

Behavioral decision-making processes in tsunami evacuation following the Kamchatka Peninsula earthquake

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Even when people receive disaster alerts, many do not take sufficient actions to ensure their safety. This study aims to examine the decision-making process underlying evacuation behavior in response to the tsunami associated with the Kamchatka Peninsula earthquake in Russia in July 2025. By examining the actual evacuation behavior on the day and the underlying decision-making processes, this study seeks to contribute to the development of disaster literacy that can guide people toward appropriate actions in disaster situations.

We conducted a survey of residents in areas where a tsunami advisory and warning were issued following the Kamchatka Peninsula earthquake on July 30, 2025. Specifically, using information from a survey company's registered panel, we recruited adults aged 20 years or older who had been within 4 km of the coastline in the tsunami warning areas. The survey was administered between September 25 and October 2, 2025. The final analytical sample consisted of 1,155 respondents.

Table 2 presents the descriptive statistics of the demographics. With respect to disaster risk perception, 88% of respondents perceived that an earthquake disaster was likely to occur within the next 30 years, whereas only 36% perceived the same for a tsunami disaster, indicating substantial differences in risk evaluation between earthquakes and tsunamis (Figure 1). Regarding recognition of hazard maps, 79% reported awareness for earthquakes and 71% for tsunamis; although there was a small difference, no major discrepancy was observed (Figure 2).

During the tsunami advisory, 31% of respondents actively stayed where they were, and 23% evacuated to shelters or other locations. In contrast, 46% reported taking no action as an evacuation-related behavior (Figure 3). When reasons were compared across behavioral categories, a major reason common to all three behaviors was "I thought it was safer to stay where I was." Among those who actively stayed, many cited the absence of building damage as well as the availability of lifelines/utilities as reasons. Among those who evacuated, many cited the danger of the tsunami. Among those who took no action, many cited the absence of building damage and "I thought it would probably be fine this time."

During the tsunami warning, 41% actively stayed where they were, and 17% evacuated to shelters or other locations, whereas 41% reported taking no action (Figure 3). Compared with the tsunami advisory, the proportion of those who actively stayed increased ($\chi^2(2) = 34.726, p < .001$). Reasons for each behavioral category were largely similar to those during the advisory. Across all three behaviors, "I thought it was safer to stay where I was" remained a major reason. Among those who actively stayed, many cited the absence of building damage and the availability of lifelines/utilities. Among those who evacuated, many cited the danger of the tsunami. Among those who took no action, "I thought it would probably be fine this time" was frequently reported.

The results suggest that a certain proportion of people took no action even when the alert level shifted from a tsunami advisory to a tsunami warning. At the same time, some respondents selected "actively staying where they were" as a safety-related action in addition to evacuation. This may indicate that excessive evacuation to shelters was suppressed to some extent. A shared reason across taking no action, actively staying, and evacuating was the perception that the current location was safe. This suggests that a

status quo bias—justifying one’s current course of action—may have influenced behavioral choices. Moreover, those who took no action frequently cited “I thought it would probably be fine this time,” implying a strong role of optimistic bias in decision-making. In addition, although heatstroke was a major practical concern in this event, very few respondents cited concerns about heatstroke as a reason for their behavioral choices. This suggests that attention may not have been sufficiently directed to risk factors other than the tsunami itself. Unlike previous studies of evacuation behavior, we did not observe an association between others’ behavior and respondents’ evacuation choices. In the context of a far-field disaster, individual situation-based judgment may have played a stronger role. Therefore, the decision-making process underlying tsunami evacuation following the Kamchatka Peninsula earthquake was characterized by a tendency to favor maintaining the status quo rather than taking proactive action. Accordingly, the development of disaster literacy that reflects such decision-making processes will be required.

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