Earthquake Evacuation Modeling of New Madrid Region

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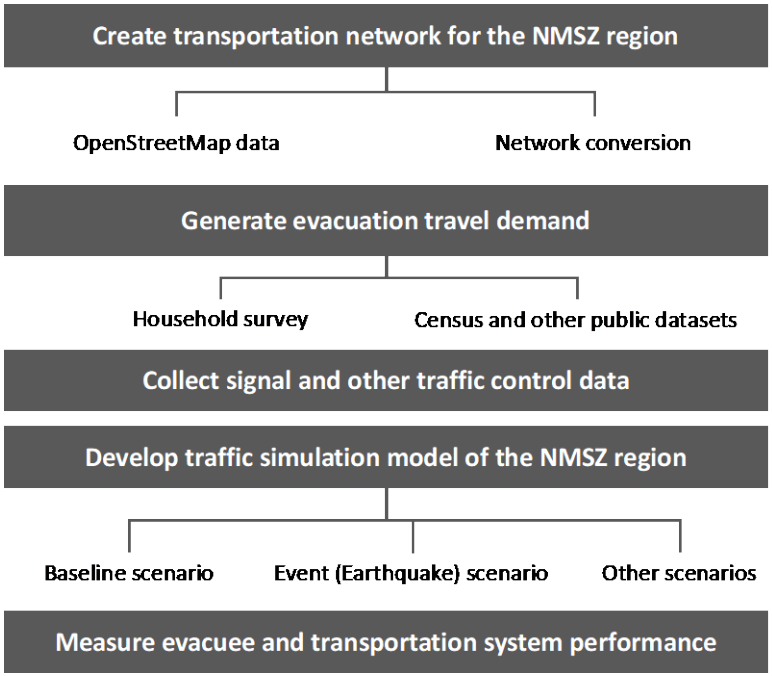
Study sponsored by MoDOT
Chris Engelbrecht, Mike White, Jen Harper, Missouri DOT

EARTHQUAKE SUMMIT 2022

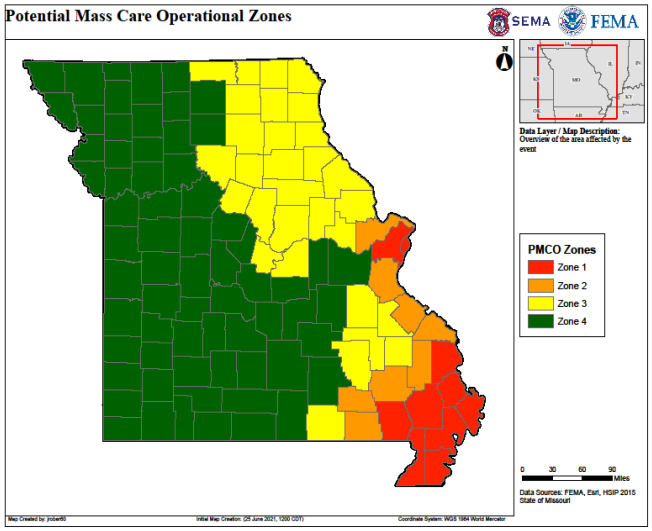
Project Objectives

- Assess evacuation performance using simulation models
- Identify locations of potential bottlenecks in the road network
- Estimate delays on major evacuation routes



Study Area

- Zone 1 of potential mass care operational zones developed by SEMA/FEMA
- Includes eight counties (Cape Girardeau, Scott, Mississippi, Stoddard, Butler, New Madrid, Dunklin and Pemiscot)



(Source: NMSZ Evacuation-MASS Care Initiative Overview, 2021)

Household Survey

Household Survey

- To obtain evacuation-related decisions – stay/evacuate, destination choice, and route choice
- Demand generation models will be estimated using survey responses

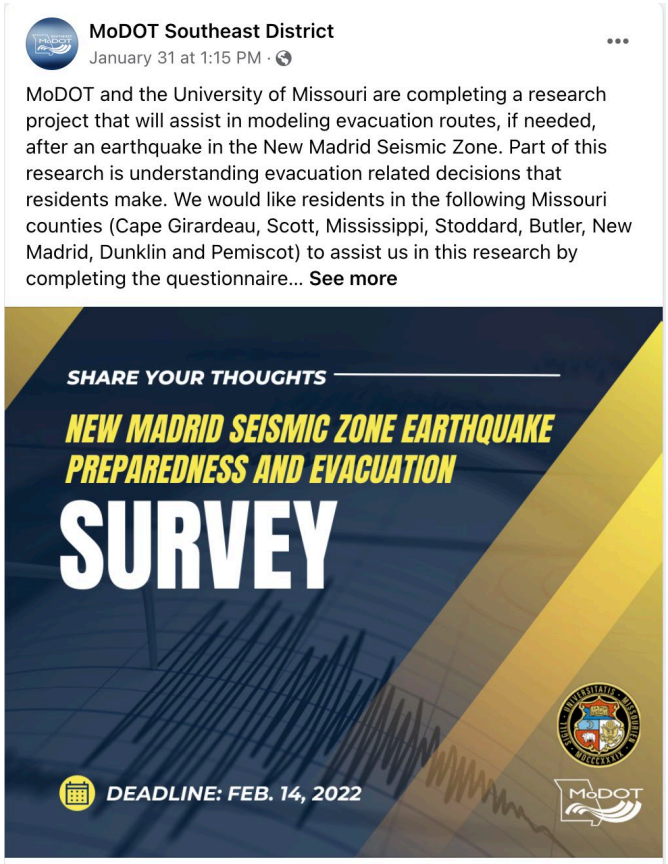
- MU IRB approval obtained early January
- MoDOT's SE District Communications Team, the SEMA Regional Coordinator for the SE and SEMA's State PIO, KFVS (TV station in Cape)
- Social media message -

MoDOT and the University of Missouri are completing a research project that will assist in modeling evacuation routes, if needed, after an earthquake in the New Madrid Seismic Zone. Part of this research is understanding evacuation related decisions that residents make. We would like residents in the following Missouri counties (Cape Girardeau, Scott, Mississippi, Stoddard, Butler, New Madrid, Dunklin and Pemiscot) to assist us in this research by completing the questionnaire at this link https://missouri.qualtrics.com/jfe/form/SV_3ICkl5t0rqWyAaa

