A study of risk perceptions in Tohoku, Japan after the 2011 and 2022 earthquakes and tsunamis

Kim-Anh Anastasia Chau
Supervisors: Prof Joanna Faure Walker & Prof Adam Harris
Institute for Risk and Disaster Reduction, UCL

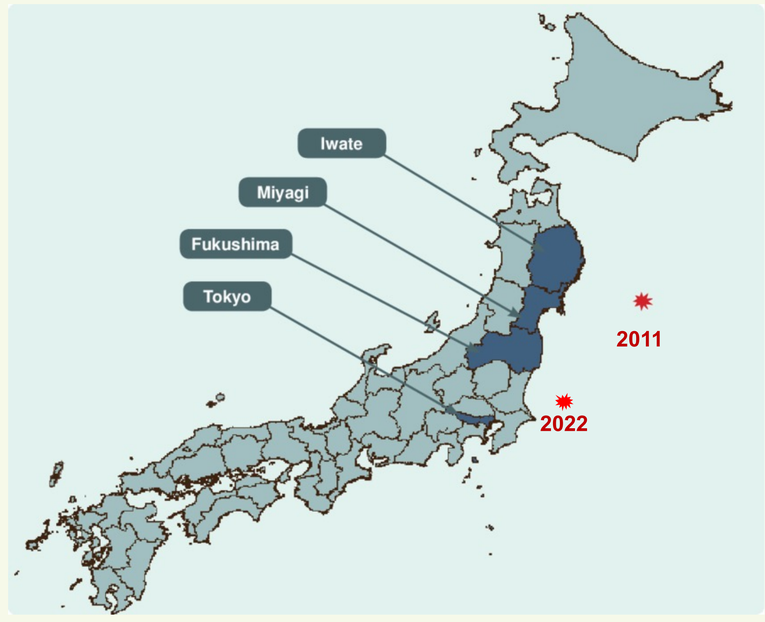
Background

- Prior experience of a hazard may increase risk perceptions, but it may depend on the **severity** of the event and **other individual factors** such as the nature of the hazard, trust, and socio-demographic factors (age, gender, race). Past research on the impact of false alarms on risk perceptions present nuanced findings.
- Eleven years after the **2011 Great East Japan Earthquake**, the magnitude 7.4 March **2022 Fukushima earthquake** struck off the northeast coast of Japan for which a tsunami advisory was issued but only a 30-cm tsunami was reported.

Objectives

This study explores the relationship between **past experiences with earthquakes and tsunamis** and **changes in feelings of safety.** Key research questions are:

1. Do people feel safer now than they did before the 2022 Fukushima earthquake?
2. Did people feel safer in 2022 than they did before the Great East Japan Earthquake?
3. Do changes in feelings of safety reflect enhanced protective measures?
4. Does experience of a catastrophic event alter a sense of safety and/or evacuation behaviour in the face of future events?



Areas under study and epicentres (in red) of the 2011 and 2022 earthquakes. Adapted from Ushizawa et al. (2013)

Methods

Exploratory stage

Focus group discussions
with community members and emergency management
n=15

Confirmatory stage

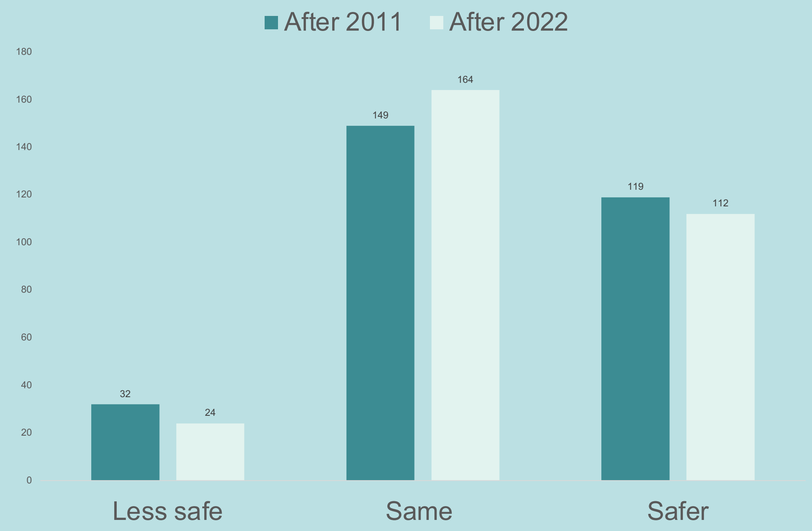
Survey
in 2023 using the online platform Rakuten
n=300

