

THEORETICAL APPROACHES TO SOCIAL VULNERABILITY OF THE POPULATION

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Abstract. *Social vulnerability, influenced by a myriad of factors such as physical, social, economic, and environmental conditions, is a critical aspect in understanding and mitigating the impacts of natural hazards. As challenges emerge, the concept of social vulnerability evolves, necessitating updated definitions and frameworks to enhance resilience and disaster management strategies. Paper aims to review and compare various definitions and models of social vulnerability, highlighting their advantages and disadvantages. By analyzing different approaches, we seek to provide a comprehensive understanding of social vulnerability and offer insights into effective strategies for reducing vulnerability and enhancing resilience. Paper employs a comparative analysis of definitions and models of social vulnerability from multiple sources. It reviews the Pressure and Release (PAR) model, Hazards-of-Place model, and indexes like the Socio-Economic Vulnerability Index (SeVI) and Built Environmental Index (BEVI). Additionally, it examines main approaches to assessing social vulnerability: demographic, taxonomic, situational, and contextual-proactive. Findings highlight the complexity and multifaceted nature of social vulnerability. Models and approaches collectively emphasize the need for interdisciplinary and community-based strategies to address social vulnerability effectively. Integrating local knowledge, empowering vulnerable populations, and addressing social inequalities are crucial for enhancing resilience and improving disaster management. The paper was elaborated within the framework of the "Young researchers 2024-2025" competition project 24.80012.0807.09TC "Strengthening scientific and methodological support for reducing social vulnerability by increasing the level of financial inclusion of low-income groups" (2024-2025).*

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Introduction. Understanding and addressing social vulnerability is paramount in contemporary disaster management and policy-making. Social vulnerability encompasses the susceptibility of individuals or groups to harm from exposure to hazards, shaped by various physical, social, economic, and environmental factors. The increasing frequency and intensity of natural disasters,

coupled with socio-economic inequalities, necessitate a deeper exploration of this concept.

In the paper we provide a review of vulnerability definitions, models, and approaches. By examining a wide array of perspectives - from environmental and social aspects to affective and creative dimensions - we try highlights the multidimensionality of social vulnerability. Furthermore, we address the challenge of balancing breadth and specificity in definitions and emphasize the importance of adaptive capacity and resilience.

Defining vulnerability. In the *Table 1.* is presented a wide array of perspectives on vulnerability, from environmental and social aspects to affective and creative dimensions. This diversity reflects the multifaceted nature of vulnerability, showing that it can be understood and approached from various angles depending on the context and purpose.

Table 1. Comparative analysis of vulnerability definitions and their advantages and disadvantages

Authors	Definition	Considered aspects	Advantages	Disadvantages
Adger (2006)	"the state of susceptibility to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt."	Environ-mental change, social change, adaptive capacity	Compre-hensive as it considers both environ-mental and social factors; highlights the importance of adaptive capacity	Too broad, encom-passing too many aspects
Wolf et al. (2013)	"a possibility of future harm."	Future risk	Simple and clear; easy to understand and apply in various contexts	Lacks detail; does not specify types of harm or factors involved
Havrilla (2017)	"the condition of being exposed or unprotected with inherent components of risk and resilience."	Expo-sure, pro-tection, risk, resi-lience	Emphasizes both risk and resilience; acknow-leges the role of protection	Overly focused on the binary of protection versus exposure
Thekdi and Aven (2021)	"the combination of consequences and uncertainties given the occurrence of a threat or set of threats."	Con-sequences, uncer-tainties, threats	Highlights the role of uncertainty; considers multiple threats	Too focused on theoretical aspects rather than practical implications
Rozmarin (2021)	"the affective pattern that stems from affective encounters	Power for-mations, affective res-ponses,	Unique perspective considering	Complex and abstract; difficult to

	with power formations, which limit and hinder life.”, ”an affective response that marks the micro vital connections of bodies as they allow transformation and creativity to surpass the limits of stable subject positions”	transfor-mation, creativity	affective and creative dimensions; highlights transfor-mative potential	apply practically
Fernandes Da Silva Ranchordas and Beck (2024)	”the susceptibility of being placed in a position of economic, social, ecological or legal disadvantage with potential harm as result.”, ”a state that every individual can experience, rather than a status or label that is given to underprivileged groups”	Eco-nomic, social, eco-logical, legal aspects, univer-sality	Inclusive; recognizes vulnera-bility as a potential state for all individuals; multifaceted.	Dilutes the focus on specific vulnerable groups; broadness hinders targeted interventions

Source: Elaborated by the author

One of the key challenges highlighted is balancing the breadth and specificity of vulnerability definitions. Broader definitions, like those by Adger (2006) and Fernandes Da Silva Ranchordas and Beck (2024), offer comprehensive views that encompass multiple factors, but are too general for targeted applications. On the other hand, simpler definitions, such as Wolf et al. (2013), provide clarity and ease of application, but lack the depth needed for nuanced analysis.