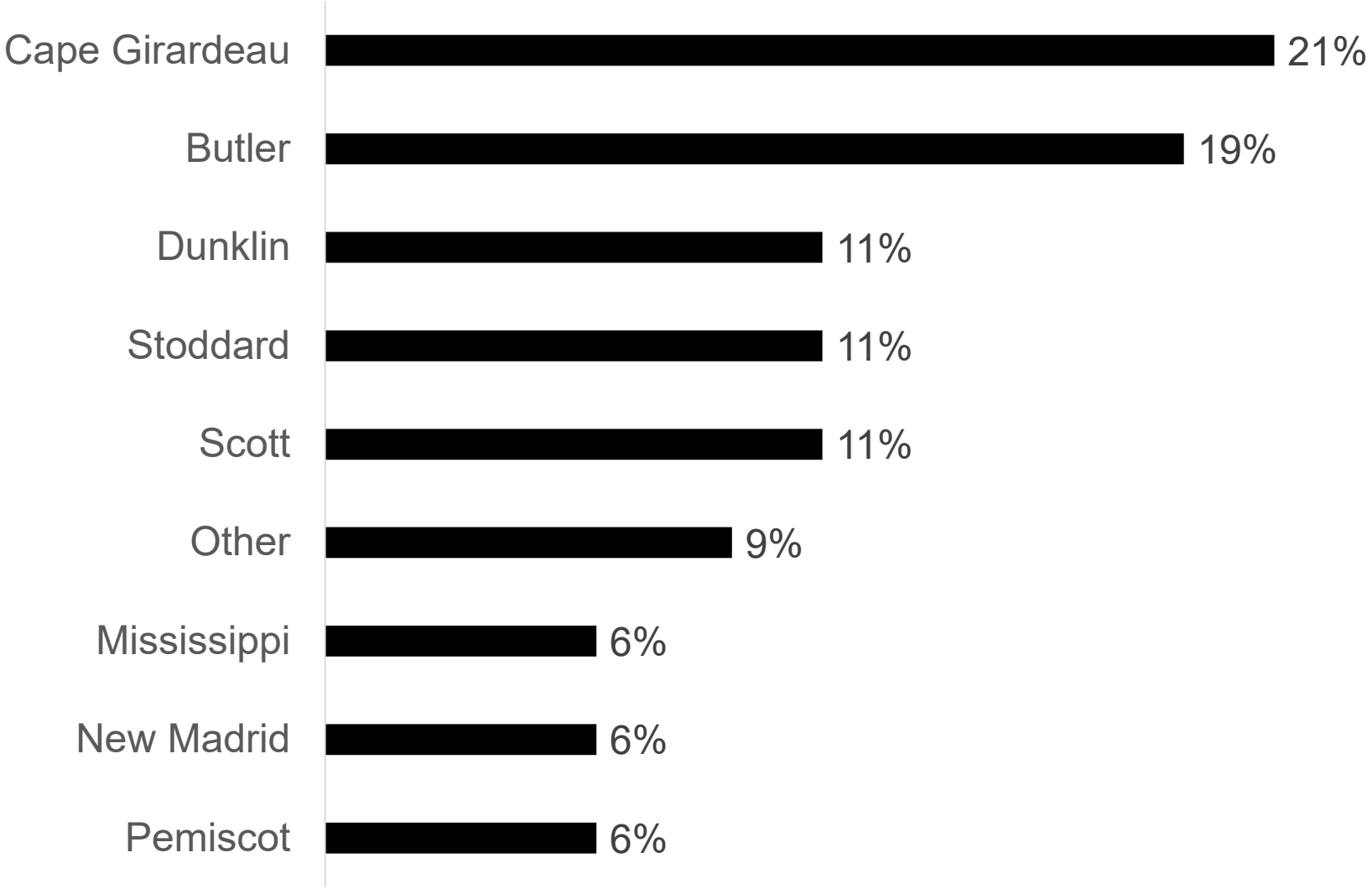
Please complete the survey by February 14, 2022.

Survey Administration

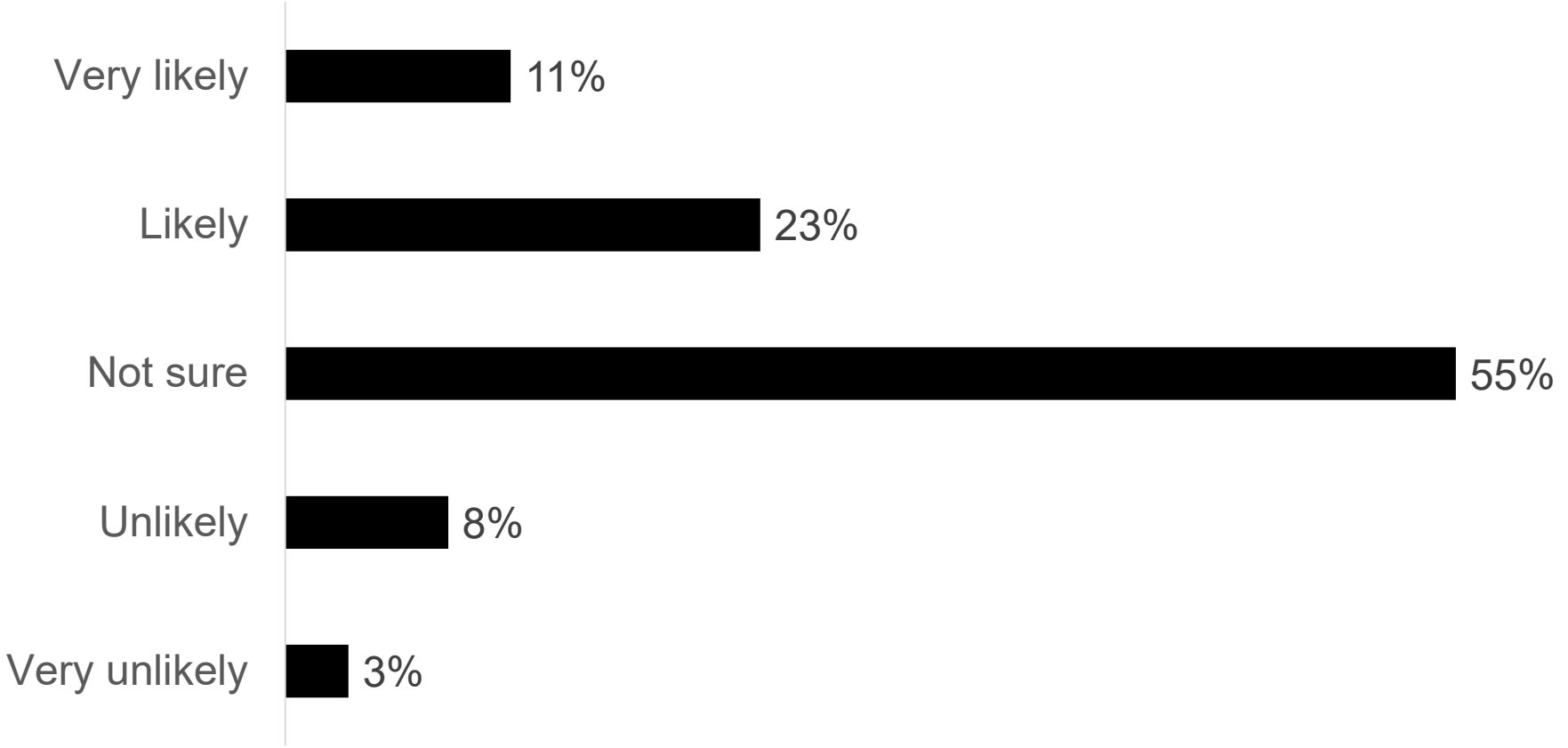
- Online survey was open from January 28 to February 21
- 891 responses received



