radio"/> Cole | <input type="radio"/> Reynolds |
| <input type="radio"/> Callaway | <input type="radio"/> Ripley |
| <input type="radio"/> Dunklin | <input type="radio"/> Schuyler |
| <input type="radio"/> Howard | <input type="radio"/> Scotland |
| <input type="radio"/> Iron | <input type="radio"/> Scott |
| <input type="radio"/> Jefferson | <input type="radio"/> Shelby |
| <input type="radio"/> Knox | <input type="radio"/> St. Francois |
| <input type="radio"/> Lewis | <input type="radio"/> St. Louis |
| <input type="radio"/> Lincoln | <input type="radio"/> Ste. Genevieve |
| <input type="radio"/> Macon | <input type="radio"/> Stoddard |
| <input type="radio"/> Madison | <input type="radio"/> Warren |
| <input type="radio"/> Marion | <input type="radio"/> Washington |
| <input type="radio"/> Mississippi | <input type="radio"/> Wayne |
| <input type="radio"/> Monroe | <input type="radio"/> A county not listed here |

Skip To: End of Block If What county do you live in? = A county not listed here

Display This Question:

If What state do you live in? = Tennessee

Q12 What county do you live in?

- Carroll
- Chester
- Crockett
- Dyer
- Fayette
- Gibson
- Hardeman
- Haywood
- Henderson
- Henry
- Lake
- Lauderdale
- Madison
- Obion
- Shelby
- Tipton
- Weakley
- A county not listed here

Skip To: End of Block If What county do you live in? = A county not listed here

Display This Question:

If What state do you live in? = Alabama

Q111 What county do you live in?

- Colbert
- Franklin
- Lauderdale
- Lawrence
- A county not listed here

Skip To: End of Block If What county do you live in? = A county not listed here

Display This Question:

If What state do you live in? = Indiana

Q112 What county do you live in?

- Gibson
- Posey
- Spencer
- Vanderburgh
- Warrick
- A county not listed here

Skip To: End of Block If What county do you live in? = A county not listed here

End of Block: Screeners

Start of Block: Susceptibility / Severity

Q13 Please indicate how much you agree or disagree with each statement below.

Q14 The chance of an earthquake striking my home is high.

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Q15 I am concerned about an earthquake affecting my home.

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Q16 I feel vulnerable to earthquakes.

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Q17 Earthquakes pose a threat to my household.

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Q18 An earthquake could cause major damage and destruction in my community.

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Q20 An earthquake could cause loss of power, water, phone, and other basic services in my community.

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Q19 An earthquake could injure or kill people in my community.

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

End of Block: Susceptibility / Severity

Start of Block: Emotion

Q21 When thinking about an earthquake occurring in your community, how afraid are you?

- Not afraid at all
- Slightly afraid
- Moderately afraid
- Very afraid
- Extremely afraid

Q22 When thinking about an earthquake occurring in your community, how anxious are you?

- Not anxious at all
- Slightly anxious
- Moderately anxious
- Very anxious
- Extremely anxious

Q23 When thinking about an earthquake occurring in your community, how overwhelmed do you feel?

- Not overwhelmed at all
- Slightly overwhelmed
- Moderately overwhelmed
- Very overwhelmed
- Extremely overwhelmed

End of Block: Emotion

Start of Block: Earthquake Experience Yes/No

Q24 Have you experienced an earthquake before?

- No
- Yes

End of Block: Earthquake Experience Yes/No

Start of Block: Earthquake Experience

Q26 Have you experienced an earthquake that caused:

Q27 Damage to property in the community where you lived?

- No
- Yes

Q28 Death or injury to people in the community where you lived?

- No
- Yes

Q29 Damage to your home?

- No
- Yes

Q31 Disruption to your power, water, phone, or other basic services?

- No
- Yes

Q30 Death or injury to family members?

- No
- Yes

End of Block: Earthquake Experience

Start of Block: Earthquake Preparedness

Q32 Have you taken any of the following actions to prepare for an earthquake?

Q33 Have you fastened, secured, or bolted down heavy objects or utilities to the walls in your home?

- No
- No, but I plan to in the next year
- Yes

Q34 Have you reinforced or retrofitted your home to protect against an earthquake (e.g., installed bracing, anchored foundation)?

- No
- No, but I plan to in the next year
- Yes

Q35 Have you prepared an earthquake/disaster kit with supplies including food and water, tools, and first aid equipment?

- No
- No, but I plan to in the next year
- Yes

Q36 Have you stored important documents in a safe place?

