

The global role of natural disaster fatalities in decision-making: statistics, trends and analysis from 116 years of disaster data compared to fatality rates from other causes

James Daniell (1,2,3), Friedemann Wenzel (1,2), Amy McLennan (3,4), Katherine Daniell (3,5), Tina Kunz-Plapp (1,2,6), Bijan Khazai (1,2), Andreas Schaefer (1,2), Michael Kunz (1,6), Trevor Girard (1,2)

(1) Center for Disaster Management and Risk Reduction Technology, Karlsruhe Institute of Technology, Karlsruhe, Germany (j.e.daniell@gmail.com), (2) Geophysical Institute, Karlsruhe Institute of Technology, Karlsruhe, Germany., (3) General Sir John Monash Scholar, The General Sir John Monash Foundation, Melbourne, Australia., (4) School of Anthropology, University of Oxford, Oxford, UK., (5) HC Coombs Policy Forum & Centre for Policy Innovation, The Australian National University, Canberra, Australia., (6) Institute of Meteorology and Climate Research, Karlsruhe Institute of Technology, Karlsruhe, Germany.

In this study, analysis is undertaken showing disaster fatalities trends from around the world using the CATDAT Natural Disaster and Socioeconomic Indicator databases from 1900-2015.

Earthquakes have caused over 2.3 million fatalities since 1900; however absolute numbers of deaths caused by them have remained rather constant over time. However, floods have caused somewhere between 1.7 and 5.4 million fatalities, mostly in the earlier half of the 20th century (depending on the 1931 China floods). Storm and storm surges (ca. 1.3 million fatalities), on the other hand, have shown an opposite trend with increasing fatalities over the century (or a lack of records in the early 1900s).

Earthquakes due to their sporadic nature, do not inspire investment pre-disaster. When looking at the investment in flood control vs. earthquakes, there is a marked difference in the total investment, which has resulted in a much larger reduction in fatalities. However, a key consideration for decision-makers in different countries around the world when choosing to implement disaster sensitive design is the risk of a natural disaster death, compared to other types of deaths in their country.

The creation of empirical annualised ratios of earthquake, flood and storm fatalities from the year 1900 onwards vs. other methods of fatalities (cancer, diseases, accidents etc.) for each country using the CATDAT damaging natural disasters database is undertaken. On an annualised level, very few countries show earthquakes and other disaster types to be one of the highest probability methods for death. However, in particular years with large events, annual rates can easily exceed the total death count for a particular country. An example of this is Haiti, with the equivalent earthquake death rate in 2010 exceeding the total all-cause death rate in the country.

Globally, fatality rates due to disasters are generally at least 1 order of magnitude lower than other causes such as heart disease. However, in some locations in countries such as Armenia, Turkmenistan, Peru and Guatemala, the annual probability of being killed in an earthquake is as high as that of being killed due to heart disease. In this study, around 50 countries have been shown to have at least one single event year for earthquake exceeding that of all traffic fatalities, and 15 countries higher than the equivalent total death rate of the country. China has shown very high death rates due to flood, however, with from 1900-2015, this rate has reduced significantly. Floods are generally an order of magnitude less than traffic accidents measured in micromorts likely due to improved flood risk reduction. However, recent events in Philippines and Myanmar show mortality reduction due to storm surge and cyclones still require much effort.

The role of life safety is increasing with risk-based disaster resistant codes becoming more commonplace globally. An examination of government funding around the world shows the correlation between retrofitting investment and disaster fatality reduction. New methods of presenting disaster statistics for political use have been used to present the information upon which such decisions are made.