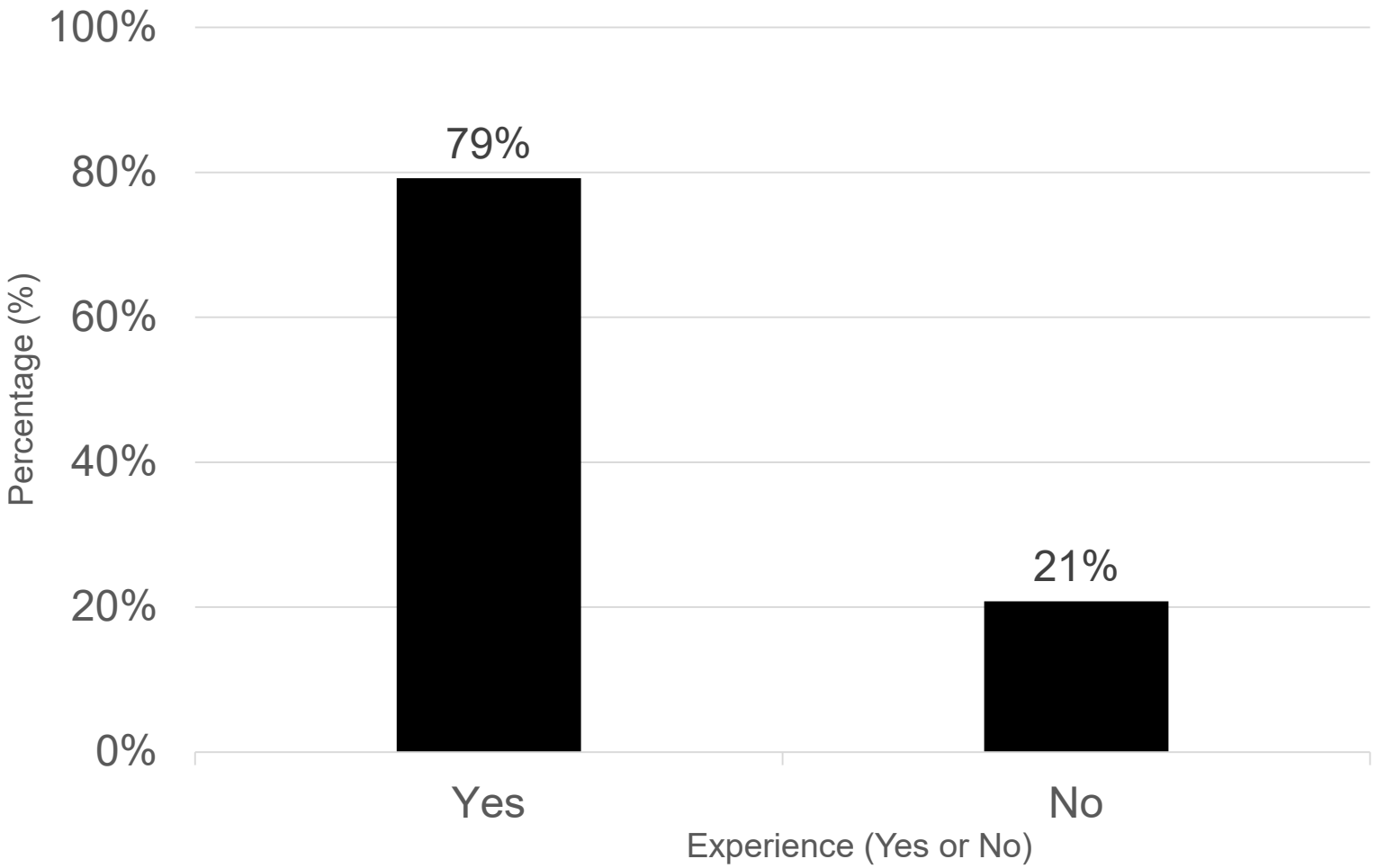
Q1. Select the county you live in (N= 891)



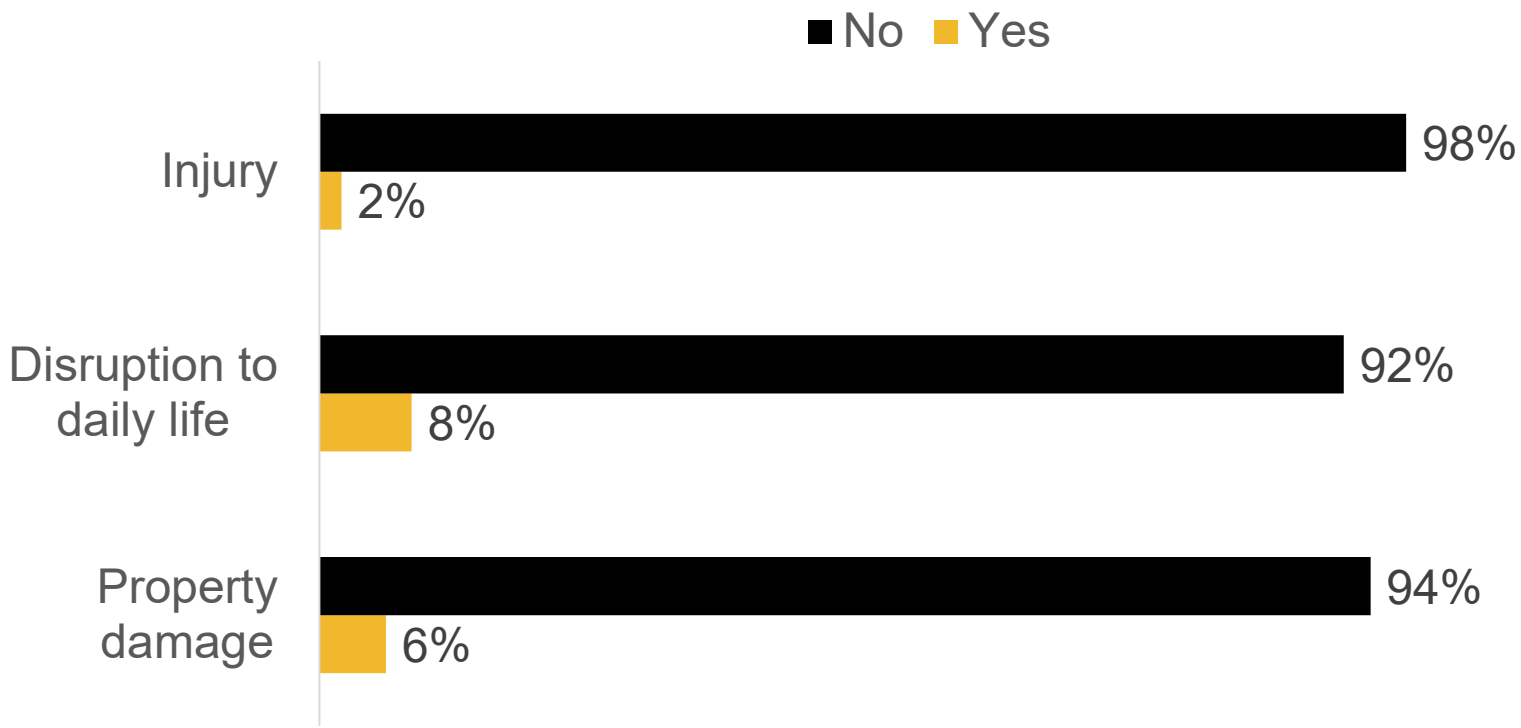
Q2. How likely is that you and your family will be impacted by an earthquake in the next five years? (N= 880)