- No
- No, but I plan to in the next year
- Yes

Q37 Have you developed a family earthquake plan?

- No
- No, but I plan to in the next year
- Yes

Q38 Have you developed a home inventory list of personal belongings?

- No
- No, but I plan to in the next year
- Yes

Q39 Have you planned for how you would evacuate the area if necessary?

- No
- No, but I plan to in the next year
- Yes

End of Block: Earthquake Preparedness

Start of Block: Earthquake Engagement/Awareness

Q40 Have you heard of the New Madrid Seismic Zone?

- No
- Not sure
- Yes

Q41 Has your community ever participated in a ShakeOut earthquake preparedness drill?

- No
- Not sure
- Yes

Q42 Have you ever participated in a ShakeOut earthquake preparedness drill?

- No
- Not sure
- Yes

End of Block: Earthquake Engagement/Awareness

Start of Block: Housing Status

Q5 Do you own or rent your current residence?

For the purpose of the survey, you own your home even if you owe money on your home loan.

- Own
- Rent

End of Block: Housing Status

Start of Block: Home - Owner

Q43 Approximately how many years have you lived in your current home?

- 0 to 5 years
- 6 to 10 years
- 11 to 15 years
- 16 to 20 years
- More than 20 years

Q44 What year was your home built?

- 1969 or before
 - 1970 to 1979
 - 1980 to 1989
 - 1990 to 1999
 - 2000 to 2009
 - 2010 to 2019
 - 2020 or later
-

Q113 What type of home do you live in?

- Single-family home
 - Multi-family home (e.g., duplex, fourplex)
 - Condominium or townhouse
 - Mobile home or trailer home
-

Q45 What type of construction is your home (select all that apply)?

- Wood frame (siding on the outside with a wood frame on the inside)
 - Masonry (constructed of brick/stone)
 - Brick veneer (wood frame house with some decorative brick/stone)
 - Pre-built (e.g., mobile homes)
 - Multi-story (has more than one floor)
-

Q46 What is the approximate current market value of your home?

- Less than \$100,000
 - \$100,000 to \$149,999
 - \$150,000 to \$199,999
 - \$200,000 to \$299,999
 - \$300,000 to \$399,999
 - \$400,000 or more
 - Not sure
-

Q47 Which option best describes your household size?

- I live alone
 - There are two people living in my house
 - There are three people living in my house
 - There are four people living in my house
 - There are five or more people living in my house
-

Q48 Do any children under the age of 18-years-old live in your house?

- No
 - Yes
-

Q49 Are you a caretaker for any adults who live in the house with you?

Being a caretaker means you provide regular unpaid care for an adult who has a health condition or disability and requires assistance.

- No
 - Yes
-

Q50 Is your house built to withstand an earthquake that shakes strong enough to move very heavy furniture?

- No
 - Not sure
 - Yes
-

End of Block: Home - Owner

Start of Block: Homeowners' Insurance

Q51 Do you have homeowner's insurance?

- No
 - Not sure
 - Yes
-

Display This Question:

If Do you have homeowner's insurance? = Yes

Q52 Without looking it up, do you know what company your homeowner's insurance is with?

- No
 - Not sure
 - Yes
-

Display This Question:

If Without looking it up, do you know what company your homeowner's insurance is with? = Yes

Q53 What company is your homeowner's insurance with?

Q54 Do you use an insurance agent to help make your homeowner insurance decisions?

- No
- Not sure
- Yes

Q55 Did you know that homeowner's insurance does not cover damage and loss caused by an earthquake?

- No
- Yes

End of Block: Homeowners's Insurance

Start of Block: Earthquake Insurance Yes/No

Q56 Do you have homeowner's earthquake insurance?

- No
- Not sure
- Yes

End of Block: Earthquake Insurance Yes/No

Start of Block: Earthquake Insurance YES

Q57 Is your earthquake insurance part of your regular homeowner's policy (endorsement) or a separate, stand-alone policy?

- Part of my regular homeowner's policy (endorsement)
- Separate, stand-alone policy
- Not sure

Q58 Why did you buy earthquake insurance (select all that apply)?

- I live in a place that has earthquakes
- I owe a significant amount on my mortgage
- To manage the substantial damage and costs to my home if an earthquake were to occur
- Insurance agent/company I recommended I get it
- Family/friends recommended I get it
- It is required
- Other (please specify) _____

Q59 Approximately how much does your annual earthquake insurance premium cost?

