



Community resilience to natural disasters: A systemic review of contemporary methods and theories

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ABSTRACT

Due to global climate change, community resilience to natural disasters has become a high priority in environmental research. Academicians and practitioners from different disciplines and organizations include several dimensions to outline the process of building resilient communities. Although this research branch suffers from the lack of a shared theoretical and methodological consensus, many scholars publish research articles each year. Similarly, social scientists include diverse contextual humanitarian dimensions that are challenging to trace. Therefore, this study attempts to undertake a systematic review of the literature of the last 12 years (2010–2021) to outline the current trends in research methods, selected dimensions, and theoretical standpoints from the social perspective. This systematic observation of the literature identifies the recent trends in adopting research design, sampling design, and data collection techniques used for the research. The present review also traces the propensity of including major theoretical dimensions in the research. After identifying the contemporary trends in research, we find that a comprehensive multi-phase research model is necessary to initiate an effective policy-making in a specific socio-ecological context.

1. Introduction

Since its origin in the 1850s, the concept of resilience has become one of the most crucial issues in contemporary literature on climate change adaptation and disaster risk reduction (from the 2000s onwards). This theoretical construct has also been employed widely in psychology in the 1950s and human ecology in the 1990s (Alexander, 2013; Nguyen and Akerkar, 2020). In engineering and physical sciences, this term refers to a “bouncing back” or return to the initial condition after exposure to external forces. Social sciences, however, conceptualize resilience as a dynamic human-centered process that increases the capacity of various systems (e.g., social, governance, economic) to absorb adverse impacts (Cutter, 2016b). Natural hazards are the major external forces that threaten the harmony of the socio-ecological system resilience. Researchers from social sciences include the perspective of resilience to study the adaptation dynamics of human communities regarding natural disasters and vulnerabilities (Liu and Ni, 2021; Uddin et al., 2020; May 2018; Howard et al., 2017; Barrios, 2014).

Recently, various disciplines such as environmental sciences, engineering, psychology, sociology, and economics include a wide range of theoretical concepts, models, and frameworks in community resilience to

natural disaster studies. Theoretically, community resilience to natural disasters emerges from the broader literature on social-ecological resilience. Especially, Holling's (1973) work on ecological resilience has significantly influenced this theoretical concept. This particular research branch of community resilience to disasters has since produced substantial scholarly studies. Nonetheless, there still is the lack of a shared consensus about conceptualizing and measuring community resilience (Tariq, 2021). As resilience is a multidimensional (economic, sociocultural, and biophysical) (Adger, 2000; Adger et al., 2005), multi-scalar (regional, community, and individual) (Elizabeth et al., 2010; Wilson, 2012), and multi-faceted notion (collaborative and cultural) (Matarrita-Cascante et al., 2017; Rotarangi and Stephenson, 2014), it is crucial to define the distinct characteristics of its literature according to the nature and scope of the studies.

This research division of community resilience to disasters does not only lack a shared theoretical framework but hot debates are its part as well. Methodological approaches of community disaster resilience are divided by the core epistemological question of resilience of what or for whom, to what? (Cutter, 2016a). Measurement techniques are different for a particular resilience (e.g., floods, cyclones) and for a wide-ranging resilience (e.g., all types of natural and human-induced hazards) (Cohen

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et al., 2013; Hughes and Bushell, 2013; Ainuddin and Routray, 2012; Sempier et al., 2010). Likewise, there are two groups of academicians with different views. One group focuses on an “objective” measurement (Ainuddin and Routray, 2012; Hughes and Bushell, 2013; Sherrieb et al., 2010) of community resilience while the other group emphasizes “subject” indicators (Béné et al., 2016, 2019; Clare et al., 2017; Jones et al., 2018). Again, two broad procedures are available to measure the community disaster resilience. A quantitative measurement procedure using different indices, scorecards, and tools (Cutter, 2016b; Sharifi, 2016) and a qualitative measurement approach using “surrogates” (Berkes and Seixas, 2005; Ross and Berkes, 2014).

