

Approaches to ‘vulnerability’ in eight European disaster management systems

Kati Orru, Sten Hansson, Friedrich Gabel, Piia Tammpuu, Marco Krüger, Lucia Savadori, Sunniva Frislid Meyer, Sten Torpan, Pirjo Jukarainen, Abriel Schieffeler, Gabriella Lovasz, and Mark Rhinard¹

While social vulnerability in the face of disasters has received increasing academic attention, relatively little is known about the extent to which that knowledge is reflected in practice by institutions involved in disaster management. This study charts the practitioners’ approaches to disaster vulnerability in eight European countries: Belgium; Estonia; Finland; Germany; Hungary; Italy; Norway; and Sweden. It draws on a comparative document analysis and 95 interviews with disaster managers and reveals significant differences across countries in terms of the ontology of vulnerability, its sources, reduction strategies, and the allocation of related duties. To advance the debate and provide conceptual clarity, we put forward a heuristic model to facilitate different understandings of vulnerability along the dimensions of human agency and technological structures as well as social support through private relations and state actors. This could guide risk analysis of and planning for major hazards and could be adapted further to particular types of disasters.

Keywords: cross-cultural analysis, disaster management, practitioner, vulnerability, vulnerability assessment

Introduction

The question of what makes societies and individuals susceptible to extreme events and their consequences is a primary focus of disaster studies (Wisner et al., 2004; Tierney, 2019; Williams and Webb, 2021). Research on the abilities of individuals, societal groups, or whole societies to access adequate resources to deal with external stressors is framed within the concept of ‘social vulnerability’ (Wisner et al., 2004; UN, 2015). To what degree vulnerability is attributed to individuals, objects, or societies—and what can be done to alleviate vulnerability—depends to a large degree on official understandings of the concept of vulnerability. Definitions not only determine the factors that are believed to influence the coping capacity of the respective referent object (for instance, individual and social conditions such as age, disability, gender, or socioeconomic status; or rather, structural and societal conditions), but they also include ontological considerations of the nature of vulnerability: is vulnerability judged a static characteristic of specific social groups, or rather, a dynamic condition that might apply to anyone at a given point in time, during a given event? How vulnerability is defined shapes the way it is addressed in policies on and the practice of disaster preparedness and response. In some areas, such as climate change–

related risks, social vulnerabilities are addressed in a risk assessment (IPCC, 2014) and adaptation planning (Grafakos et al., 2020). The COVID-19 pandemic revealed widespread difficulties in anticipating and responding to complex vulnerabilities (UN, 2020; WHO, 2020). The heterogeneity of approaches in tackling vulnerability not only holds true for different crises, but equally for different countries and at times even different institutions within countries. Coming to grips with this heterogeneity requires a comprehensive, cross-country comparison of how vulnerability is defined and translated into action by the institutions involved in disaster management in order to enhance our understanding of how it is politically understood and processed. Yet, such a comparative study is so far missing in the literature.

To address this research gap, this paper looks at how vulnerability has been defined and used in the disaster management systems of eight European countries: Belgium; Estonia; Finland; Germany; Hungary; Italy; Norway; and Sweden. First, we review how the concept of vulnerability is presented and defined in institutional systems of different European countries with varying historical and socioeconomic backgrounds. Second, we identify the distinct ways in which responding to vulnerability has been organised by those systems.

Our comparative study follows a joint research protocol for document analysis and expert interviews in case study countries in the period from September 2019 to February 2020. Data for the document analysis included legal acts and regulatory texts, official policies/strategies, reports produced by thinktanks, research institutions, and non-governmental organisations (NGOs), and news media reports. We identified key official documents in each country on disaster management and scrutinised them for (i) representations of vulnerability, (ii) sources of vulnerability, and (iii) approaches to mitigating vulnerability. To complement the data gathered via desk research, the same analytical themes were investigated through 95 semi-structured interviews conducted with public officials working for national government bodies tasked with disaster management as well as representatives of NGOs involved in disaster management (see Table A1 in the Appendix). Interviewees were selected based on document analysis and by applying the 'snowballing' technique whereby informants guided researchers to other relevant informants (Brace-Govan, 2004). Our research team used a prevalent research strategy in similar cross-national studies (Chapple and Ziebland, 2018), namely a joint, preliminary analysis of interviews and documents that started with compiling case studies built around a brief sheet of answers to thematic questions and a longer more detailed country study narrative. We then applied qualitative thematic content analysis (Nowell et al., 2017) to the country case studies to identify major commonalities and differences in the ways in which vulnerabilities are defined and treated within different disaster management systems.

The picture we produced is messy, revealing the use of varying, competing, and fuzzy definitions of vulnerability, sometimes even within the same institution. While this fuzziness complicates the study of vulnerability, it also mirrors the current state of its political negotiation. Quarantelli (1987) has argued convincingly that, when

it comes to defining ‘disaster’, for example, scholars must make assumptions clear, and thus debatable. Such a step is an important one in improving disaster risk reduction—to some extent maybe even more important than forcing a shared understanding. This argument is equally relevant to vulnerability as well. Our study provides useful comparative snapshots of these assumptions, allowing us to reflect on the advantages and pitfalls of the different understandings of vulnerability that are present in academia and practice.

We begin by reviewing the existing research on vulnerability to identify central conceptual debates. We then present the results of our study, showing how vulnerability is understood and addressed in different countries. We conclude by summarising the analysis and discussing the merits of different official approaches to vulnerability.

Readings of vulnerability in the academic debate

The academic literature on vulnerability is wide and diverse, but we can discern five key debates regarding the concept. The first one concerns *who or what is vulnerable*. Throughout the history of disaster research, the matter of who or what is considered ‘vulnerable’ has been highly contested. The concept of vulnerability differs among academic disciplines owing to their focus on different aspects of risk, such as household responses to risk or welfare outcomes (Paul, 2014). This diversity stretches from geographical referent objects, such as concrete locations (villages, city quarters, or rural areas, for instance), and technical referent objects, such as infrastructure (buildings or industry, for example), to societal referents, such as organisations (relief organisations or social support organisations, for instance) and individuals (elderly or persons with disabilities, for example), to even situations that render the respective referent objects vulnerable (living conditions and situations of distress, for instance).

Defining the referent object of vulnerability is important, since it determines how vulnerability, as a phenomenon, is approached (UNDRO, 1976; Wisner et al., 2004; McEntire, 2005; Anonymous, 2006). While geographical location can determine the level of exposure and the functioning of infrastructure may shape susceptibility to harm, the vulnerability analysis of societal entities—and even more the socio-technical entanglements—requires a more sophisticated, and somewhat more contested, approach. Looking at how the referent object(s) of vulnerability are officially treated can thus help to understand gaps in support, as well as trends in the perception and consideration of vulnerabilities of individuals and groups (Anonymous, 2006).