- Less than \$1,000 per year
- \$1,000 to \$2,000 per year
- \$2,001 to \$4,000 per year
- More than \$4,001 per year
- Not sure

Q60 Earthquake insurance deductibles are typically a percentage of your coverage limit. What percentage of your coverage limit is your earthquake insurance deductible?

- 1-5%
- 6-10%
- 11-15%
- 16-20%
- 21% or more
- Not sure

End of Block: Earthquake Insurance YES

Start of Block: Earthquake Insurance NO

Q61 Why do you not currently have earthquake insurance (select all that apply)?

- I have not heard of it before
- The premium is too expensive
- The deductible is too much
- It is too hard to get
- I don't need it
- It is not worth it
- Insurance for other risks like flood and fire is more important
- Other (please specify) _____

Q62 Have you ever had earthquake insurance in the past?

- No
- Not sure
- Yes

End of Block: Earthquake Insurance NO

Start of Block: Home - Renting

Q115 Approximately how many years have you lived in your current residence?

- Less than one year
- 1 to 2 years
- 3 to 4 years
- 4 to 5 years
- More than 5 years

Q117 What type of residence do you live in?

- Single-family home
- Multi-family home (e.g., duplex, fourplex)
- Condominium or townhouse
- Apartment
- Mobile home or trailer home

Q119 Approximately how much is your monthly rent?

- Less than \$500
- \$500 to \$999
- \$1,000 to \$1,499
- \$1,500 to to \$1,999
- \$2,000 or more
- Not sure

Q120 Which option best describes your household size?

- I live alone
- There are two people living in my house
- There are three people living in my house
- There are four people living in my house
- There are five or more people living in my house

Q121 Do any children under the age of 18-years-old live with you?

- No
- Yes

Q122 Are you a caretaker for any adults who live with you?

Being a caretaker means you provide regular unpaid care for an adult who has a health condition or disability and requires assistance.

- No
- Yes

Q123 Is your house built to withstand an earthquake that shakes strong enough to move very heavy furniture?

- No
- Not sure
- Yes

End of Block: Home - Renting

Start of Block: Renters Insurance

Q124 Do you have renters insurance?

- No
- Not sure
- Yes

Display This Question:

If Do you have renters insurance? = Yes

Q125 Without looking it up, do you know what company your renters insurance is with?

- No
- Not sure
- Yes

Display This Question:

If Without looking it up, do you know what company your renters insurance is with? = Yes

Q126 What company is your renters insurance with?

Q127 Do you use an insurance agent to help make your renters insurance decisions?

- No
- Not sure
- Yes

Q128 Did you know that renters insurance does not usually cover damage and loss caused by an earthquake?

- No
- Yes

End of Block: Renters Insurance

Start of Block: Earthquake RENTAL Insurance Yes/No

Q129 Do you have earthquake insurance for renters?

- No
- Not sure
- Yes

End of Block: Earthquake RENTAL Insurance Yes/No

Start of Block: Earthquake RENTAL Insurance YES

Q132 Is your earthquake insurance part of your regular renters policy (endorsement) or a separate, stand-alone policy?

- Part of my regular renter's policy (endorsement)
- Separate, stand-alone policy
- Not sure

Q133 Why did you buy earthquake insurance for renters (select all that apply)?

- I live in a place that has earthquakes
- To manage the substantial damage and costs to my possessions if an earthquake were to occur
- Insurance agent/company I recommended I get it
- Family/friends recommended I get it
- Other (please specify) _____

Q134 Approximately how much does your annual earthquake insurance for renters premium cost?

- Less than \$250 per year
- \$251 to \$500 per year
- \$501 to \$1,000 per year
- More than \$1,001 per year
- Not sure

End of Block: Earthquake RENTAL Insurance YES

Start of Block: Earthquake RENTAL Insurance NO

Q130 Why do you not currently have earthquake insurance for renters (select all that apply)?

- I have not heard of it before
- The premium is too expensive
- The deductible is too much
- It is too hard to get
- I don't need it
- It is not worth it
- Insurance for other risks like flood and fire is more important
- Other (please specify) _____

Q131 Have you ever had earthquake insurance for renters in the past?

- No
- Not sure
- Yes

End of Block: Earthquake RENTAL Insurance NO

Start of Block: Earthquake Insurance Policy

Q63 Suppose that your current home and your possessions are damaged or destroyed by an earthquake in the future. Do you expect that the federal government would compensate you for at least part of that damage and loss?

