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Development of fragility functions to estimate homelessness after an earthquake

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Immediately after an earthquake, many stakeholders need to make decisions about their response. These decisions often need to be made in a data poor environment as accurate information on the impact can take months or even years to be collected and publicized. Social fragility functions have been developed and applied to provide an estimate of the impact in terms of building damage, deaths and injuries in near real time. These rough estimates can help governments and response agencies determine what aid may be required which can improve their emergency response and facilitate planning for longer term response.

Due to building damage, lifeline outages, fear of aftershocks, or other causes, people may become displaced or homeless after an earthquake. Especially in cold and dangerous locations, the rapid provision of safe emergency shelter can be a lifesaving necessity. However, immediately after an event there is little information available about the number of homeless, their locations and whether they require public shelter to aid the response agencies in decision making.

In this research, we analyze homelessness after historic earthquakes using the CATDAT Damaging Earthquakes Database. CATDAT includes information on the hazard as well as the physical and social impact of over 7200 damaging earthquakes from 1900-2013 (Daniell et al. 2011). We explore the relationship of both earthquake characteristics and area characteristics with homelessness after the earthquake. We consider modelled variables such as population density, HDI, year, measures of ground motion intensity developed in Daniell (2014) over the time period from 1900-2013 as well as temperature.

Using a base methodology based on that used for PAGER fatality fragility curves developed by Jaiswal and Wald (2010), but using regression through time using the socioeconomic parameters developed in Daniell et al. (2012) for "socioeconomic fragility functions", we develop a set of fragility curves that can be used to estimate homelessness as a function of information that is readily available immediately after an earthquake.

These fragility functions could be used by relief agencies and governments to provide an initial assessment of the need for allocation of emergency shelter immediately after an earthquake.

Daniell JE (2014) The development of socio-economic fragility functions for use in worldwide rapid earthquake loss estimation procedures, Ph.D. Thesis (in publishing), Karlsruhe, Germany.

Daniell, J. E., Khazai, B., Wenzel, F., & Vervaeck, A. (2011). The CATDAT damaging earthquakes database. Natural Hazards and Earth System Science, 11(8), 2235–2251. doi:10.5194/nhess-11-2235-2011

Daniell, J.E., Wenzel, F. and Vervaeck, A. (2012). "The Normalisation of socio-economic losses from historic worldwide earthquakes from 1900 to 2012", 15th WCEE, Lisbon, Portugal, Paper No. 2027.

Jaiswal, K., & Wald, D. (2010). An Empirical Model for Global Earthquake Fatality Estimation. Earthquake Spectra, 26(4), 1017–1037. doi:10.1193/1.3480331