

## Natural hazard fatalities in Switzerland from 1946 to 2015

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Switzerland, located in the middle of the Alps, is prone to several different natural hazards which regularly cause fatalities. To explore temporal trends as well as demographic and spatial patterns in the number of natural hazard fatalities, a database comprising all natural hazard events causing fatalities was compiled for the years 1946 until 2015. The new database includes avalanche, flood, lightning, windstorm, landslide, debris flow, rockfall, earthquake and ice avalanche processes. Two existing databases were incorporated and the resulting dataset extended by a comprehensive newspaper search. In total the database contains 635 natural hazard events causing 1023 fatalities. The database does not include victims which exposed themselves to an important danger on purpose (e.g. high risk sports).

The most common causes of death were snow avalanches (37 %), followed by lightning (16 %), floods (12 %), windstorms (10 %), rockfall (8 %), landslides (7 %) and other processes (9 %). Around 14.6 fatalities occurred on average each year. A distinct decrease of natural hazard fatalities could be shown over the last 70 years, which was mostly due to the decline in the number of avalanche and lightning fatalities. Thus, nearly three times as many people were killed by natural hazard processes from 1946 to 1980 than from 1981 to 2015. Normalisation of fatality data by population resulted in a clearly declining annual crude mortality rate: 3.9 deaths per million persons for the first 35 years and 1.1 deaths per million persons for the second 35 years of the study period. The average age of the victims was approximately 36 years and about 75% were males. Most people were killed in summer (JJA, 42%) and winter (DJF, 32 %). Furthermore, almost two-thirds of the fatalities took place in the afternoon and evening. The spatial distribution of the natural hazard fatalities over Switzerland was quite homogeneous. However, mountainous parts of the country (Prealps, Alps) were somewhat more prone to fatal events compared to the Swiss Plateau and the Jura.

It appears that the overall natural hazard mortality rate in Switzerland over the past 70 years has been relatively low in comparison to rates in other countries or rates of other types of fatal accidents in Switzerland. Nevertheless, the collected data provides a valuable base for analysis and helps authorities to better identify higher risk demographic groups and regions, and accordingly target these to reduce the number of victims.