Similarly, *the ontological basis of vulnerability* is contested. This terminology refers to the following question: is vulnerability a property of an entity or is it a condition, which applies because of a specific situation? Or in other words, is being vulnerable something static that cannot be changed or is it dynamic? Both approaches can be found in contemporary disaster management, often associated with the narratives of ‘vulnerable groups’ and ‘vulnerable situations’.

The ‘vulnerable groups’ narrative is broadly employed in research and practice. Here vulnerability is frequently cast as a characteristic attribute of certain societal

groups due to their specific conditions (Sparf, 2016; Tierney, 2019). According to this view, groups such as disabled persons or those living in poverty are considered to be vulnerable and tend to be seen as such not only during specific events but in general; vulnerability becomes static. Although this view is supported by recent crises and events that demonstrate that it is often similar individuals who can be thought of as vulnerable (such as children, the elderly, persons with disabilities, and the socio-economically disadvantaged), there are also strong arguments against taking such an approach (Gabel, 2019). Not only do these findings not hold true for all members of these groups—they are also rather quite heterogenic in their requirements and need for assistance—but also those who are often not considered to be vulnerable might become so due to particular situations in which they find themselves, framing vulnerability as a characteristic that affects everyone in a certain way. Other authors argue against such an essentialist understanding of vulnerability, describing it as a situational and relative, and thus dynamic, phenomenon (Hilhorst and Bankoff, 2004, pp. 2–3; UN, 2015). They contend that vulnerability is regularly in flux and cannot be reduced to a single metric for the purpose of classification (Adger, 2006). Such arguments frequently outline two aspects that must be considered: one's exposure (the interplay of circumstances and individual conditions, including abilities to respond without suffering, and the diversity of social groups, such as different capacities among the elderly); and the interplay of different disadvantages, which lead to a person being vulnerable. While vulnerability is linked to sociodemographic markers such as gender, class, or race, increasing evidence suggests the need for an intersectionality approach (Kuran et al., 2020) that helps to differentiate between the specific ways in which structural factors such as socioeconomic inequality, inadequate preparedness policies, and situational and temporal aspects, may exacerbate these vulnerabilities. In this vein, to what extent, for instance, a person with a certain impairment becomes vulnerable depends on the specific situation and on existing social structures and the extent to which they empower such an individual (Wisner et al., 2004; Mechanic and Tanner, 2007; UN, 2015; Gabel, 2019). Wisner et al. (2004, p. 15) propose, therefore, that we speak of vulnerable situations; a term that was also taken up by the United Nations' Sendai Framework for Disaster Risk Reduction 2015–2030. However, this approach is much more complex and hence much harder to operationalise.

Considering these different approaches for disaster management is important for two reasons. On the one hand, we might differentiate between individual conditions and social context as sources of vulnerability, as we do below. While living in poverty can be seen as widely increasing vulnerability (Tierney, 2019, p. 127), living within an affluent society may not necessarily protect against relative deprivation and marginalisation (Eriksen et al., 2020). Consequently, whether a particular impairment increases vulnerability is very much dependent on the general social approach to reducing barriers and on the specific context. Moreover, if people are deemed ontologically vulnerable, they cannot be emancipated, only protected. This, however, results in the deprivation of their agency, thus in an objectification. On the other hand, differentiation means distinguishing between systemic relations and

processes on a macro level (such as the definition of vulnerable groups) and the intersectionality of individual living conditions (Sparf, 2016). In this way, whichever approach is used influences if vulnerability is addressed as an individual condition or a societal one.

To reduce vulnerability, it is important to identify *what are the sources of vulnerability*. In line with Blaikie et al. (1994, p. 23), three levels of factors can be distinguished:

- Meta-level factors are at the root of societal vulnerabilities, which refer to fundamental societal challenges such as the distribution of wealth and power (Hartman and Squires, 2006). For example, owing to differentiating power relations, people are often marginalised due to deviant needs and/or impairments, making their interests less prominent in planning for disasters (Krüger, 2019).
- Macro-level factors refer to the degree of society-specific dynamic pressures, such as given economic development, demographic change, and societal inequalities (Christie et al., 2016). This category, for instance, includes the consideration and equality of certain social groups, such as persons with disabilities. Policies oriented towards these sources include national guidelines for individual preparedness standards and the responsibilities these place on citizens to prepare for disasters (Kailes, 2015). An example of society-specific pressures may also include the low trust in news sources and weak public service media, which make individuals more susceptible to false claims and malicious disinformation that may put them at increased risk (Hansson et al., 2020; Torpan et al., 2021), as is particularly evident from the COVID-19 crisis (Hansson et al., 2021).
- Micro-level factors describe the specific policy and procedural aspects of dealing with a crisis in a given society, such as economic/planning/housing, accessibility, or the use of media, as well as disaster management strategies for dealing with vulnerability (Kailes and Enders, 2007). These strategies, for instance, consider climate change adaptation efforts, which are increasing in particular in urban areas subject to extreme weather events (Hunt and Watkiss, 2011; Grafakos et al., 2020).

Different ways of conceptualising vulnerability are linked to varying assumptions regarding *which actors are tasked with alleviating it*. These are critical since identifying obligations points up the potential capacities of vulnerable individuals and the role of state actors or the non-governmental sector in alleviating vulnerability. Official positions reflect broader societal assumptions and influence the robustness of social structures. Who receives what kind of support depends on the conceptualisation of vulnerability, and thus the legitimacy of consuming granted resources, and the prevailing distribution of responsibility to cope with disasters (Kaufmann, 2013).

The matter of obligation to reduce vulnerability is also important given the interaction and co-constitution of disaster management and social structures. The institutions and actors responsible for vulnerability reduction vary in different countries. Therefore, the approaches to vulnerability in different disaster management systems may depend on the structures of national institutions and the policies assigned to

mitigate vulnerabilities. The state has been emphasised as the key actor in reducing vulnerabilities and enabling resilience since many individuals are deprived of the economic and social resources necessary to (re)act in response to a hazard or crisis (Krüger, 2019).

That said, the social structures in which individuals are embedded are of the utmost importance for disaster management (Sparf, 2016, p. 2). Furthermore, as disasters not only produce vulnerabilities, but also worsen those that already exist in everyday life (IFRC, 2007; Kelman and Stough, 2015), the reduction of vulnerability is not just a task for disaster management authorities and organisations, but also, *inter alia*, for non-disaster management actors, such as care and social services and disabled persons' institutions.

People outside of formal emergency and disaster management arrangements may help others who are at risk or are affected by disasters (Whittaker, McLennan, and Handmer, 2015). Taking a closer look at this cooperation between security and civil society entities regarding vulnerability reduction permits the identification of spaces for improving support (Wisner et al., 2004; Mechanic and Tanner, 2007).

Lastly, the debate about *how vulnerability can be reduced* arises in conceptual discussions. According to different understandings of the above-mentioned dimensions of vulnerability, the measures to reduce social vulnerability can differ. At the same time, similar understandings of vulnerability might lead to different approaches to dealing with them in different countries (Räsänen et al., 2020). These differences start with the way in which vulnerabilities are assessed, depend on the actors responsible for action, and may continue with the specific strategies and tools used to diminish vulnerabilities.