Several definitions emphasize the role of adaptive capacity and resilience (e.g., Adger (2006), Havrila (2017)). These aspects are crucial in understanding how individuals and communities can respond to and recover from vulnerabilities. Highlighting adaptive capacity and resilience brings a dynamic component to the concept, focusing not just on the state of being vulnerable but also on the potential for overcoming it. Definitions like those by Rozmarin (2021) introduce complex and abstract concepts such as power formations and affective responses. While these provide a deeper theoretical understanding, they pose challenges for practical application, especially in policy-making and intervention design. Practicality is crucial for definitions intended for use in real-world contexts, such as disaster management or social policy. The varying definitions underscore the importance of context in understanding and applying the concept of vulnerability. Different situations may require different definitions. For instance, environmental policies might benefit from Adger’s comprehensive approach, while social interventions might find Wolf et al.’s simplicity more effective. The definition by Fernandes Da Silva Ranchordas et al. (2024) can be noted for its inclusivity, recognizing vulnerability as a state that anyone can experience. This universality can foster a

more empathetic and comprehensive approach to addressing vulnerabilities, but can also dilute focus from specific groups that need targeted support. The definitions show the interdisciplinary relevance of vulnerability. They incorporate elements from environmental science, social science, psychology, and more disciplines. This interdisciplinary approach is beneficial for developing holistic strategies to address vulnerability but also requires collaboration across fields. The inclusion of recent definitions (e.g., Thekdi and Aven (2021); Rozmarin (2021); Fernandes Da Silva Ranchordas et al. (2024)) indicates that the concept of vulnerability is evolving. As new challenges and understandings emerge, definitions are adapted to better capture the nuances of vulnerability in contemporary contexts.

Vulnerability is a multifaceted concept that encompasses multiple elements. One element of vulnerability is the context-specificity, because tailoring vulnerability and resilience measures to the specific cultural, political, social, and environmental contexts (*Figure 1*). The cultural context pertains to understanding local customs, beliefs, and practices that influence vulnerability. Political context covers the assessing the influence of local governance, policies, and political stability. The social context refers to evaluating social structures, community networks, and social capital. Environmental context appertains to considering the specific environmental conditions and natural hazards of the area.

Another element that affects vulnerability is the role of infrastructure, because of the impact of critical infrastructure on reducing or increasing vulnerability. Critical infrastructure includes telecommunication, transportation networks, buildings, bridges, and utilities (water, gas, electricity). There is the need to assess how susceptible is infrastructure vulnerability to damage from hazards. The implementation of hazard-proofing or reinforcement of critical infrastructure is necessary as mitigation measure. The population depends on infrastructure, so it is required to understand how communities rely on infrastructure for resilience.

The third element of vulnerability is adaptation and adaptive capacity - the ability of individuals, households, and communities to adjust to potential hazards, mitigate impacts, and recover. Adaptation can be of short-term and include immediate actions taken to respond to hazards (e.g., building dams, emergency planning) or long-term, which incorporates adaptation into the cultural and societal norms (e.g., urban planning, sustainable practices). Adaptive capacity represents the availability and access to resources such as financial capital, technology, information, and social networks. There are also constraints that limit adaptation (e.g., lack of resources, political barriers).