- Definitely
- Probably
- Not sure
- Probably not
- Definitely not

Q65 In places that often have earthquakes, building codes may require that new homes are built to withstand earthquake damage. However, meeting these codes can increase the cost of construction.

Q64 Do you believe implementing earthquake-oriented building codes where you live is important?

- Not at all important
- Slightly important
- Moderately important
- Very important
- Extremely important

Q66 Do you feel the building codes in your community are sufficient to address the earthquake risk?

- No
- Not sure
- Yes

End of Block: Earthquake Insurance Policy

Start of Block: Earthquake Information Use

Q66 Over the past year, which of the following sources have you used to get information about earthquakes in your area (select all that apply)?

- Television news and their websites
- Newspapers and their websites
- Radio stations and their websites
- Social media sites such as Facebook, Twitter, Instagram, TikTok, and YouTube
- Government agencies and websites
- Community organizations like schools and libraries
- Faith-based institutions like churches, synagogues, and mosques
- Emergency management officials

Q75 Over the past year, how often have you done each of the following?

Q76 Had conversations with family and friends about earthquakes.

- Never
- Rarely
- Sometimes
- Fairly often
- Very often

Q79 Shared information with family and friends about earthquakes.

- Never
- Rarely
- Sometimes
- Fairly often
- Very often

Q80 Discussed earthquakes with neighbors and co-workers.

- Never
- Rarely
- Sometimes
- Fairly often
- Very often

Q81 Attended meetings or community events about earthquakes.

- Never
- Rarely
- Sometimes
- Fairly often
- Very often

End of Block: Earthquake Information Use

Start of Block: Information Sufficiency

Q82 Please indicate if you do or do not have enough information to do each thing below.

Q83 Understand earthquake risk in your area.

- I do not have enough information
- I have enough information

Q84 Stay safe during an earthquake.

- I do not have enough information
- I have enough information

Q85 Know what to do during an earthquake.

- I do not have enough information
- I have enough information

Q86 Help others during an earthquake.

- I do not have enough information
- I have enough information

Q87 Prepare for an earthquake.

- I do not have enough information
 - I have enough information
-

Q88 Cope with earthquake damage.

- I do not have enough information
 - I have enough information
-

Q89 Understand earthquake insurance coverage.

- I do not have enough information
 - I have enough information
-

End of Block: Information Sufficiency

Start of Block: DCI campaign awareness

Q98 In February 2021, the state of Missouri distributed earthquake information through the Are You Ready campaign.

Q99 Do you recall seeing Are You Ready information on websites?

- No
 - Not sure
 - Yes
-

Q100 Do you recall seeing Are You Ready information on social media?

- No
 - Not sure
 - Yes
-

Q101 Do you recall seeing Are You Ready information on television?

- No
 - Not sure
 - Yes
-

Q102 Do you recall hearing Are You Ready information on the radio?

- No
 - Not sure
 - Yes
-

Q103 Have you visited the centralusquake.org website?

- No
 - Not sure
 - Yes
-

End of Block: DCI campaign awareness

Start of Block: Demographics



Q104 What is your 5-digit zip code?

Q105 What racial or ethnic group best describes you?

- Asian or Pacific Islander
 - Black or African American
 - Hispanic or Latino
 - Native American or Alaskan Native
 - White or Caucasian
 - Multiracial or Biracial
 - A race/ethnicity not listed here (please specify):
-

Q106 How would you describe your gender?

- Female
 - Male
 - Transgender or non-binary
-

Q107 What is your highest level of education you've obtained?

- Grade school or less (kindergarten to 8th grade)
 - Some high school
 - High school diploma
 - Some college
 - Associates degree
 - Bachelor's degree
 - Graduate degree
-

Q108 What option best describes your current relationship status?

- Single
 - Married / Living with partner
 - Widowed
 - Divorced / Separated
-

Q109 Which category best describes your household income (this includes the combined income of all of those who live in your home)?

- Less than \$15,000
 - \$15,000 to less than \$29,999
 - \$30,000 to less than \$44,999
 - \$45,000 to less than \$59,999
 - \$60,000 to less than \$74,999
 - \$75,000 to less than \$89,999
 - \$90,000 to less than \$104,999
 - \$105,000 to less than \$119,999
 - \$120,000 to less than \$134,999
 - \$135,000 or more
 - Not sure
-

Q110 How would you describe your political affiliation?

- Strong Democrat
- Democrat
- Independent/Other
- Republican
- Strong Republican
- Prefer not to answer

End of Block: Demographics