Our study began with this theoretical background and looked at how and to what extent vulnerabilities are considered in national crisis planning and responses. Our empirical evidence confirms that different national disaster management systems reflect different positions on these five central discussions. The following section reviews the empirics, combining the results of country-specific analyses built on official documents, secondary literature, and interview transcripts. The countries analysed here were not sampled in such a way as to allow for generalisation. The selection strategy was mainly a convenience sample: our language competences and access to data led us to them. The cases represent both large and small member countries, along with those traditionally seen as 'new' and 'old' members of the European Union. The analysis provides a useful heuristic indication of the variety and diversity of national European approaches to the issue of vulnerability.

Vulnerability in national disaster policies in Europe

It became clear during the research that few countries take a thorough, in-depth approach to problematising 'vulnerability' or its definitional implications. Moreover, vulnerability was rarely consensually defined within a single country, since various

actors attach different meanings to it. Still, through close analysis of discourses employed and implications stated, some patterns within and across countries could be identified. This section aims to structure the diverse and partly contradictory definitions of vulnerability along three axes by shedding light on the different referent objects and ontological constitutions of vulnerability, as well as on the different allocations of responsibility to reduce vulnerability.

Who or what is vulnerable?

One clear finding is that, across cases, discussion of individuals as the main object of vulnerability is limited. National disaster management systems have been mainly focused on the vulnerability of critical infrastructure rather than on individual vulnerabilities in crises. In several instances (such as Estonia, Finland, and Germany), individuals or ‘vulnerable groups’ are simply mentioned in national policy documents without specifying who in particular belongs to these sociodemographic groups (such as clear definitions for children, the elderly, and people with special medical conditions), what characterises their vulnerability or what makes certain individuals or groups vulnerable, and in which situations. While the word ‘vulnerability’ occurs occasionally in national policy documents on civil protection and disaster management, alternative notions and ways of interpretation are preferred in some countries. For example, in Italy, individual or group vulnerabilities are generally described in terms of ‘social fragility’ or ‘special needs’ of individuals who, despite specific welfare and medical assistance by civil protection authorities, are not self-sufficient (Council of Ministers, 2018; Civil Protection Department, Italy, 2019). In Hungary, instead of the vulnerability concept, the term ‘disadvantaged group(s)’ is frequently used to denote people who are unable to protect themselves against shocks due to their age, disability, health condition, or social status (Endrődi, 2015, p. 126).

A more quantified, and natural hazards (earthquakes)–centred, definition of vulnerability related to risk is used by the Civil Protection Department, Italy (2018), following the formula: $risk = probability \star vulnerability \star exposure$. The larger the probability of the hazard and the extent of the exposure, the greater is the risk. The vulnerability component denotes the propensity of the affected people and activities or infrastructures to suffer damage following the occurrence of an event (Civil Protection Department, Italy, 2018).

Belgium and Germany use aspects of quantifiable and more contextualised definitions of vulnerability. The German Federal Office for Civil Protection and Disaster Assistance (BBK, 2014b, p. 20) has considered vulnerability as linked to the interplay of three components: *exposure*, the physical impacts of a (natural) hazard; *susceptibility*, the likelihood of suffering harm due to exposure; and *coping capacity*, the availability of resources to mitigate the negative effects of the event.

In sum, the consideration of individual vulnerabilities varies, whereas the definition of vulnerable groups or entities and the baseline conditions for rendering situations vulnerable mostly remain vague.

What is the ontological basis of vulnerability?

As the theory section above shows, academic discussions on the ontology of social vulnerability (whether it is an absolute feature of a certain population or whether it is dynamic, depending on situations) interact with debates on the meta-, macro-, or micro-level sources of vulnerability. We examine both analytical questions here. While we hold that the two perspectives have advantages as well as pitfalls, we primarily aim to collect and analyse the interviewees' stances on vulnerability rather than provide a detailed conceptual exploration.

The relative and situational nature of vulnerability is highlighted in approaches taken by Finland, Norway, and Sweden. For example, a Swedish Civil Contingencies Agency (MSB, 2011, p. 8) study on disasters triggered by natural hazards argues that all approaches to the concept of vulnerability must take into account the complexities of local contexts. It concludes that differences in geographical location and social context create a different understanding of vulnerability. Hence, it remains difficult, if not impossible, to establish a universal or at least a national definition of vulnerability (MSB, 2011). Rather the contrary: one interviewee in a leading position in an aid organisation² pointed out that the term 'vulnerability' was not used at all in his daily work on the ground (which of course does not imply that the phenomenon of being vulnerable is ignored in practice). Given this broad range, references to the concept of vulnerability are highly contextual and make it hard to find general assessments of its consideration. In contrast, a number of interviewees referred to particular groups (especially elderly people or people in need of care) as being vulnerable *per se*, which represents a rather static understanding of vulnerability. The German Federal Office of Civil Protection and Disaster Relief defines vulnerable groups in terms of personal abilities and situational preparedness. Hence it merges different readings of vulnerability by combining situational and ontological aspects (BBK, 2019, p. 15). Moreover, vulnerability is equally ascribed to individuals, groups, and materiality, such as infrastructural artefacts. The different referent objects of vulnerability point to different ontological understandings of vulnerability, oscillating between the material fragility of infrastructure to ascribed group characteristics and situational contexts rendering entities vulnerable.

Often, individual vulnerabilities are considered in relation to specific hazards and risk scenarios. The threats that appear to be most acute in a particular society or region also determine which kinds of vulnerabilities become acknowledged (or, on the contrary, overlooked). This selection bias is evident in the case of cyber threats, which are accorded increased attention in the disaster management systems of several countries analysed here (Estonia, Finland, Norway, and Sweden).

In sum, the picture produced from the interviews is a fragmented one. While there is a tendency for a situational understanding in many Nordic countries and vulnerable group thinking is dominant in Estonia, Germany, Hungary, and Italy, definitions also varied within countries and across disaster relief actors (and sometimes even within the same disaster relief body). In addition, some interviewees ascribed vulnerability to their disaster relief organisation and/or to critical infrastructures,³

adding an organisational and technological framing of vulnerability to the rendering (Rogers, 2013). These variations might be traced back to different state actors with different responsibilities owing to the kind of hazard that is to be addressed.

What are the sources of vulnerability?

Several country studies (Estonia, Germany, Hungary, and Italy) indicate that on the operational level of disaster management, vulnerability is mainly related to an individual's limited, or inadequate, perceived self-sufficiency in a time of disaster, which results in a greater need for external assistance. This implies that certain people have a higher propensity to rely on help from their social networks or state institutions when it comes to preparing or responding to a crisis.

