Preparedness Stakeholder Perception of Near-Earth Object Risk: A Doctoral Research Design

Lisa Wier and Tony McAleavy

Fire and Emergency Management Administration, Oklahoma State University, Stillwater, OK, USA

lisa.wier@okstate.edu

FIRE AND EMERGENCY MANAGEMENT ADMINISTRATION
College of Engineering, Architecture and Technology

Introduction

Near-Earth objects (NEOs) are low probability-high consequence hazards with potentially catastrophic extinction-level impacts. The 2013 Chelyabinsk airburst, asteroid 2024 YR_4, and recent technological advancements such as the Double Asteroid Redirect Test have stressed the criticality of planetary defense. There is, however, limited research that addresses perception of NEO impact risk among the public and prominent stakeholders. Consequently, preparedness initiatives are based on differing understanding of the risks faced which compromises response efficacy. Preparedness begins at the local level. Smaller asteroids, which are much more common than catastrophic larger ones, have the capacity to overwhelm community lifelines, infrastructure, and local capabilities. However, their inclusion within emergency management research and local policy remains limited.

How do the general public, emergency managers, and asteroid subject-matter expert/scientific community perceive the risk of a NEO impact?

Looking for Participants!

How do we understand asteroid impact risk…
and are we ready for it? I'm looking for **emergency managers** and **asteroid subject-matter experts** to share their insights in a short virtual interview. Your perspective will help strengthen risk communication and preparedness for this rare but high-impact hazard.

Interviews begin spring 2027. Scan the QR code for details and to sign up. I'd love to hear from you! Thank you!

Research Applications

- Improve risk communication strategies by identifying gaps between public, emergency managers, and experts to develop clearer, evidence-based messaging about asteroid threats and uncertainty.
- Inform emergency management planning by integrating NEO hazards into local and state emergency plans and addressing a currently underrepresented risk.
- Guide policy and interagency coordination by providing insight for aligning planetary defense initiatives with emergency management frameworks to enhance preparedness and response capabilities.

Selected References

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Methodology

NEO SUBJECT-MATTER EXPERTS

Semi-structured interviews

EMERGENCY MANAGERS

Semi-structured interviews

GENERAL PUBLIC

Web-based self-completed questionnaires

This dissertation will utilize an exploratory sequential mixed methods research design informed by a **mental models research approach**, **critical realism**, an **abductive** system of logic, **semi-structured interviews**, an **online questionnaire**, **descriptive and inferential statistics**, and **content analysis**.

1. Local, state, tribal, and federal-level **emergency managers** in the United States will be purposive and snowball sampled for **semi-structured qualitative interviews** pertaining to their knowledge, understanding and risk perception of likely NEO impacts on their jurisdiction.
2. **Scientists, researchers, and professionals with expertise in NEO impacts** and planetary defense at various agencies will be purposive and snowball sampled for **semi-structured interviews** about their risk perception about NEO impacts, future generational threats for global catastrophe, current understanding of public risk perception, and areas for improvement in public communication.
3. **Members of the public** will be convenience, purposive, and snowball sampled to participate in a **web-based self-completed questionnaire**. This will focus on their perception of asteroid impacts broadly and to examine specific issues that may arise from the findings of the interviews.

The interviews will be analyzed using qualitative content analysis to identify questions and constructs to inform the questionnaire. The quantitative analysis will serve two purposes: to evaluate the validity of the survey measurement, and to describe and analyze the public perceptions of NEO risk. The results will inform influence diagrams to visually represent how people process new information and identify recommendations for risk communication practices.