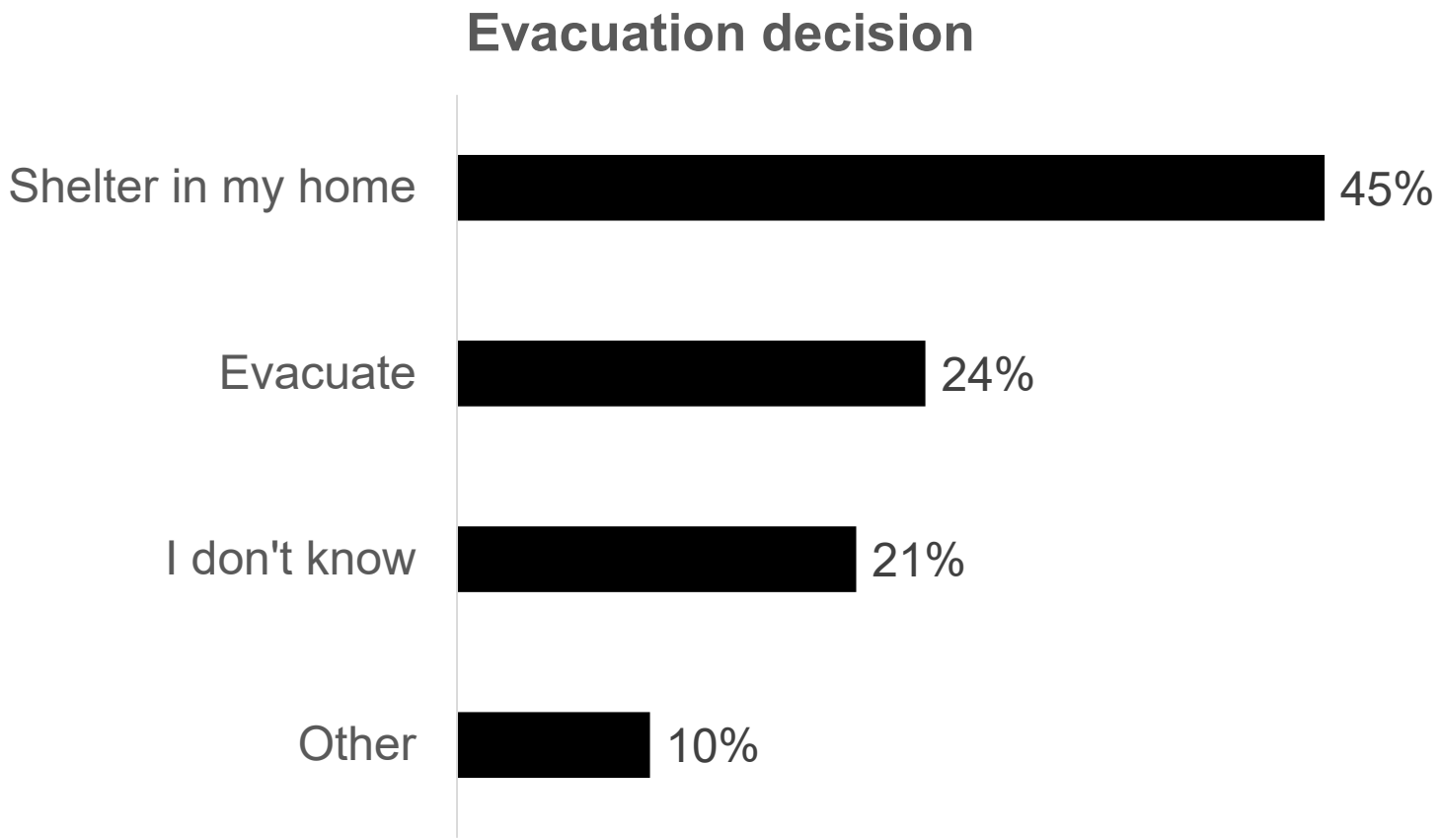
Q3. Have you ever experienced an earthquake? (N= 879)



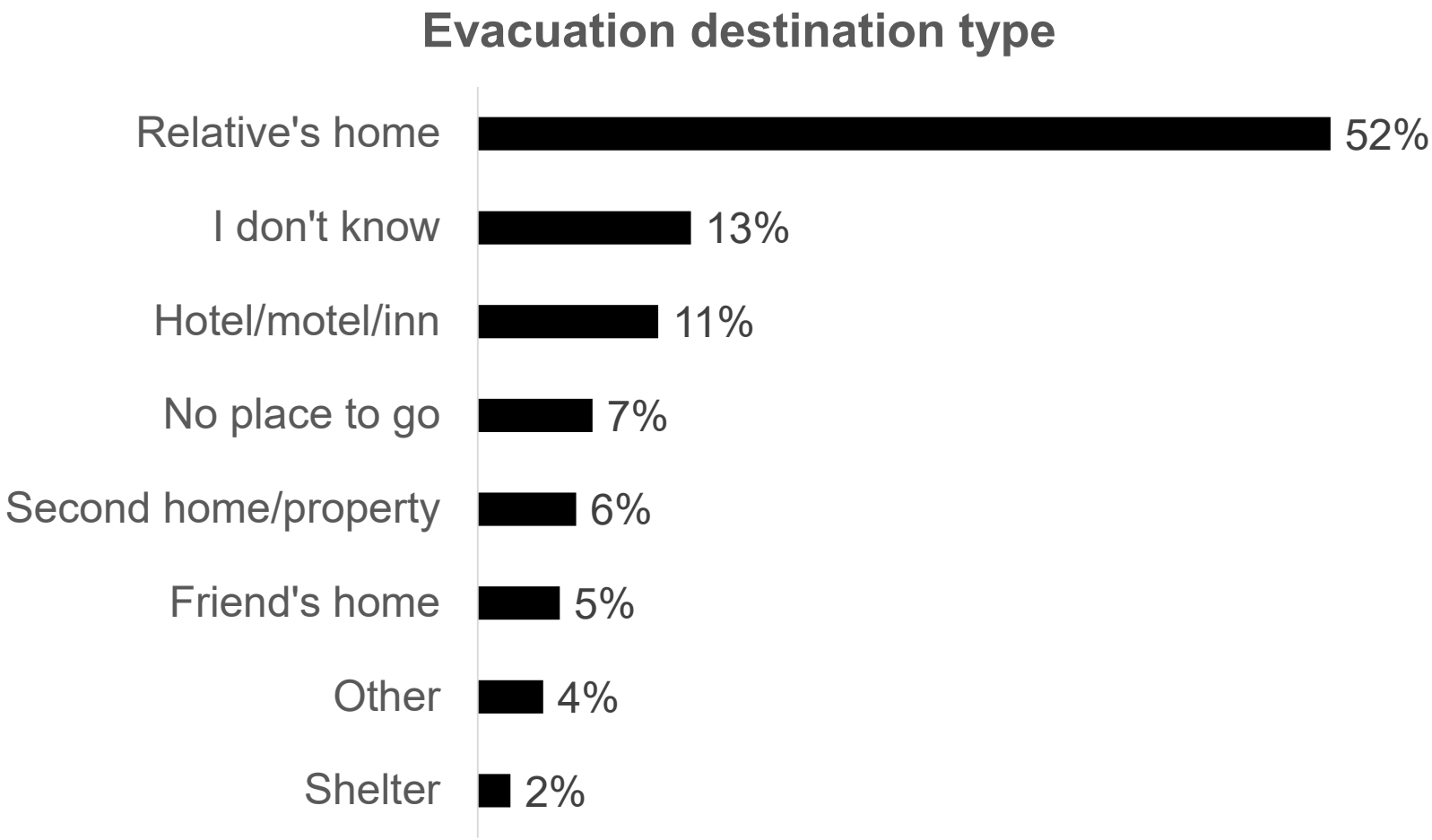
Q4. If you have experienced an earthquake before, did you have any of the following happen to you? (N= 790)