In most countries, vulnerability is considered to be something that can be reduced through preparation. That means becoming aware of threats, acquiring skills, and procuring the material sustenance required for coping. Individuals who have completed necessary preparations for a crisis, either independently or in cooperation with their communities, are seen as considerably less vulnerable (Government Office, Estonia, 2018, p. 30; FHS, 2019). Whereas self-preparedness is generally advised, the existing literature warns of the withdrawal of the state from responsibilities in also enabling the preparedness of vulnerable people (see the following subsection on alleviating vulnerability for more information).

Authorities in several countries (Belgium, Finland, Norway, and Sweden) acknowledge that individual capabilities to influence vulnerability are not for the individual to choose, but rather coping capacities very much depend on the structural and situational conditions that shape opportunities to prepare and protect oneself. The reflections of interviewees in Belgium, Estonia, and Sweden problematise the *a priori* identification and acknowledgment of certain individuals or groups as 'vulnerable' in a crisis, because this may lead to stigmatisation and victimisation in society.⁴

Combining our first two analytical dimensions (referent object and ontological status), we can identify a variety of examples of individuals or groups characterised as 'vulnerable' to certain hazards or in crises in general. Table 1 summarises these cases, along with aspects that are seen as constitutive of their vulnerabilities and the specific setting in which they are mainly described as vulnerable.

Our analysis reveals that individual and group vulnerabilities are mentioned most often in the context of extreme weather events, especially those linked to climate change, but also in relation to disruptions of vital services, accidents, and attacks. The overview shows that vulnerability factors can be read either as a group characteristic or as a situational description. Certain individuals or groups, such as the elderly, children, the chronically ill, or persons with disabilities, are generally seen as vulnerable to different kinds of threats. Thereby, individuals with heterogeneous backgrounds are grouped into a certain attribute category (for instance, the elderly) to determine their vulnerability while neglecting their otherwise different contexts and capacities. Their vulnerability is said to be rooted in individual or group characteristics, but it can also be deepened by particular situational factors. Individual vulnerabilities

Table 1. An overview of factors seen as constitutive of individual and group vulnerabilities

Factors seen as constitutive of vulnerabilities	Examples found in the study	Crisis contexts that might be problematic with regard to these factors	References
Mental and physical capacities, mobility	Elderly; infants and children; persons with disabilities; people with specific health conditions (such as those with dementia).	Climate-related and natural hazards (such as heatwaves); situations that require evacuation; disease outbreaks and pandemics.	Estonia (Ministry of Interior, Estonia, 2018) Finland (Tuomenvirta et al., 2019) Germany (BBK, 2014b) Hungary (NDGDM, 2012) Italy (Council of Ministers, 2018) Norway (Helsedirektoratet, 2016) Sweden (MSB, 2014b, 2016).
Communication abilities	People with inadequate access to information due to limited mental or physical capacities or poor language skills (such as migrants and tourists).	Crisis situations that are preceded by public warnings; (transport) accidents.	Belgium (interview, BPS (Brussels Prevention and Security), December 2019) Estonia (Government Office, Estonia, 2018) Finland (Hyvonen et al., 2019) Germany (BBK, 2014b) Norway (interviews, Oslo og Viken and Nordland County, DSB (Norwegian Directorate for Civil Protection), 2019)
Social capital and networks	People living alone and/or without personal social networks or inhabitants of isolated areas; non-resident groups.	Crisis situations that require the evacuation and relocation of people; natural hazards; extreme weather events.	Estonia (Government Office, Estonia, 2018); Germany (BBK, 2014b) Sweden (MSB, 2016)
Socioeconomic status	People living in poverty; recipients of social benefits (such as the unemployed); socioeconomically marginalised persons (such as the homeless).	Crisis situations that require self-preparedness and equipment; situations that require evacuation; disruptions of financial services.	Estonia (Government Office, Estonia, 2018) Finland (Turvallisuuskomitea, 2017; Hyvonen et al., 2019)
Institutionalised setting	People living in institutional settings (such as social and elderly care facilities, hospitals, shelters, or prisons); schoolchildren.	Crisis situations that require the evacuation and relocation of people; on-site accidents (such as fires) and attacks (such as school shootings); disruptions of vital services.	Estonia (Government Office, Estonia, 2018) Norway (interviews, Oslo og Viken and Nordland County governments and DSB, 2019) Sweden (MSB, 2016)
Type and conditions of dwelling	People living in top-floor (in the case of heatwaves, for example) or basement apartments (during floods, for instance); apartment buildings depending on the central provision of vital services.	Climate-related and natural hazards (such as heatwaves, floods, or storms); disruptions of vital services (electricity, heating, water supply, and sewerage).	Estonia (interview, ERB (Estonian Rescue Board), November 2019) Germany (BBK, 2014a, 2014b) Hungary (interview, PVSZ (Hungarian Civil Protection Agency), December 2019)

Factors seen as constitutive of vulnerabilities	Examples found in the study	Crisis contexts that might be problematic with regard to these factors	References
Residential area or geographic region	People living in urban areas with a high exposure to hazards; areas that are isolated; areas with hazardous facilities.	Climate-related and natural hazards (such as heatwaves, floods, storms, or earthquakes); industrial accidents; attacks; disruptions of vital services.	Estonia (Government Office, Estonia, 2018) Germany (BBK, 2014a, 2014b) Sweden (MSB, 2014b, 2016)
People on the move	Visitors to an area, tourists, commuters, and passers-by.	Accidents; attacks; transport fires; disruptions of vital services; climate-related and natural hazards.	Belgium (interview, BPS, 2020) Norway (DSB, 2019)

Source: authors.

primarily explained by situational or contextual factors, meanwhile, are threat-specific rather than universal. The factors that are seen as constitutive of individual vulnerabilities frequently tend to intersect in the case of certain individuals and groups, such as elderly people who live alone or in an institutional setting.

Broad societal challenges and pressures are rarely addressed in most conceptions of vulnerability. Typically, individual physical and mental capacities, communication behaviour, as well as individual social networks are seen as sources of vulnerability. These are related to a person's capacities, rather than the ability of policies, procedures, and structures to support and enhance crisis coping appropriately. The macro-level sources of vulnerability become more prominent when the geographical and infrastructural surroundings of an individual or community are stressed (such as hazard-prone areas or disruptions of vital services). However, even when interlinked, these macro considerations hardly address explicitly welfare issues as structural impediments to disaster coping. Institutionalised settings in which certain individuals or groups, who/which may already have limited or reduced physical and mental capacities, are placed, imply further dependency on the environment and its capacity to protect. The interviews also revealed another situational element of vulnerability, being on the move or happening to be in the place of an accident, highlighting the situational quality of vulnerability that is not easy to document officially.

Which actors are tasked with alleviating vulnerability?

None of the countries studied here has a specific disaster management authority or civil protection agency whose specific, formal obligation is to research and mitigate disaster-related vulnerability. Instead, authorities and actors from different sectors and levels of disaster management (national, regional, municipal) generally deal with vulnerable individuals and groups as part of their overall responsibilities related to disaster management. However, their professional competences and preparedness for that usually vary.