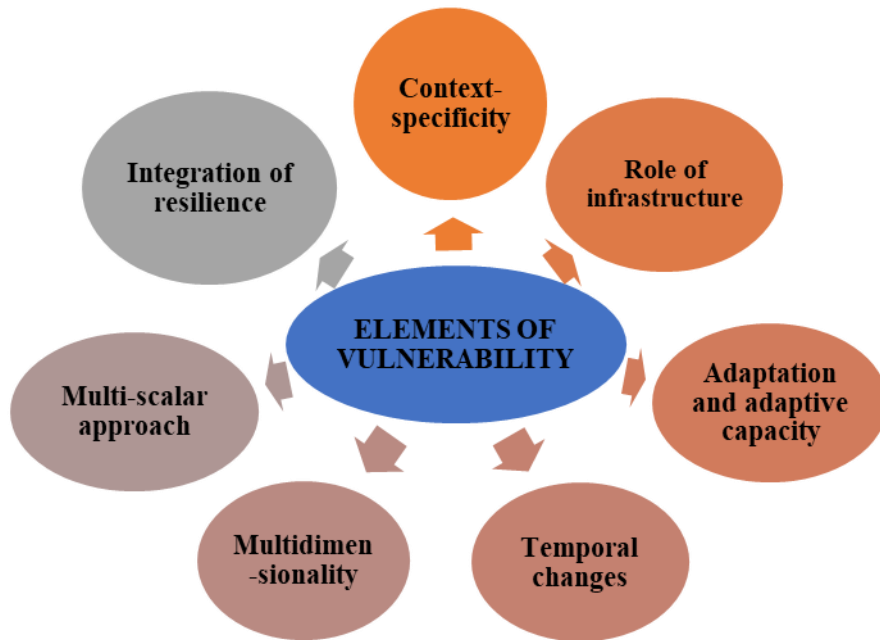


Figure 1. **Elements of vulnerability**

Source: Adapted by the author on the basis of Hufschmidt (2011)

Another element of vulnerability are temporal changes, the dynamic nature of vulnerability and resilience over time. Vulnerability can change, it evolves due to factors like population growth, urbanization, and climate change. The temporal phases can be classified into: pre-impact (preparedness), impact (response), and post-impact (recovery and adaptation). Adaptive strategies over time can incorporate learning from past experiences and anticipate future hazards.

Multidimensionality is a characteristic of vulnerability, the inclusion of various dimensions such as social, economic, environmental, and political factors. Social dimension includes community cohesion, social networks, demographics (age, gender). Economic dimension cover income levels, economic activities, employment rates. Environmental dimension refers to ecosystem health, natural resource management. Political dimension includes governance structures, policy frameworks, institutional capacity.

Vulnerability can be addressed across different spatial scales (local, regional, national, and global levels of analysis) and temporal scales (short-term, medium-term, and long-term perspectives). There are also scale interdependencies, because actions at one scale impact other scales (e.g., local actions influencing regional outcomes).

Resilience can be integrated as a core component of vulnerability assessments. The factors. Self-organization, diversity, flexibility, and redundancy in systems are factors that influence resilience. In order to build resilience are developed strategies to enhance the ability to absorb shocks and maintain

functionality. Recovery speed and social capital strength are indicators that can measure resilience.

The concept of social vulnerability is a multifaceted issue influenced by various factors such as physical, social, economic, and environmental conditions and refers to the characteristics and situations of individuals or groups that affect their ability to anticipate, cope with, resist, and recover from the impact of natural hazards, is being heightened by elements like poverty, occupation, ethnicity, exclusion, marginalization, and inequities in material consumption (Singh, Eghdami and Singh, 2014). Vulnerable groups often include ethnic minorities, disempowered classes, religious groups, or those in certain occupations who live or work in disaster-prone areas. These groups tend to have limited access to resources such as information, technology, political power, and social networks, which further exacerbates their vulnerability. Integration of local knowledge and community input into disaster management can empower local populations and enhancement of their capacity can help withstand future emergencies (Singh, Eghdami and Singh, 2014). The concept of social vulnerability also includes the impact of social inequalities and historic patterns of social relations, which create deeply embedded barriers resistant to change.

Approaches to vulnerability analysis. The vulnerability analysis framework emphasizes the need to understand both the physical impact of disasters and the social conditions leading to differential outcomes. It involves examining: individual within household (personal attributes affecting vulnerability); community level (interaction with the surrounding community); geographical level (proximity to services), institutional level (disaster funding and mitigation studies).

There are several models to understanding and assessing social vulnerability: Pressure and Release (PAR) Model, Hazards-of-Place Model, Socio-Economic Vulnerability Index (SeVI) and Built Environmental Index (BEVI).