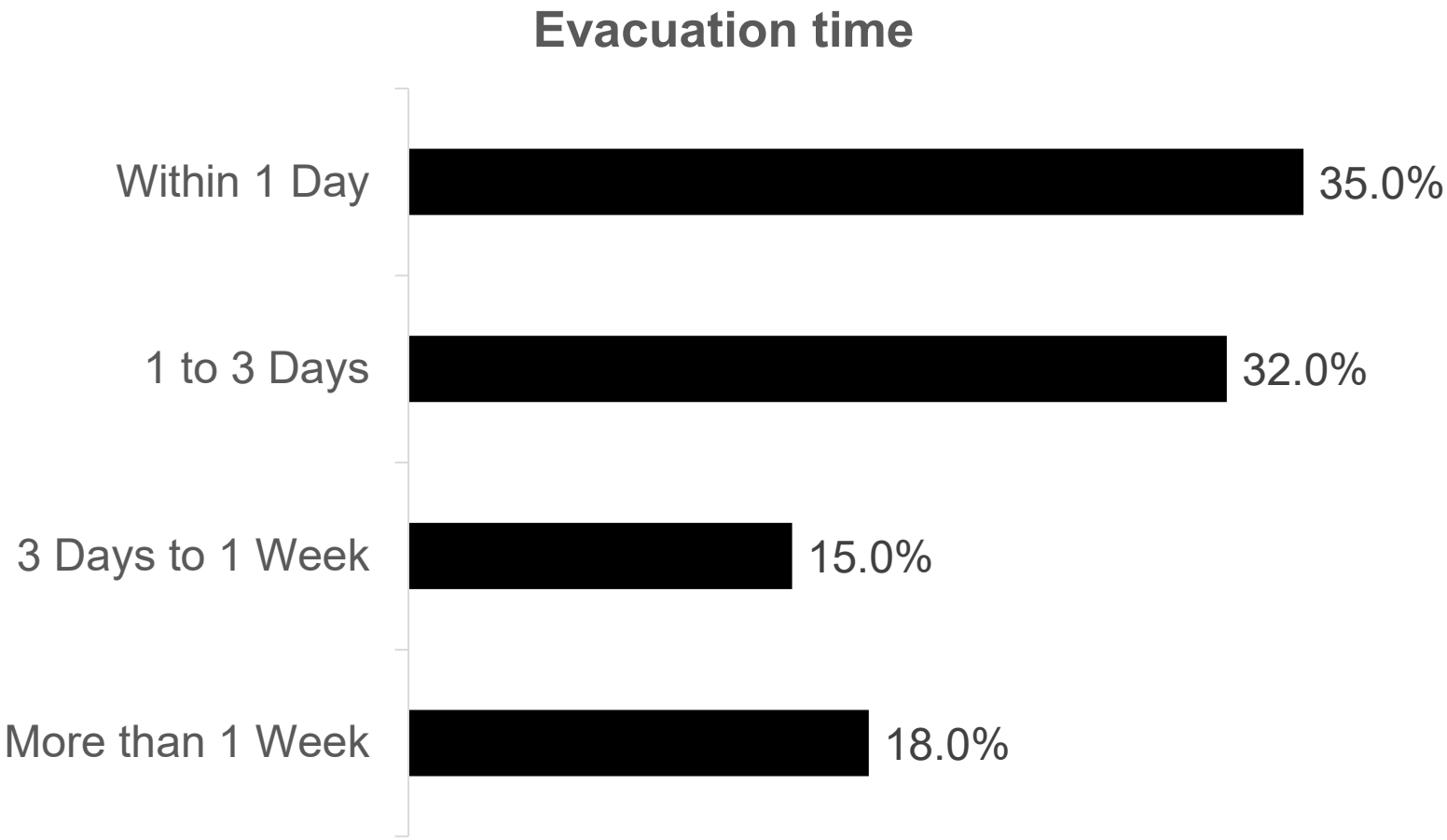
Q5. If an earthquake was going to impact your neighborhood, what would you be most likely to do? (N= 880)



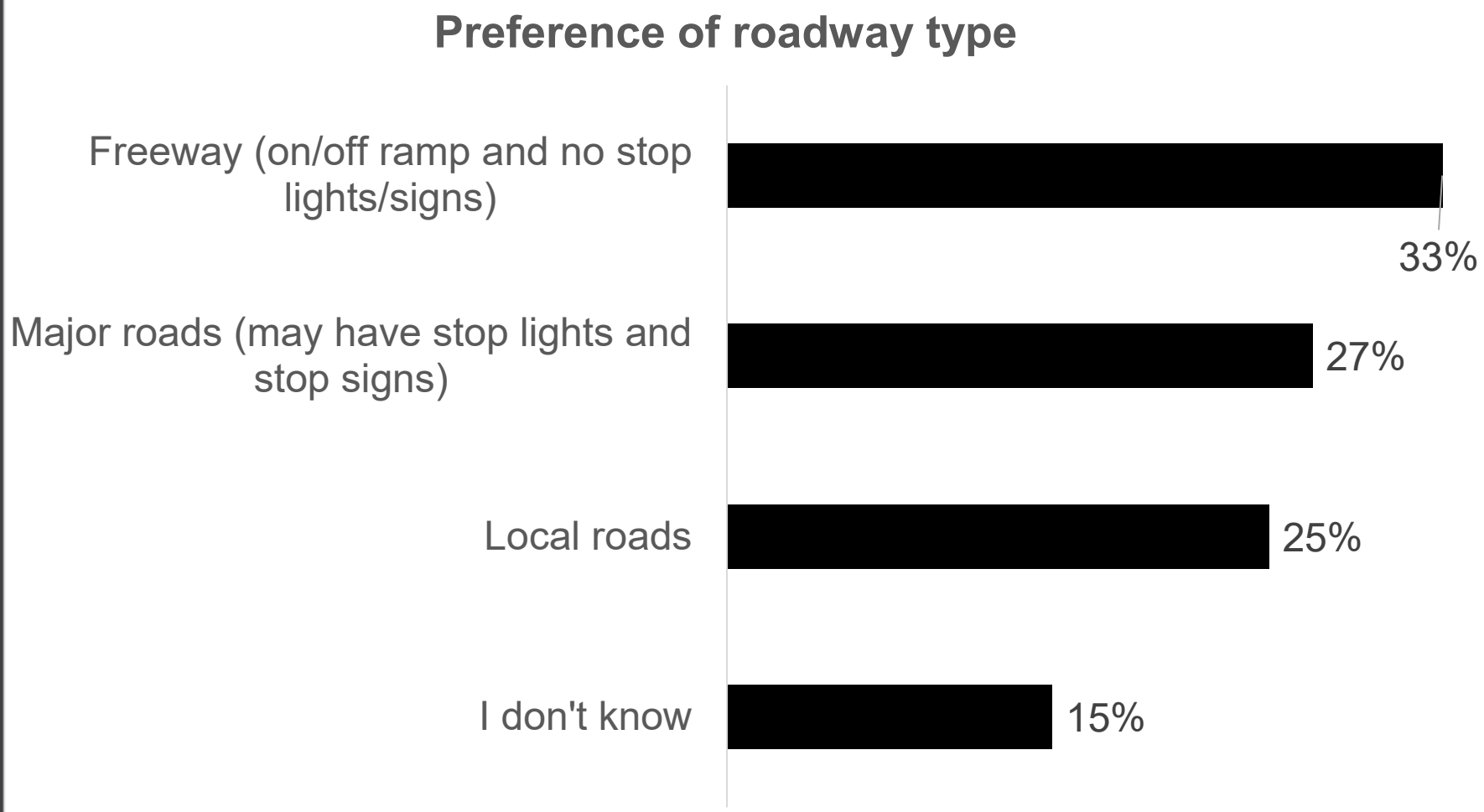
Q6. What kind of place would you go to? (N= 655)