Multiple perspectives, burning epistemological questions, conceptual confusion, and operational debates create a puzzle in this literature. Even complexities are apparent in defining the term community resilience, which further fetches more variations in incorporating social dimensions and contexts in the investigations. Also, social scientists, mainly academicians, and researchers from anthropology, economics, political science, psychology, and sociology, analyze the role of multifarious social aspects to understand the trajectory of community resilience to natural disasters. According to the conceptualization of the term community resilience and socio-ecological features, they comprise several social theories and methods that are highly contextual and challenging for understanding the present state of knowledge from the social perspective. The existing literature lacks review articles that analyze trends in methods and theories used for research from the societal perspective. In such conditions, a systematic review of the literature on community resilience to natural disasters from the social research perspective is necessary to illustrate the advancement and present status of this interdisciplinary field of study. Therefore, we undertake a systematic review of literature from 2010 to 2021 to trace the contemporary trends in social research from methodological and theoretical perspectives. As this study summarizes the applied methods and theories of social sciences, it will help future research to design the most applicable research methods, techniques, and theories for this research wing. Besides, this study identified those social dimensions that got less attention in the existing literature. Hence, this study will serve as a foundation for future research. Moreover, as current literature lacks a shared theoretical framework, the study proposes a comprehensive multi-phase research model to develop a shared theoretical framework and effective policies for a specific socio-ecological context to strengthen community resilience to natural disasters.

2. Research methodology

An appropriate research framework is essential to guide the systematic review that provides an opportunity to study the vast literature on community resilience to natural disasters. We use the ‘Preferred Reporting Items for Systematic Reviews and Meta-Analyses’ (PRISMA) method as the primary technique, which is a commonly used methodology for literature review (Moher et al., 2015). This method focuses three sections (identification, screening & eligibility, and inclusion) that allow identifying literature in a systematic way.

2.1. Selection of research articles

We use Web of Science (WoS) and Scopus databases to search for research articles, which are widely used by scholars (Gusenbauer, 2019), using advanced search based on specific keywords to identify the target literature. The search command we use was “Community resilience” and “Natural disasters” in the time range from 2010 to 2021.

The command retrieved respectively 243 and 263 records from WoS and Scopus databases. After merging all matched items, we identified 448 records for screening. Next, we excluded 316 articles by screening for Title, Keywords, and Abstract according to exclusion criteria listed below. Subsequently, we evaluated 132 full-text research articles and

excluded 70 scholarly articles using the same exclusion criteria again. This procedure gave us 62 research articles for the final review. Fig. 1 displays the PRISMA flowchart for this systematic analysis.

2.2. Inclusion and exclusion criteria

This study applied following inclusion and exclusion criteria to select the articles (Table 1).

2.3. Techniques of data collection

All selected articles were reviewed intensively to collect the data about various parameters. The major focus was on applied methodological approaches and theories. We classified broad research approaches (Quantitative/Qualitative/Mixed methods) of the selected articles and outlined the information about research design (Explorative/Descriptive/Analytical), sampling design (Probability/Non-probability/Census/Multiple), sources of data collection (Secondary/Primary/Multiple), and data collection techniques (e.g., Survey, Interviews, Focus Group Discussion, Key Informant Interviews). Moreover, we attempted to summarize the theoretical concepts or standpoints of the published research items to trace the trend, background, and dimensions that connect the literature with broad theoretical perspectives.

2.4. Data processing and analysis procedures

We manually coded the extracted data of the selected articles and organized them in MS Excel for a representation through tables and figures before carrying out their analysis. We used the peer debriefing approach to ensure the validity and credibility of our study (Baxter and Eyles, 1997). By applying peer debriefing approach we critically reviewed and systematically followed the implementation of methodological procedures. The first author screened and evaluated the retrieved articles following the exclusion and inclusion criteria. Next, he coded all retrieved information and organized it in a tabulated form. The second author rechecked the process of data coding and organization. Both authors reached a consensus after several rounds of discussion and cross-checking.

