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The role of victim's behavior and surrounding environment in the vulnerability of individuals in flood fatality incidents. Findings from Greece

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Despite the recent advances in technology and infrastructure, extreme flood events continue to induce a significant number of fatalities across the globe, hurting particularly flash flood-prone and other vulnerable communities. The vulnerability of individuals to flooding has been studied in numerous previous works that examine various demographic and situational factors and their relation to the risk that floodwaters pose to individuals or more broadly, their association with flood mortality.

In an effort to provide a better understanding of how flood fatalities occur and how we can prevent them, this work focuses on the influence of the surrounding environment and victims' behaviour during fatal incidents. The study exploits a database of flood fatalities for Greece (1960-2019) and examines statistical correlations between different elements, including the victims' age and gender, their activity, the immediate surroundings and the environment that the incidents occur, as well as victims' behaviour on the basis of their actions.

With respect to the surrounding environment, results indicate that particular characteristics of fatalities differ considerably depending on the setting. Outdoor, vehicle-related deaths are more abundant in rural settings, in which victims show mostly an active (risk-taking) behaviour towards floodwaters. Urban environments are characterized by larger numbers of indoor deaths (especially for the elderly) and a wider diversity of victim activities. Overall, analysis indicates that dangerous situations tend to develop differently between urban and rural settings.

With regard to victim behaviour, analysis of the database shows a great diversity of motivations behind their actions at the time of fatal incidents. A study of these motivations indicates that an overwhelming majority of flood victims come in contact with floodwaters deliberately, while they are in an initial position of safety. On the contrary, a smaller percentage of victims (close to one quarter) exhibits behaviours that can be characterized as passive, such as getting trapped inside buildings or being unable to flee danger, highlighting a population with particular vulnerability characteristics. Furthermore, victim behaviour was found to be strongly connected to victim demographics and surroundings, to an extent that it can be predicted with a high degree of certainty (i.e. close to 90%) by means of a statistical model.

The analysis provides insights useful to further understand the vulnerability of the population to flooding, in terms of how dangerous situations develop. The findings can be exploited in shaping policy and education programs that aim to mitigate risk of fatal incidents to specific population groups (e.g. vehicle-occupants, individuals with mobility impairment). Through better-targeted initiatives, these insights have the potential to enhance the overall resilience of communities, especially in flood-prone areas.