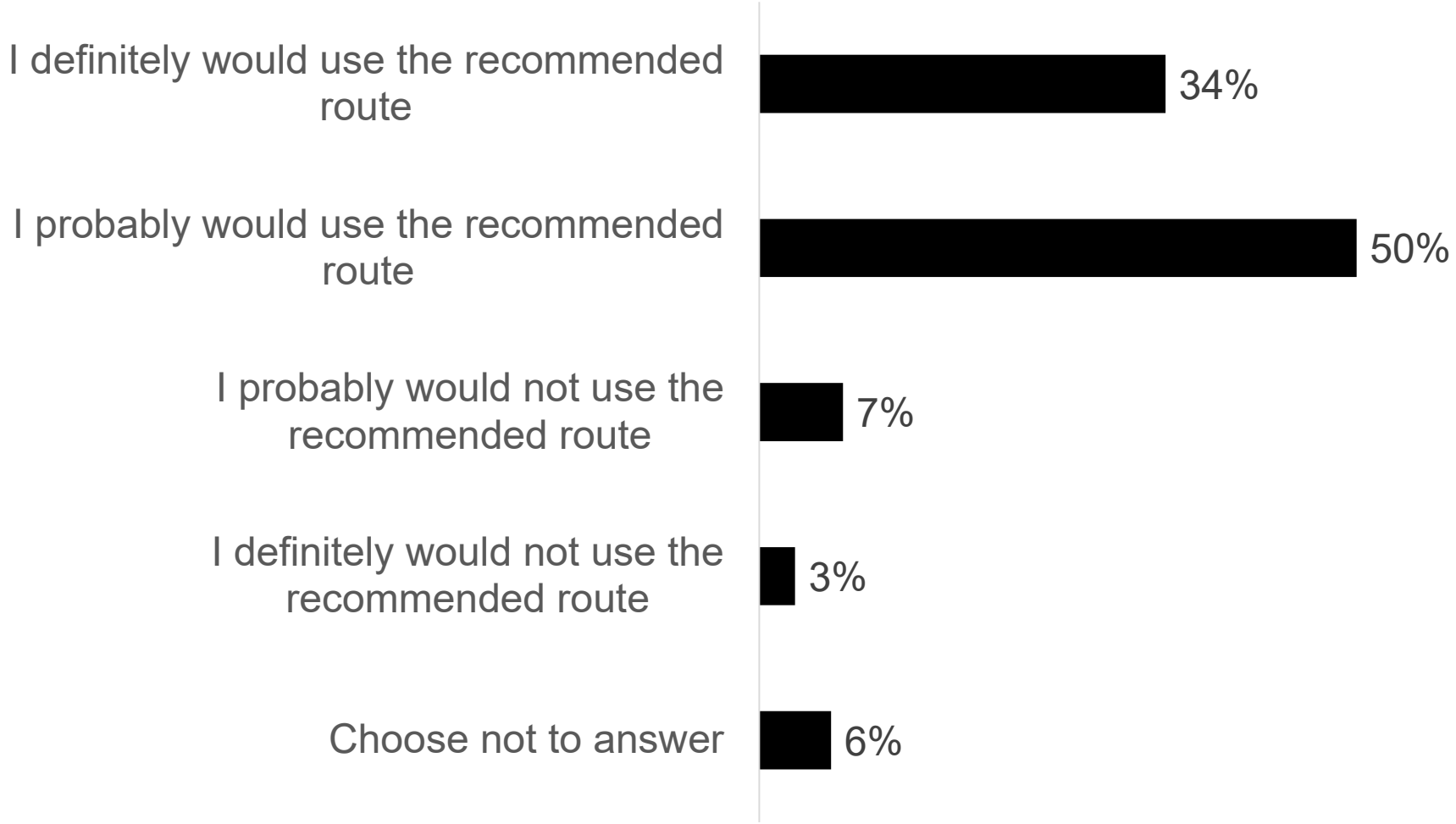
Q7. When do you think you would be most likely to leave to your destination after an earthquake? (N= 636)



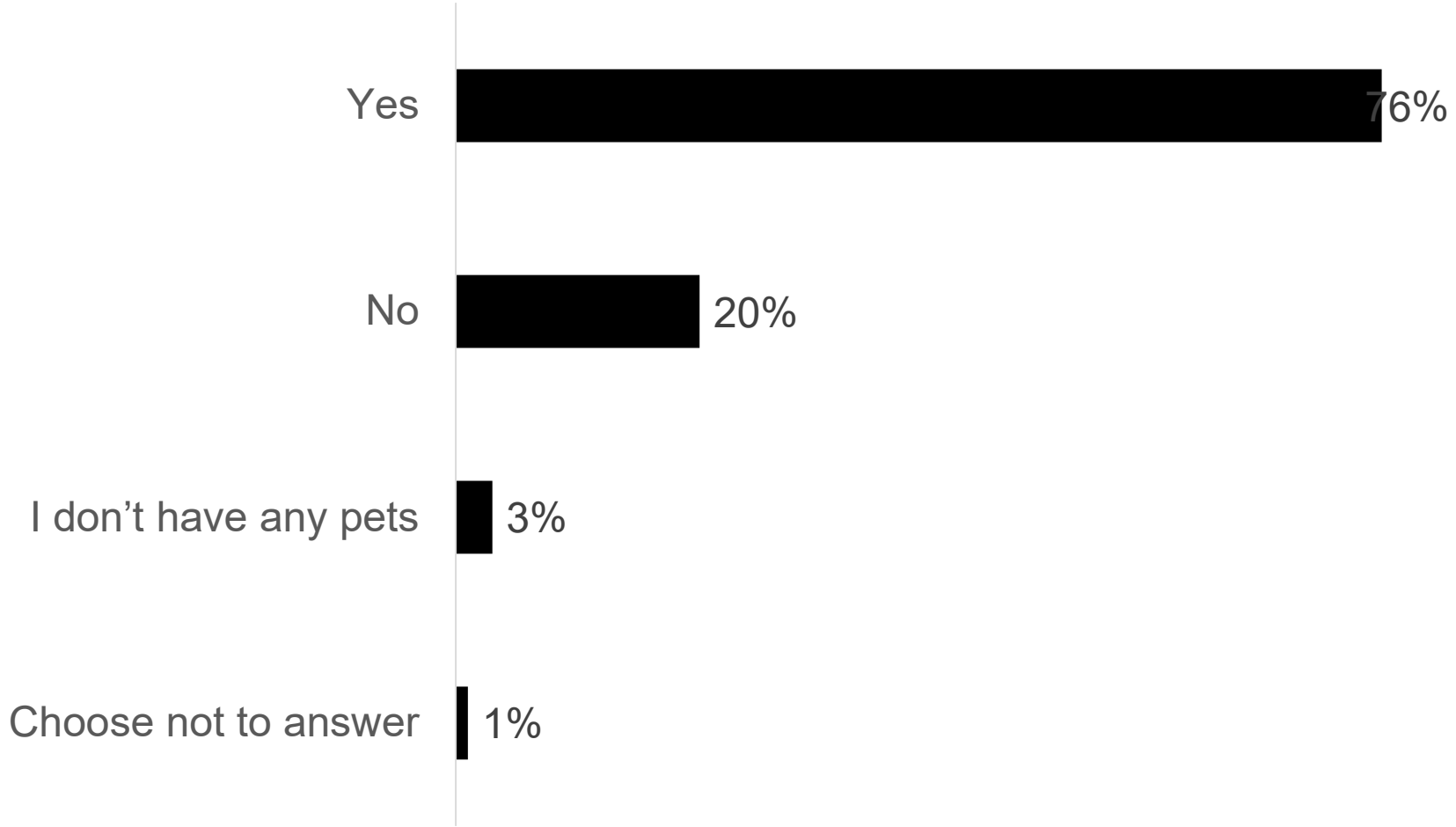
Q8. Which type of road would you mostly travel on? (N= 647)



Q9. If officials recommend using a particular evacuation route, would you use that route? (N= 649)



