Conclusions

People are the most important element to protect from disaster. This chapter assessed the impact of natural and human-made disasters on population in all its facets, from the individual to society as a whole. The chapter covered case studies at various spatio-temporal scales. There is the slow-onset, long-duration example of the heatwave in Europe in 2003, which affected many countries for a rather long time. At the other extreme, there is the impact of rather local events such as the fire in the Grenfell Tower (United Kingdom) in 2017 or the toxic cloud in Zevekote (Belgium) in 2017. In terms of hazards with fast onset and short duration, there is the analysis of the earthquakes in Van (Turkey) in 2007 and a number of earthquakes in central Italy.

The spatio-temporal dimensions of onset, intensity and duration are central points when analysing the impact of disasters. The most obvious impacts (and the most reported and discussed) are the direct impacts causing death, injury or loss of livelihood. They affect the individual strongly. The indirect losses are related to changes in everyday life due to loss of homes and/or jobs, or even health deterioration through environmental effects such as contamination of air, water, soil and food. Indirect losses affect individuals and their habitat, but they may also influence the functioning of entire societies. Finally, the intangible impacts reduce the quality of life by psychological stress caused by the disaster, such as losses or temporary evacuation or relocation. The intangible impact is often neglected, in particular the long-term effects such as post-traumatic stress disorders.

Populations are not equally vulnerable to any specific hazard. Individual capacities and behaviour influence a person's vulnerability to a particular hazard. While the direct physical vulnerability of the individual to death, injury or homelessness is well understood (for example through physical building vulnerability studies), indirect social vulnerability is often overlooked. At the community level, socioeconomic aspects such as age, income and formal education can indicate the social vulnerability of specific groups. Socioeconomic inequalities can lead to very different vulnerability and resilience patterns, which calls for better incorporation of socioeconomic aspects in vulnerability assessments and research.

A common feature from the analysis of the case studies is that the population (individual citizens, policymakers, society as a whole) is often unaware of disaster risk reduction and prevention measures. Policymakers should invest in risk knowledge and awareness creation as well as in self-protection. This could be achieved by systematically including personal safety and disaster prevention in education curricula.

Although a lot of information is already available for the prediction, assessment and possible mitigation of the effects of hazardous events relating to population, researchers should exploit the increasing data available to investigate the still existing gaps, trying to get the full picture and develop tools for informed decision-making. At the same time, policymakers should create legislation to

support systematic data collection on all human impacts of disasters over a longer period, beyond death and physical injury, including the location, the demography of the affected population and temporal descriptors of the event. Specific attention should be given to the indirect impacts such as long-term effects on people exposed (including emergency responders), with a focus on psychological trauma and mental health.

The wealth of information provided by new data sources such as social media, mobile phone data or Earth observation should be used by scientists to improve the modelling of human exposure and vulnerabilities, addressing individual, social and locational factors. For example, Earth observations can inform decisions and actions for the benefit of humankind. The new satellites available as well as the development of ground- and drone-based sensors has resulted in a noticeable increase in the use of these techniques for assessing the potential impact of natural hazards. Initiatives such as the Group on Earth Observation also contribute to this exploitation, aiming to develop a new generation of measurements and spatial statistics in support of post-2015 international processes on sustainable and urban development, climate change and disaster risk reduction.

Horizon Europe (the EU's research and innovation framework programme for 2021–2027) will incorporate research and innovation missions to increase the effectiveness of funding by pursuing clearly defined targets.