State and local authorities

At the national level, central authorities (including ministries and agencies) responsible for disaster management generally draft policy guidelines and regulations, conduct assessments, and plan and organise risk and crisis communications. In several countries, such as Germany, the disaster management system is designed in a decentralised and subsidiary manner. Therefore, when it comes to making and implementing disaster management policies in some countries, the national level plays a smaller role. We identified only three countries (Estonia, Finland, and Sweden) in which state-level initiatives were focused specifically on vulnerable groups. For example, the Finnish National Rescue Association⁵ organises trainings, conducts research on vulnerabilities, and builds networks with other authorities and research communities in order to be prepared to work with, inter alia, the elderly, people with memory disorders, and migrants during a crisis. In Sweden, the Civil Contingencies Agency has organised training in collaboration with a non-profit organisation and municipalities to enhance young people's handling of multiple types of disadvantage, including social exclusion, in a time of crisis.⁶ And in Estonia, the Estonian Rescue Board works on crisis preparedness as part of its home counselling on fire safety, which is targeted at, but also aims to identify and advise, vulnerable households.⁷

At the local level, municipalities and local (social welfare) authorities are generally expected to have information on and knowledge of vulnerable individuals and groups among their residents and to provide primary emergency assistance to them during crises. However, the extent to which municipalities' respective obligations and tasks are regulated varies significantly between different countries. Social vulnerabilities are addressed through the work of social services on the municipal level under the law for disaster management (in Finland and Norway) (Rapeli, 2018) and by the law of social and other municipal services applying regardless of the circumstances (in Belgium, Estonia, Germany, Hungary, Italy, and Sweden). While municipalities in some countries (Norway and Sweden) are obliged to analyse and consider individual vulnerabilities as part of their risk assessments and/or emergency plans, in others, this is advised, but not mandatory (Germany), and in the early stages (Belgium, Finland, and Italy) or missing (Estonia and Hungary).

Voluntary organisations

In most countries (Belgium, Finland, Germany, Hungary, Italy, and Norway), civil society organisations such as the national Red Cross, voluntary organisations working with certain constructed vulnerable groups (such as the homeless or disabled people), or associations that specialise in providing certain types of assistance (such as psychological help) have a crucial role to play in assisting the vulnerable during disasters. In Belgium, for instance, the Red Cross supports citizens within the first 48 hours of a crisis (Belgian Red Cross, 2016). By way of example, the Red Cross was a key actor during the response to the terrorist attacks in Brussels Airport at Zaventem and the Maalbeek metro station in March 2016. In Italy, the Red Cross and other volunteer organisations provide healthcare and psychosocial assistance to affected

populations, focusing particularly on minors and the elderly; as occurred, for instance, during the L'Aquila earthquake on 6 April 2009 (Italian Red Cross, 2010). In Germany, the Red Cross and other emergency organisations also engage in relief work, as during flooding incidents in 2002 and 2013 (DRK, 2014). Moreover, the church is actively involved in assisting vulnerable people in crises, especially psychosocial help, as in Finland, for example. Meanwhile, the Estonian Defence League and the Swedish Civil Defence League have taken on the role of helping those vulnerable in disaster situations (Kaitseliit, 2017).

Community responsibility

In cases where individual, informal preparedness for crises is seen to reduce individual vulnerabilities, authorities encourage citizens' acknowledgement of other community members' vulnerabilities to various hazards and crises and to offer assistance.

Public guidelines proposed for crisis preparedness and appropriate behaviour in crises can remind people to pay attention to and, if possible, help those in need (see, for example, BBK, 2018). Taking note of vulnerable individuals in the community while preparing for or when in crisis is encouraged, as in, for instance, the Estonian (Ministry of Interior, Estonia, 2018), Finnish (SPEK, 2020a), German (BBK, 2018), and Swedish (MSB, 2018) guides on public emergency preparedness. Such reminders, however, are often rather general and do not contain primary instructions on how to assist one another in a crisis. The German *Disasters Alarm* guide represents rather the opposite, providing a concrete action list to prepare for a disaster and particular actions to cope with such an event (BBK, 2018). In Finland and Germany, government-coordinated first aid and safety courses encompass self-protection and acknowledge the needs of certain social groups, such as children, care givers, and refugees (BBK, 2019; SPEK, 2020b).

Only in Norway, according to the interviews and references used here, do municipalities assume a coordinated active role in advising people on how to prepare for crises and recognise those who would need assistance in such situations. For instance, Oslo municipality encourages people in its crisis preparedness guidance to think about those with impaired vision, hearing, or mobility in their neighbourhood or community, as well as about persons who do not understand Norwegian or English and may thus need help in a crisis (Oslo kommune, 2019).

In addition to government and public sector initiatives, voluntary aid organisations can also contribute significantly to the awareness of citizens and their acknowledgement of vulnerability factors, as the findings from different countries (such as Belgium, Finland, and Italy) suggest. In Belgium, for example, the national Red Cross has programmes under which people can volunteer to visit isolated elderly people in their homes or at asylum centres.⁸ However, these programmes convey implicit assumptions of normal capacities and run the risk of unduly transferring responsibility to individuals without regard for their actual coping capacities. Scholars argue that this is problematic if the mitigation of vulnerability remains a demand rather than a political goal that is pursued by means of providing adequate capacities (Krüger, 2019).

How can vulnerability be reduced?

National disaster management policies and regulations generally do not include specific requirements or tasks concerning how authorities should deal with vulnerable individuals or groups in the context of prevention, preparedness, response, and recovery. Even if general principles oblige respective authorities to consider certain individual aspects or needs, the question of how this should be done often remains open.

Finland is one of the few countries in which rescue services responsible for assisting individuals in accidents and crises have their own organisational and procedural guidelines on how to deal with individuals and groups defined as vulnerable. The Finnish National Rescue Association, for instance, has prepared trainings and materials that focus on specific groups, such as ethno-cultural minorities (SPEK, 2020a). Rescue services are also prepared to assist the elderly in care institutions or people with disabilities.⁹

In most cases, responsibility for creating and/or implementing guidelines on how to assess and respond to individual vulnerabilities in times of crisis lies with municipalities and local authorities. Specific guidelines on municipal support to vulnerable groups in such circumstances exist in Belgium, Finland, and Norway. For example, Belgian municipal plans need to consider a broad range of referent objects from individuals to institutions that are particularly vulnerable owing to their location or activity (FPS Home Affairs, 2022). In Norway, the regulation concerning municipal emergency preparedness includes references to vulnerable groups, such as children and youths and asylum seekers and refugees (Helsedirektoratet, 2016; DSB, 2018).