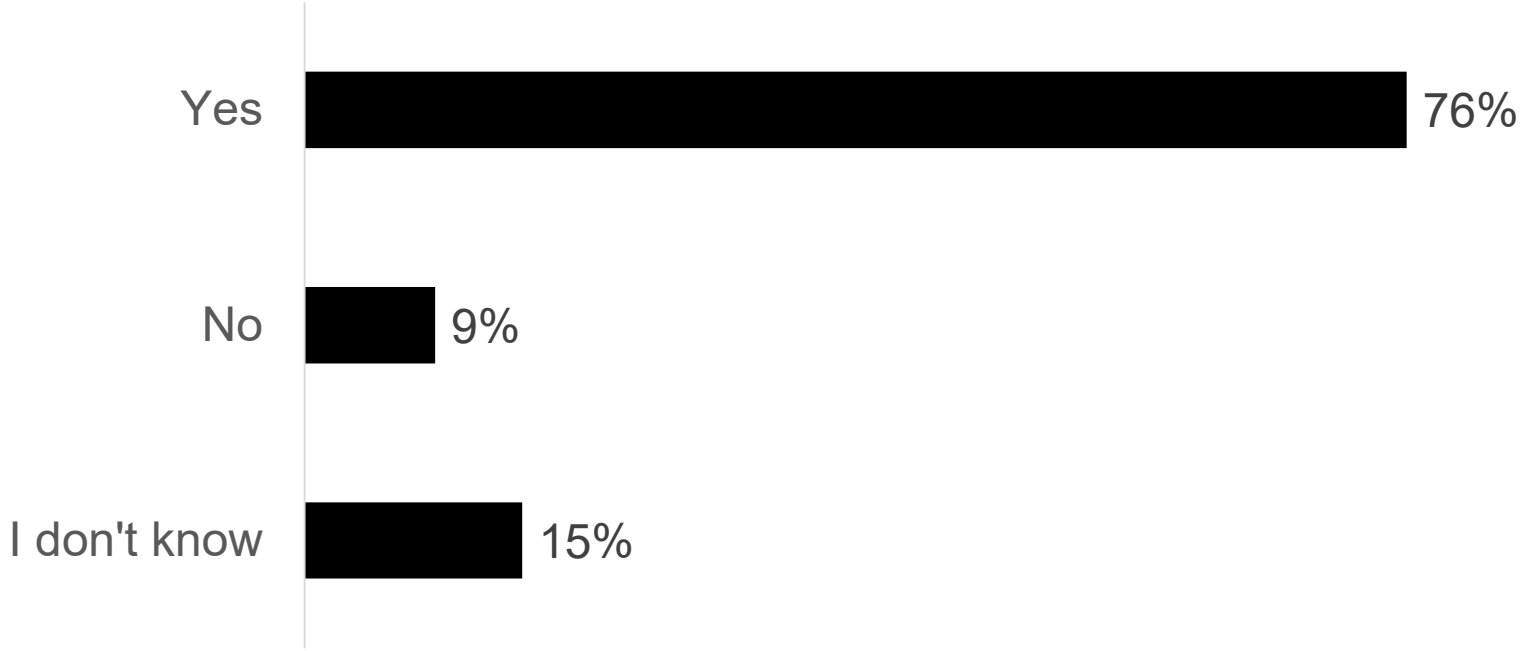
Q13. If you have any pets, will you take them with you if you evacuate? (N= 650)



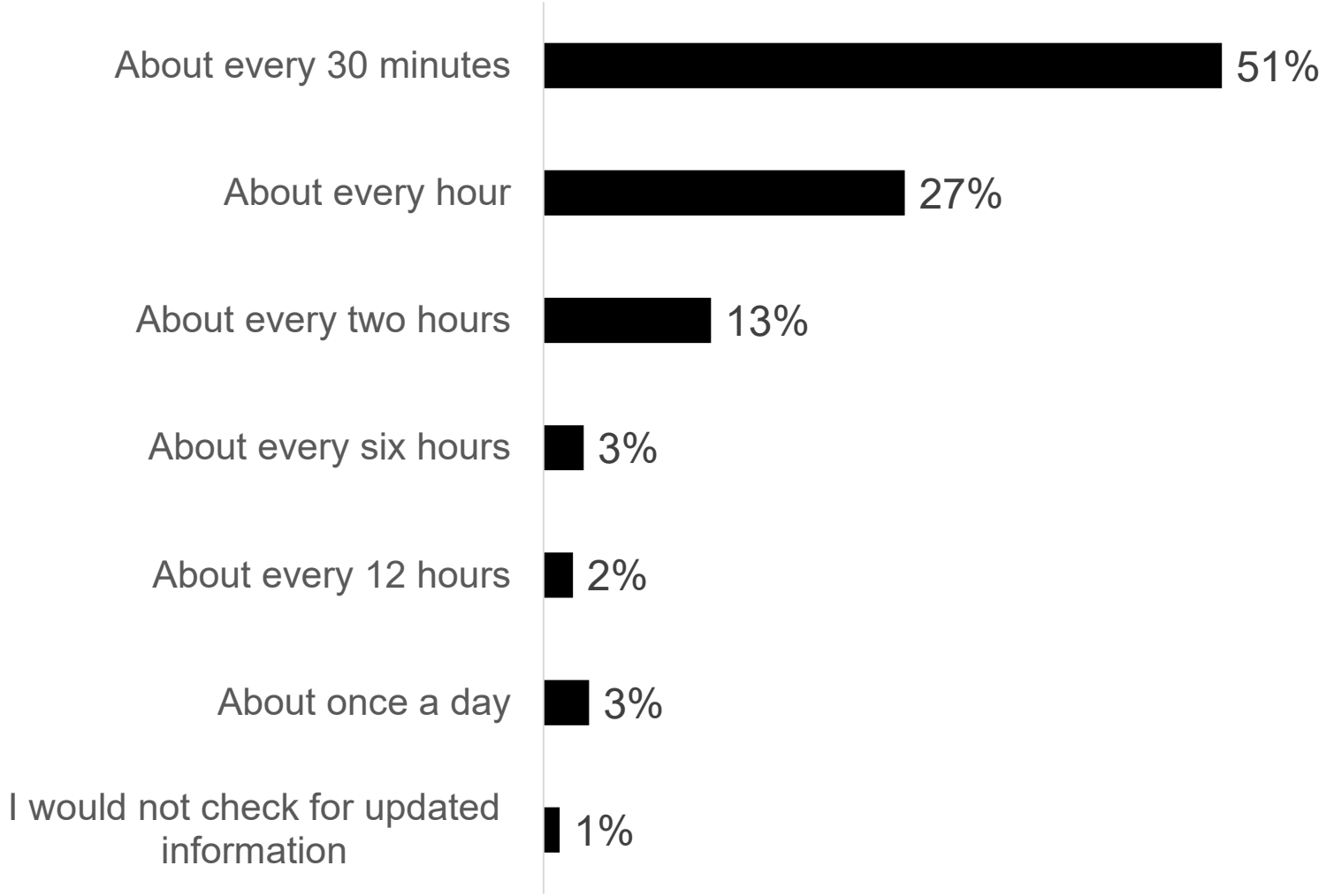
Earthquake Scenario

For the rest of the survey, we want you to imagine that a catastrophic earthquake of magnitude 8.0 has occurred in the New Madrid region. This region has experienced severe infrastructure damage with households losing access to basic utilities (power, internet, water, gas). A mandatory evacuation order has been given for your neighborhood. Please keep this scenario in mind as you answer the remaining questions.