Analysis stage

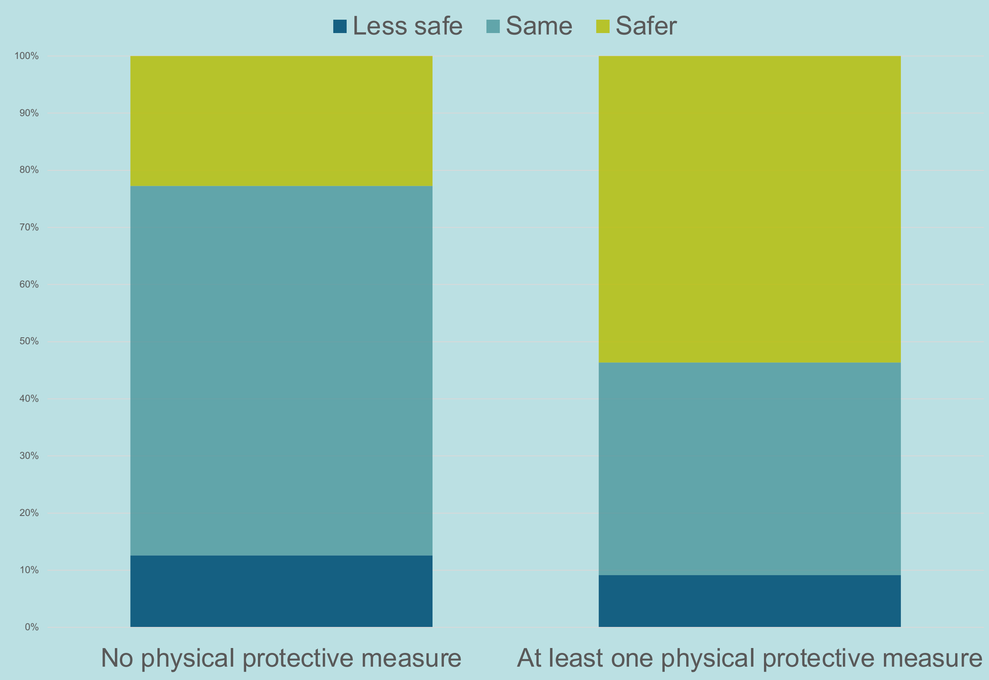
Quantitative and **qualitative** analysis

Results

- Contrary to expectations, respondents felt generally **the same** (2011: 49.7%, 2022: 54.7%) or **safer** (2011: 39.7%, 2022: 37.3%) after experiencing each event.
- Additional physical protective measures which have been added either after 2011 or 2022 (e.g. seawall) are not associated with changes in feelings of safety.
- But **moving to higher ground** or **living further away from the sea** appear to make feeling safer more likely.



Changes in feelings of safety between 2011 and 2022 and between 2022 and now.



Changes in feelings of safety between 2011 and 2022 without and with the addition of physical protective measures.

Respondents are **2.7** times more likely to feel safer in 2022 compared to 2011 when living further away from the sea and **3.7** times more likely when living on higher ground.

Discussion

- This study suggests that people may feel safer after a disaster if their physical exposure is decreased, i.e. by living further away from the sea or living on higher ground.
- Qualitative analysis suggests that people may feel safer if their experience indicates a lower personal risk based on the severity of the personal consequences of the 2011 and/or 2022 earthquakes and tsunamis.
- This study did not find evidence of a relationship between changes in feelings of safety and behaviour intentions.
- The 2011 disaster set a precedent in many ways, radically changing the participants' response to earthquakes and tsunamis, both in terms of mental preparedness and in terms of preparation actions.

References
Lechowska, E. (2018). What determines flood risk perception? A review of factors of flood risk perception and relations between its basic elements. Natural Hazards, 94(3), 1341-1366.
Lindell, M. K., & Hwang, S. N. (2008). Households' perceived personal risk and responses in a multihazard environment. Risk Anal, 28(2), 539-556.
Sorensen, J. H. (2000). Hazard Warning Systems: Review of 20 Years of Progress. Natural Hazards Review, 1(2), 119-125.
Wachinger, G., Renn, O., Begg, C., & Kuhlicke, C. (2013). The risk perception paradox--implications for governance and communication of natural hazards. Risk Anal, 33(6), 1049-1065.

Contact: kim-anh.chau.21@ucl.ac.uk
Linkedin: Anastasia Chau
Twitter/X: @KAnastasiaChau

INSTITUTE FOR RISK & DISASTER REDUCTION