



## **Are fatality potentials of natural disasters increasing? Examining how natural and human factors affect societal vulnerability.**

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Natural disasters result from an interplay between natural processes that produce the physical conditions for a disaster and the social, political and economic factors that determine the risk, resilience and vulnerability of a population. Estimating the contribution of socio-economic factors to natural disaster risk is difficult, and this difficulty may lead to underestimation of their significance. We believe it is crucial to better characterise these factors in order to assess and improve the disaster mitigation and response strategies in place.

This study probes natural disaster data to identify and explain trends in the frequency of disasters and explore how the relationship between natural and human factors is reflected in these statistics. Analysis of the fatality data from the earthquake, flood and storm list, obtained from the Emergency Events Database (EM-DAT), shows an increase in the number of flood and storm disasters with time. It also showed a small increase in the number of earthquake disasters. For floods and storms, the analysis also showed an increase in low-fatality disasters and a decrease in high fatality disasters with time. Low-income countries were seen to be most affected by floods, while the high-income countries were most affected by storms. As expected, high-income countries saw fewer disasters and fatalities compared to low-income countries. Earthquakes were seen to have killed more people with fewer events compared to floods and storms. Fatality data from Europe revealed similar observations to those from the global data.

The jump in the frequency of flood and storm disasters can be ascribed to climate change, however we suggest that social factors such as urbanisation, rapid population growth and growing income inequality have also contributed to this effect, especially in poorer countries. We attribute the decrease in the number of high fatality events to better early warning and mitigation strategies and improved resilience of structures in place. This effect is more pronounced in high-income countries and can be credited to the success of their policies and mitigation strategies. These policies also may transform high-fatality disasters into low-fatality disasters, perhaps partially explaining the increase in the low-fatality disasters. We also show that earthquakes are more likely to cause a high fatality disaster compared to floods and storms for all countries, and reviews of seismic risk maps and current mitigation strategies are therefore overdue. Analysis of European disasters shows that Europe is well equipped for flood and storm events, and relatively less well-equipped for earthquakes.

These results demonstrate that while the number of disasters is on the rise, there seems to be a change in the morphology of the disaster, with an increasing number of low-fatality disasters. While climate change is one of the key factors responsible, the effects of social changes must not be overlooked.