In other countries (Estonia, Germany, Hungary, and Italy) guidelines for local municipalities exist only on a very general level. For instance, Estonia's Civil Protection Concept (Government Office, Estonia, 2018) highlights the need to assess the number of people with special needs in local municipalities. In Hungary, emergency plans prepared by municipalities or workplaces are supposed to specify conditions for 'disadvantaged groups' (Ministry of Interior, Hungary, 2011), but there is no central guidance on how to do so.

Assessment of vulnerability

One approach to reducing vulnerabilities is to start with a vulnerability assessment. Such assessments are predicated on the idea that results can provide a basis for the allocation of resources for preparedness, response, and recovery. We found different types of assessments that vary in their thematic scope and focus, including *ex ante* and *ex post* analyses, as well as various methodological approaches applied within different countries' disaster management systems.

Such assessments are conducted in advance, to improve preparedness. However, they can also be carried out during and after a crisis. The few *ex-ante* analyses performed by national authorities aim to identify social groups that may be vulnerable to certain hazards or possible crises in society. In several countries (Belgium, Estonia, Finland, Germany, Norway, and Sweden), national assessments for climate change

mitigation and adaptation also cover the definition of vulnerable individuals following *An EU Strategy on Adaptation to Climate Change* (European Commission, 2013). The Finnish assessment of climate risks, for instance, indicated that elderly people in particular suffer during heatwaves and warmer winter weather (Tuomenvirta et al., 2019).

In Sweden and Norway, national vulnerability assessments also cover other risks. Swedish government agencies are required to conduct annual risk and vulnerability analyses, which primarily concern accidents involving dangerous chemicals, extreme weather conditions, and disruptions of technical infrastructure (Sveriges Riksdag, 2006, p. 942). Here, too, the elderly are singled out as vulnerable to various risks, especially those living alone or in care facilities (MSB, 2014a, 2016). Similarly, in Norway, several national analyses of groups vulnerable to various accidents have been done over the years (Haldorsen and Munch-Olsen, 2011; Government of Norway, 2012).¹⁰

In Norway and Sweden, municipalities took the lead on risk assessments and pinpoint vulnerable individuals within their territory as part of their prevention and emergency planning strategies. For example, in Norway, municipal-level risk and vulnerability analyses have pre-identified several vulnerable groups: people depending on home care in the case of extreme weather events that hinder mobility; high school students in the case of school shootings; and tourists who lack local networks (Haldorsen and Munch-Olsen, 2011; Government of Norway, 2012).¹¹ In Germany, the Federal Office for Civil Protection and Disaster Assistance has published guidelines for assessing individual vulnerability to heatwaves, heavy rainfall, and floods at the community level (BBK, 2014a, 2014b). Moreover, it provides examples of vulnerable groups as a precondition for the subsequent strengthening of disaster resilience (BBK, 2019). However, as is the case in many of the countries under review here, we did not find evidence of how these guidelines have been used in practice.

Only in Italy did we find evidence of assessments conducted during a crisis to identify vulnerable individuals in an emergency (including people who need special assistance). At such a time, the Italian Civil Protection Department collaborates with municipalities to appraise the immediate needs of those identified as the most fragile, supported by a recently issued questionnaire formula (Civil Protection Department, Italy, 2019).

Ex post analyses are carried out to learn about the experiences of residents or groups most affected by a disaster. For example, the Finnish National Rescue Association (SPEK, 2017) conducted a survey among local residents of the city of Pori after a fire at a titanium dioxide manufacturing facility in 2017. In Hungary, a social impact analysis was performed after the red sludge disaster in the southwest of the country in 2010, indicating the increased tensions between Roma and other inhabitants as compared to before the disaster (Ferencz and Bartal, 2015).

Criticism has been levelled against the use of risk assessments, often by state authorities themselves. A study by the Swedish Civil Contingencies Agency (MSB, 2011, p. 28) asserts that it is extremely difficult to identify vulnerable groups, and that it is challenging to include those results in the preparation of emergency planning measures.

The study also draws attention to the implications of pointing out vulnerable groups publicly. Other actors demand a sound analysis of needs and vulnerabilities according to international and national standards (DRK, 2018, p. 9). Yet, the collection of adequate information on individual vulnerabilities requires coordinated efforts between different local authorities, services, and sectors, which may not always succeed. The results of such analyses can thus be misleading.

Risk and crisis communication

Risk and crisis communication efforts are also increasing as a way to address vulnerabilities and the needs of individuals. Most countries had communication guidelines in place to that effect. In Hungary, rules related to disaster management state that 'disadvantaged groups' should be informed about the eventual crisis appropriately by applying tailored materials and guidance (Ministry of Interior, Hungary, 2011). In Norway, the same principles are included in the national communication policy and applied equally in the field of disaster management (Fornyrings- og administrasjonsdepartementet, 2021). Oslo municipality, for instance, has translated its guidelines on household preparedness for crises into several languages and has shared them with other Norwegian municipalities.¹² Germany's Ministry of Interior has published crisis communication guidance that acknowledges the necessity of a transparent dialogue with the population that recognises needs and thus affords the authorities credibility in terms of their problem-solving competence (BMI, 2014).

Authorities interviewed for this study also pointed out deficiencies in informing vulnerable individuals about hazards and emergencies. In the case of the latter, it can be difficult to reach people who do not have enough knowledge of the national language(s), or who do not use national or local information channels.¹³ The needs of migrant groups as well as foreigners involved in emergencies are increasingly addressed in the context of disaster management in several countries (Belgium, Finland, Germany, Italy, Norway, and Sweden). Yet, risk and crisis communication may not be adjusted to the needs of other vulnerable groups, such as disabled people. For example, in Germany and Sweden, public address systems used for emergency warnings have been criticised for the lack of adaption to sensory impaired individuals (Bachman, 2013; Office of the United Nations High Commissioner for Human Rights, 2015; DRK, 2018).¹⁴

Discussion

The empirical findings presented here paint a rather mixed picture of how vulnerability is approached. Not only is it addressed in different ways, but also to differing extents and via different structures in and across countries and sectors.

While countries such as Finland, Norway, and Sweden tend to have a more contextualised, and thus qualitative, *understanding of vulnerability*, Italy has a more categorical, quantifiable method. Belgium and Germany combine aspects of both. In

Estonia, Germany, and Hungary, vulnerability is attributed to certain groups, mainly pre-determined based on sociodemographic factors (the elderly, chronically ill, or socioeconomically deprived).

There are pros and cons to all approaches. By categorising individuals as genuinely ‘vulnerable’ due to ascribed and familiar characteristics (such as age, disabilities, or gender), relief operations can focus on responding speedily during a disaster. But the downside is an implicit tendency to stigmatise certain populations and a lack of nuance regarding support needs. Not all elderly people of the same age have the same requirements, for instance. Owing to a variety of individual factors, needs can differ substantially among those who are subsumed under the same ‘vulnerable group’. Dynamic or situational understandings of the nature of vulnerability put the type of disaster or shock upfront in planning, rather than emphasising the similarity of particular groups (Gabel, 2019). This mitigates the risk of stereotyping people. However, such an understanding of vulnerability is rather abstract and although used in the Sendai Framework, is difficult to operationalise in disaster relief operations. This can result in a lack of action, since the onset of a disaster brings other priorities.