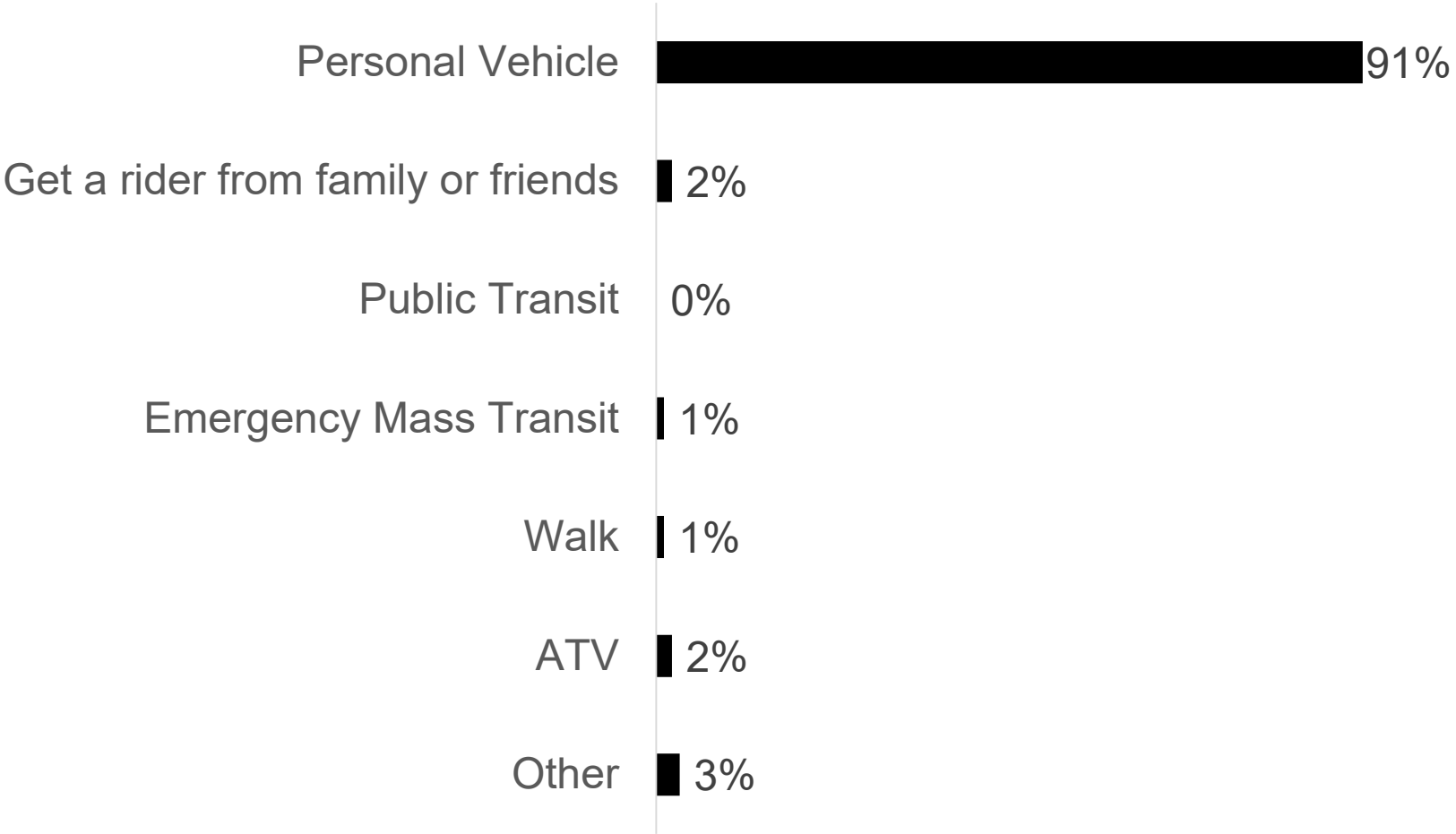
Q14. Given the scenario described above, would you evacuate? (N= 592)



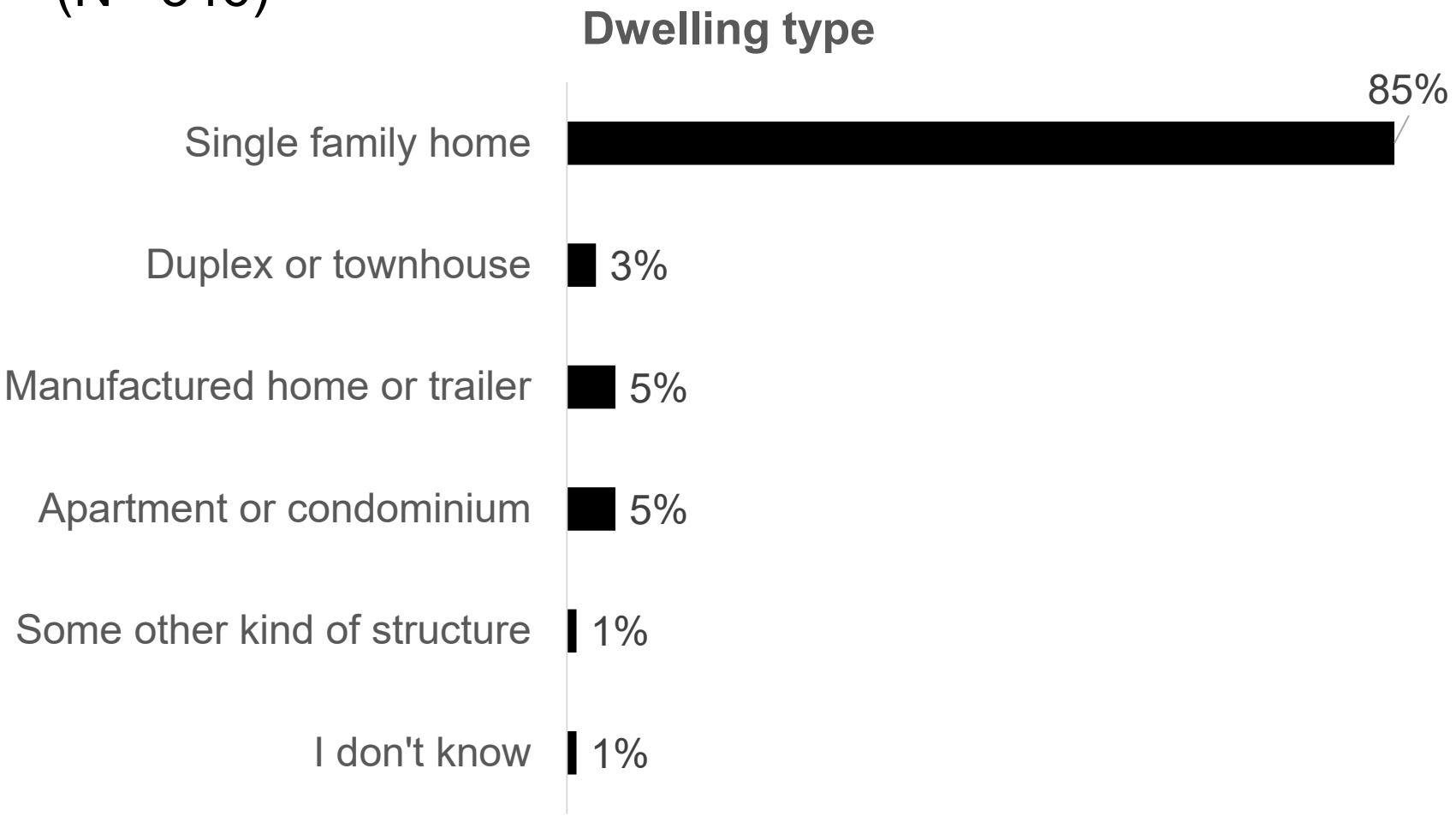
Q15. How frequently would you check for updated information on the earthquake and/or the evacuation? (N= 592)



Q16. Which of the following options would you be most likely to use to evacuate? (N= 586)



Q17. Which of the following best describes your home? (N= 546)



Q19. Where would you go? (N= 603)

Q20. What route would you take to get there? (N= 539)

Next Steps

- Analyze survey responses
- Build travel demand models using survey data and other public datasets (Census, ACS, BTS, etc)
- Generate demand between origin-destination pairs and assign it in simulation
- Generate evacuation performance measures

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