The Pressure and Release (PAR) model, proposed by Blaikie et al. (2014), describes patterns of social vulnerability by linking socio-economic, political, and institutional forces to unsafe physical and social conditions. The model conceptualizes disaster as a complex interaction between two opposing forces: natural hazards and a vulnerable society. It outlines a progression that connects the impact of a hazard on people through levels of social factors that generate vulnerability. The main components include: economic, demographic, and political root causes affecting resource distribution; dynamic pressures of lack of local institutions, of skills and training, of investment in infrastructure, of rapid population growth, and of urbanization; unsafe conditions experienced by people in hazardous locations, including fragile physical environments, fragile local economies, vulnerable societies, and public actions or inactions.

The Hazards-of-Place Model by Cutter et al. (2003) integrates biophysical vulnerability with social vulnerability to assess the overall risk in a specific location. It identifies vulnerability as a combination of risk from hazardous events and the social conditions that affect susceptibility and resilience. Key factors affecting social vulnerability include: lack of access to resources such as

information, knowledge, and technology; limited access to political power and representation; social capital, including social networks and connections; beliefs and customs; building stock and age; frail and physically limited individuals; type and density of infrastructure and lifelines.

In a study of Norway by Holand et al. (2011), social vulnerability is divided into two indexes: Socio-Economic Vulnerability Index (SeVI) that includes socio-economic status, education levels, employment status, demographic and ethnic composition, gender equality, political activity, and housing and Built Environmental Index (BEVI) that is based on factors like distance to the nearest hospital, population and housing density, age of building stocks, average age of sewers and water pipelines, length of municipal roads, and number of exit routes per 1000 inhabitants.

There are 4 approaches to assessing social vulnerability: demographic, taxonomic, situational, contextual-proactive. The demographic approach follows the United Nations Disaster Relief Organization (UNDRO) definition of vulnerability as the potential for danger or loss and considers human beings as elements at risk, alongside structural vulnerabilities like buildings and healthcare systems. The taxonomic approach focuses on the vulnerability of social groups, breaking down vulnerability into different elements (social, economic, environmental, informational, etc.) and identifies components like initial well-being, livelihood resilience, self-protection, societal protection, and social capital. The situational approach analyzes the actual situations of individuals or families rather than their group memberships and recognizes the variability of social vulnerability based on daily, seasonal, and yearly changes in access to resources and power. The contextual-proactive approach encourages communities to use the concept of vulnerability to understand their own exposure and risks and involves thorough analysis with residents to discuss strengths, capabilities, weaknesses, and needs.

The demographic approach is systematic, but often overlooks the nuanced social dynamics of different groups. The taxonomic approach provides in-depth insights, but can be complex and data-intensive. The situational approach captures the dynamic nature of vulnerability and is context-specific, but its qualitative nature may lack broad applicability. The contextual-proactive approach is empowering, but it can be resource-intensive and dependent on active community participation.

These models and approaches collectively highlight the complexity of social vulnerability, emphasizing the need to consider a wide range of factors, including socio-economic conditions, political and institutional structures, and physical environments. They stress the importance of interdisciplinary and community-based strategies to mitigate the impact of disasters and reduce social vulnerability. By integrating local knowledge, empowering vulnerable populations, and addressing underlying social inequalities, these frameworks aim to enhance resilience and improve disaster management.

Conclusions. The concept of social vulnerability is inherently complex and multifaceted, influenced by various interlinked factors. This paper has

demonstrated that broader definitions, while comprehensive, may be too general for targeted interventions. Conversely, simpler definitions, though clear, might lack the depth required for nuanced analysis. Models like the Pressure and Release (PAR) model and the Hazards-of-Place model, along with indexes such as SeVI and BEVI, provide valuable frameworks for understanding vulnerability. Each model and approach has its strengths and limitations, highlighting the need for a tailored application based on specific contexts and objectives. Approaches to assessing social vulnerability—demographic, taxonomic, situational, and contextual-proactive—each offer unique insights. However, the effectiveness of these approaches depends on their application context and the specific vulnerabilities being addressed. To effectively reduce social vulnerability and enhance resilience, it is essential to integrate local knowledge, empower vulnerable populations, and address underlying social inequalities. Interdisciplinary and community-based strategies are crucial for developing holistic disaster management plans. As the concept of social vulnerability continues to evolve, ongoing research and adaptive strategies will be vital in mitigating the impacts of natural hazards and improving the resilience of communities worldwide.

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