Similarly, the idea of ‘vulnerable groups’ conveys assumptions about the nature of vulnerabilities and produces (vulnerable) populations. The notion of ‘special needs’ individuals is one such example. Following Kailes and Enders (2007), that very term suggests that persons place an extra—non-normal—burden on disaster management structures. Neither the importance of guaranteeing all citizens access to information, nor individuals’ demands to receive information or warnings, is by any means ‘special’. Yet, disaster management organisations may nevertheless see this as ‘additional effort’. In this way, security politics in general and disaster politics specifically are the product of and can perpetuate normative assumptions about and within society.

Our empirical material indicates that typically, individual capacities, communication behaviour, and social networks are considered as *sources of vulnerability*. These tend to intersect in the case of some individuals and groups (such as the elderly in institutional settings) and may be exacerbated by certain situational factors. However, vulnerability is rarely seen as triggered by local strategies (such as segregation due to planning), procedures (such as poor crisis preparedness of care homes and hospitals), and structures (such as areas lacking alternatives to existing vital infrastructures). Our data thus reveal a prevailing lopsided idea of vulnerability that neglects some root causes of uneven coping capacities in different parts of society. Even in the affluent countries included in this study, pre-existing systemic inequalities in society are perpetuated during crises and the subsequent recovery phases. This has been demonstrated in previous research (for example, see the case of Hurricane Katrina (2005) in Tierney (2019, pp. 136–143)) and holds true for the current COVID-19 pandemic. With regard to the latter, lower income populations face higher infection rates due to fewer possibilities to work from home or poorer access to tests (Shadmi et al., 2020; Chang et al., 2021). Even in countries with a strong welfare system, risk information and official warnings may not be accessible to homeless people, non-native language-speakers, or those with mental health conditions. Similarly, novel telehealth and online learning services are not accessible to everyone (Shadmi et al., 2020).

The specific approaches to individual vulnerabilities studied here appear to be rather selective because of the specific national contexts, histories, and the variety of threats recognised by the societies. As Tierney (2019) notes, societies co-produce and co-construct disasters. The only commonality seems to be the recognition that extreme weather events, often linked to climate change, may produce coping problems for vulnerable people. Largely due to pan-European disaster management efforts to highlight the matter, climate change adaptation activities do consider aspects of social vulnerabilities (Orru et al., 2018; Grafakos et al., 2020).

We find that *vulnerability reduction strategies* and conceptions of *who should mitigate vulnerability* tend to place the burden on individuals by neglecting those structural issues rendering some more susceptible to the consequences of disasters than others. Risk and crisis communication strategies are widely used while the provision of economic and social support structures for crisis preparedness and response may be inadequate. Similarly, we found an array of public guidelines urging citizens to look after 'the vulnerable'. But these lack specificity and can easily lead to an abdication of institutional/state responsibilities. Moreover, this stance on vulnerability renders 'the vulnerable' as passive receivers of help by depriving them of any sort of agency or competence (Krüger, 2019).

Many preparedness measures in the countries studied stem from the communal level, including municipalities (social and welfare authorities) and non-governmental actors. Except for some evidence of growing municipal-level initiatives in Belgium, Norway, and Sweden, municipalities are usually given only limited guidance on how to fulfil that task. In other countries, this is in the early stages (Germany and Italy) or is missing (Estonia and Hungary); vulnerable groups are primarily pre-determined based on external attributions. Based on the example of climate change adaptation (Reckien et al., 2018, 2019), the municipalities provided with clear policy guidance by the national government can better mitigate social and infrastructural vulnerabilities during these extreme weather events. Moreover, municipalities with experience of disaster relief have a more nuanced understanding of their own capacities and limitations.

One reason for the lack of nuance and understanding of the social and cultural contexts shaping disaster vulnerability is a lack of disaggregated census data on social diversity (Mazurana, Benelli, and Walker, 2013). Disaster management agencies tend to be disconnected from social services and any meaningful understanding of societal diversity. They have little training in or knowledge of individual needs (IFRC, 2018). This general issue is also represented in the gap between disaster management and social actors (for Germany, see, for example, Gabel (2019)).

Our extensive interview material and scrutiny of relevant documents indicate that too little research has been carried out on vulnerable individuals and groups to comprehend better their risk perceptions, crisis preparedness, and response strategies. Yet, this empirical work is necessary to ensure that persons identified as vulnerable are not considered as passive. Whether official expectations of individual vulnerabilities at the municipal level match appropriate institutional arrangements (such as

guidelines and resources for assessment, risk, and crisis communication) in different countries remains to be explored in more detail.

The importance of differentiated approaches, acknowledging both individual characteristics and societal structures, must also be considered by European officials increasingly involved in devising collective crisis and disaster management policies. At best, European-level guidelines seem most useful, rather than legislation or a 'one-size-fits-all' approach. While understanding diversity of causes and conditions of vulnerability is just a first step towards a more nuanced approach to effective policy, it is a critical one in tackling the root causes of vulnerability instead of concentrating only on its symptoms.

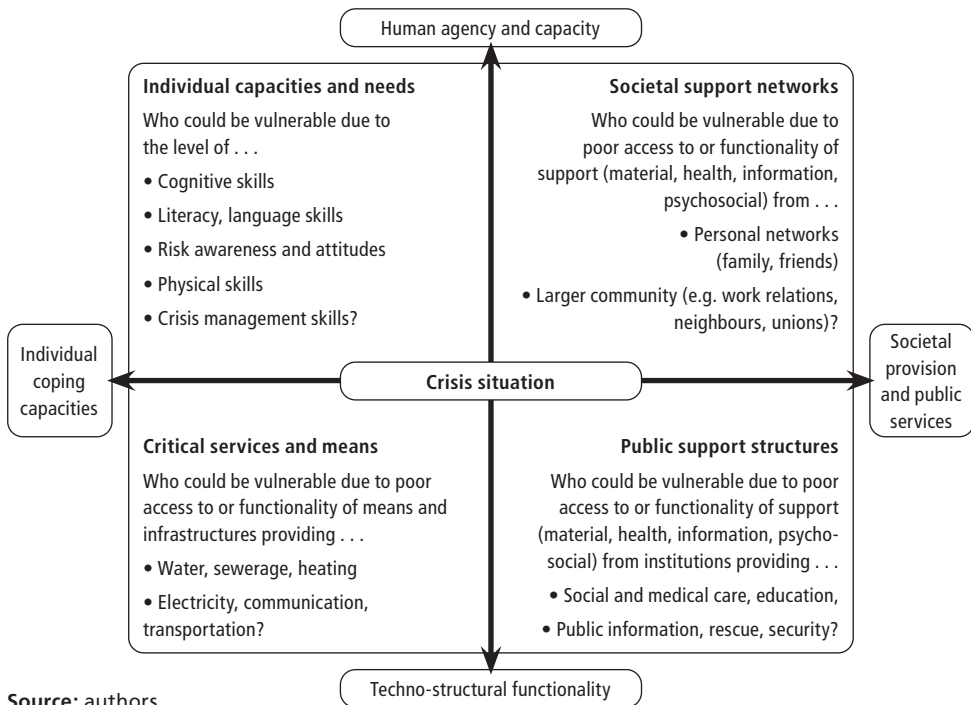
Furthermore, to utilise existing ideas and procedures to reduce vulnerability in the most profitable way, it is necessary to make explicit diverse conceptual assumptions about vulnerability. Only then can societies debate the issue, and only then can scholars make cross-country comparisons and ponder generalisability. We suggest, therefore, that future guidelines on vulnerability answer five key questions:

- Who or what is regarded as vulnerable?
- Is vulnerability considered to be static or dynamic?
- What are the deemed sources of vulnerability?
- Who is tasked with alleviating vulnerability?
- What are the measures to reduce vulnerability?

Moreover, we would argue that there needs to be more emphasis on the *sources of vulnerability* in disaster management policies because of ever-increasing societal reliance on such support, particularly in affluent, technology-dependent societies with relatively strong social care systems. We propose that for a more systematic understanding (assessment and response), the identified factors of social vulnerability be categorised across two dimensions: (i) sources primarily the result of human agency or technological functionality; and (ii) sources more dependent on individual coping capacity or societal support structures (see Figure 1).

In a specific crisis situation, vulnerability could be conceptualised, on the one hand, in terms of human agency and capacities and the functionality of the surrounding technological and political structures. On the other hand, vulnerability may be seen as a function of the availability of social (material, psychosocial, and informational) support through private relations and/or societal provision (institutional care). In our view, both dimensions should be included if one is seeking to devise a comprehensive definition of vulnerability, as in crisis, these factors of vulnerability intersect and their impact is amplified or attenuated by the characteristics of the situation (such as individual proximity to the hazard source and the measures applied in certain circumstances).

Lastly, there are limitations to the method of cross-national comparative qualitative analysis applied in this study. The mapping of varying interpretations of vulnerability across countries is challenging owing to the country-specific connotations of

Figure 1. Conceptual dimensions of 'social vulnerability' in disaster management

the terms used in various documents and by the interviewees. Research team members' knowledge of the local sociocultural contexts, including the institutions and policies involved in national disaster management, helped to mitigate the risk of misrepresenting country data. Having multiple interviewees from each country allowed us to compare further and re-check the validity of information provided about a national disaster management system.

Conclusion

Although vulnerability is one of the core concepts in current disaster risk reduction strategies, what is understood and done in this regard differs remarkably across countries and institutions. Disaster management policies and practices are often shaped by fuzzy, competing, and theoretically incongruent understandings of *who* is considered to be vulnerable, and for *what reasons*, and *who* should do *what* to alleviate vulnerability.

We found that various pre-determined and context-specific conceptualisations of vulnerability were applied in eight European disaster management systems. This empirical diversity should stimulate further theoretical debate on appropriate ways of tackling vulnerability. Our results suggest that before a consensual approach to vulnerability can be developed to improve disaster management in Europe, policy-makers and disaster management practitioners should always make transparent their

assumptions and definitions of ‘vulnerability’. We have put forward a heuristic model for understanding the factors of vulnerability across the dimensions of human agency and technological structures as well as social support through private relations and state actors. This could guide risk analysis and planning for major hazards and could be further adapted to particular types of disasters.

Appendix

Table A1. Interviews at institutions, month of interview*

Belgium Red Cross December 2019	Brussels Prevention and Security (BPS) December 2019
Estonian Rescue Board (ERB) South Regional Rescue Centre November 2019	Estonian Ministry of Social Affairs November 2019
Finnish National Rescue Association (SPEK) January 2020	Finnish National Rescue Association (SPEK) South-West Area December 2019
SPEK, Finnish National Rescue Association (SPEK) South-East Area January 2020	German aid organisation 1 December 2019
German aid organisation 2 January 2020	German aid organisation 3 December 2019
German local disaster authority January 2020	Hungarian Civil Protection Agency (PVSZ) December 2019
Nordland County Municipality December 2019	Norwegian Directorate for Civil Protection (DSB) December 2019
Oslo and Viken County Government December 2019	Swedish Civil Contingencies Agency (MSB) December 2019

Note: * For the other interview sources used as background for this analysis, see Orru et al. (2020).

Source: authors.

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Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Correspondence

Kati Orru, Institute of Social Studies, University of Tartu, Lossi 36, 51003 Tartu, Estonia. E-mail: kati.orrut@ut.ee

Endnotes

- ¹ Kati Orru is an Associate Professor in Sociology of Sustainability at the Institute of Social Studies, University of Tartu, Estonia; Sten Hansson is an Associate Professor in Communication Studies at the Institute of Social Studies, University of Tartu, Estonia; Friedrich Gabel is a Research Associate at the International Centre for Ethics in Science and Humanities, University of Tübingen, Germany; Piia Tammpuu is a Research Associate at the Institute of Social Studies, University of Tartu, Estonia; Marco Krüger is a Research Associate at the International Centre for Ethics in Science and Humanities, University of Tübingen, Germany; Lucia Savadori is an Associate Professor in Psychology at the Department of Economics and Management, University of Trento, Italy; Sunniva Frislid Meyer is a Senior Research Political Scientist at the Institute of Transport Economics, Norway; Sten Torpan is an Analyst at the Institute of Social Studies, University of Tartu, Estonia; Pirjo Jukarainen is a Project Manager at the Police University College, Finland; Abriel Schieffeler is a Project Coordinator at the Salvation Army, Belgium; Gabriella Lovasz is a Senior Consultant at Geonardo, Hungary; and Mark Rhinard is a Professor of International Relations at Stockholm University, Sweden.
- ² Interview, German aid organisation 3, December 2019.
- ³ Interviews, German aid organisation 1, December 2019, and German aid organisation 2, January 2020.
- ⁴ Interviews, Estonian Ministry of Social Affairs, November 2019, Brussels Prevention and Security, December 2019, and MSB, December 2019.
- ⁵ Interview, SPEK, January 2020.
- ⁶ Interview, MSB, December 2019.
- ⁷ Interview, ERB, November 2019.
- ⁸ Interview, Belgian Red Cross, December 2019.
- ⁹ Interviews, SPEK South-West Area, December 2019, and SPEK South-East Area, January 2020.
- ¹⁰ See also interview, DSB, December 2019.
- ¹¹ See also interview, DSB, December 2019.
- ¹² Interview, Oslo and Viken County Government, December 2019.
- ¹³ Interview, Brussels Prevention and Security, December 2019.
- ¹⁴ See also interview, MSB, December 2020.

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