3. Results

3.1. General impressions

Many globally well-recognized publishing organizations promote the concept of community resilience and frequently publish scholarly articles that use different dimensions and ideas. Table 2 provides the frequency distribution of some general aspects (top five publishers of reviewed research articles, top seven publishers of reviewed research articles, top five countries as a field of study, types of studied disasters of reviewed articles) that we outlined to understand the current state of community disaster resilience research.

We identified 15 publishing companies that had published all research articles we have selected. The top five publishers of this research area include Elsevier, Springer, Taylor & Francis, MDPI, and Blackwell Publishing Ltd. We also include 37 journals that publish studies in this research area. Of these, the *International Journal of Disaster Risk Reduction* published maximum research articles from those we selected for this study. Table 2 also lists other top journals. Notably, interdisciplinary journals on disaster studies publish more scholarly articles on community resilience to natural disasters than other journals of environmental sciences that are not interdisciplinary.

Due to global climate change, natural disasters have become more devastating and more frequent than ever. Most of the selected empirical studies examine community resilience against specific disasters; however, 12 studies investigate community resilience in general. Also, most

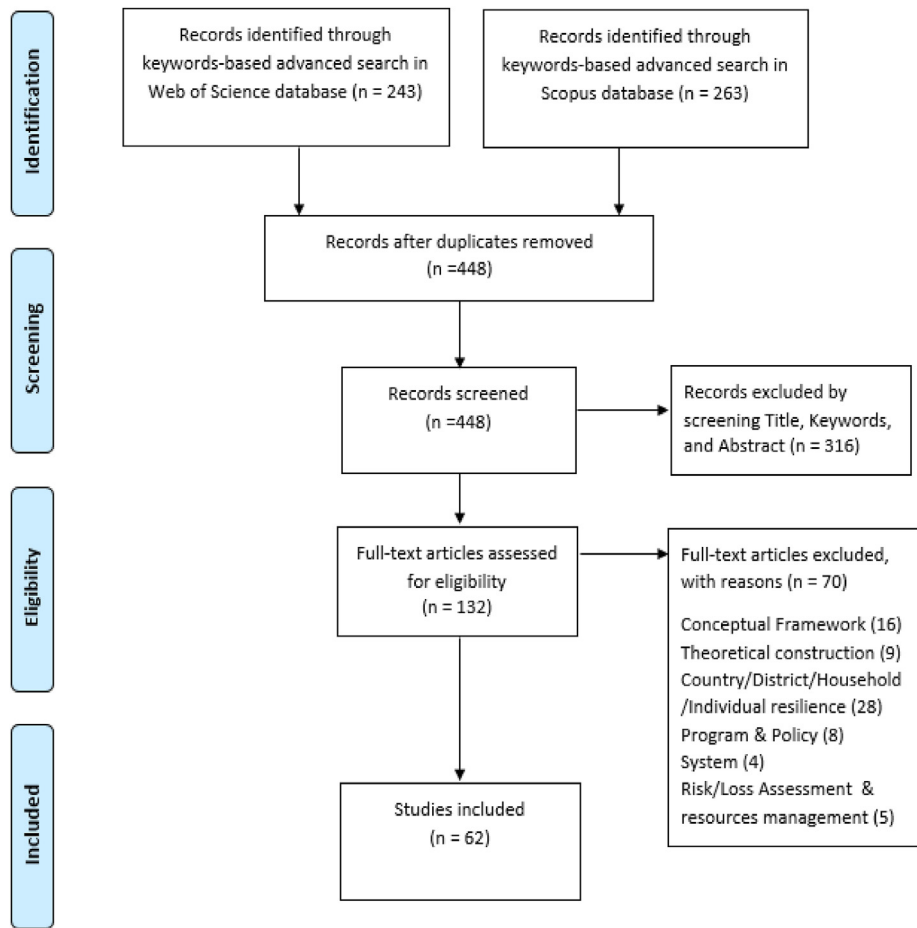


Fig. 1. PRISMA flowchart for this systematic study.

Table-1
Applied inclusion and exclusion criteria to select the articles.

