Assess Earthquake Damage & Loss susceptibility of Buildings and Compare with Social Vulnerability Indicators – A Study on Earthquake Hazard in Turkey

February 6, 2023, the countries of Turkey and Syria were rocked by a massive 7.8 magnitude earthquake. Both countries experienced extreme damage and, as of late-February 2023, the death toll has exceeded 45,000 people (with this number expected to increase). This disaster reminds us, even in the modern age, catastrophic disasters are possible and pose challenges to mitigation, preparedness, response, and recovery. As our world continues to grow in complexity, more advanced tools are needed to model and understand vulnerability from natural hazards. Increased knowledge of earthquake potential and the composition of exposed communities may help scientists, policymakers, and practitioners better allocate funds, resources, and time to decrease future hazard impacts.

In this study, researchers will utilize advanced modeling tools, software, and Turkey census data to model earthquake impacts and cross-compare the results against social vulnerability indicators. Tools employed by the research team will include the NHERI SimCenter Building Recognition using AI at Large-Scale (BRAILS) (for developing a regional inventory), the USGS Shakemap, and the Regional Resilience Determination (R2D) tool.

The research team will construct fragility curves (or employ Hazus earthquake data) for the chosen jurisdictions of interest in Turkey. The study will also, for comparison, examine structure performance and estimate failure probability in another region of Turkey susceptible to a similar disaster. Finally, the study will identify social vulnerability indicators and contribute to a social vulnerability index for Turkey, helping scholars and practitioners better articulate the unequal impacts of disasters. A multi-disciplinary study with perspectives from an intellectually diverse team, the study has the potential to contribute to several fields and has broader impacts on practitioner communities.