Inclusion Criteria	Exclusion Criteria
- Research articles that focused on the societal side of community resilience to natural disasters or nature-induced shocks and stresses - Scholarly articles published between 2010 and 2021	Exclusion criteria for the screening stage: - Books, book chapters, review articles, conference proceedings, concept papers, and editorial material - Articles whose title, keywords and abstract did not represent community resilience to natural disaster Exclusion criteria for the eligibility stage (full-text analysis): - Articles that focused on human-induced shocks and stresses - Articles that explored the resilience of physical and mental health - Articles that investigated the resilience of businesses, organizations, institutions, systems, programs, and policies - Articles that focused only on food/ livelihood security/resilience - Articles that focused only on resources loss, management, and conservation - Theoretical, methodological, and conceptual articles that are not an empirical study

of the studies focus on floods (n = 19). We found that scholars from different counties are engaged in this research and have conducted empirical studies in 26 countries (Fig. 7). Most of the research work is conducted in the USA, Bangladesh, Australia, China, and Canada as these countries are hotspots of many disasters.

3.2. Research designs and methods

In general, the social research designs/approaches vary according to the general purposes of the study: a) Exploratory, b) Descriptive, and c) Explanatory/analytical (Babbie, 2010). Fig. 2 shows the general trend of research designs selected by the scholars, among which explanatory/analytical research design dominate the field. About 43% of the selected articles followed the analytical research design whereas 39% and 18% of research articles followed descriptive and exploratory research design respectively. Such sample statistics indicates that drawing out for every socio-ecological setting an explanation or a causal relation from among the diverse concepts and variables of community resilience to natural disasters can be very difficult. Still, researchers search for answers to new research questions and problems and attempt to measure and understand their relationships.

Broadly, social researchers classify research methods into three distinct types: a) Quantitative methods, b) Qualitative methods, and c) Mixed methods (Creswell, 2009). Our study shows that recent research projects frequently adopt the quantitative approach to investigate the issue (Fig. 2). Among all empirical studies, about 43% of the articles utilized a fully quantitative research method that drew out causal relationships among the studied concepts or variables; 34% of the studies

Table 2
General impressions about selected reviewed articles.

	Top Five (05) Publishers of Reviewed Research Articles	Frequency
Publishers (N = 15)	Elsevier	18
	Springer	11
	Taylor & Francis	10
	MDPI	7
	Blackwell Publishing Ltd	3
Journals (N = 37)	Top Seven (07) Publishers of Reviewed Research Articles	
	International Journal of Disaster Risk Reduction	8
	Natural Hazards	5
	Journal of Environmental Planning and Management	4
	Global Environmental Change-Human and Policy Dimensions	3
	Sustainability	3
	International Journal of Environmental Research And Public Health	3
	Disasters	3
	Top Five (05) Countries as the field of study	
	USA	11
The country as Field of Study (N = 26)	Bangladesh	8
	Australia	7
	China	7
	Canada	4
	Types of Studied Disasters of Reviewed Articles	
Natural Hazards (N = 7)	Floods	19
	Cyclones & Coastal Hazards	12
	Earthquake & Tsunami	10
	Storms & Typhoons	7
	Wildfire	4
	Drought	2
	General	12

selected the qualitative approach; and the rest 23% used a mixed-methods approach to conduct the empirical investigation. This simple statistical analysis shows that a considerable portion of studies in this subfield deal with complex subjective issues that demand a qualitative or mixed-methods approach. On the contrary, quantifying all variables and identifying the causal relations in every context seems challenging for this highly interdisciplinary field of study.

3.3. Data sources and sampling design

Generally, there are two types of data sources, primary and secondary; however, in many research projects, researchers collect data using both sources. So, we classified the data sources for empirical social research into three types: a) Primary, b) Secondary, and c) Multiple. Fig. 2 displays the general trend of data source selection for studying community resilience to natural disasters. From the percentage analysis, it is evident that researchers mainly rely on primary sources. About 71% of the research papers utilize primary sources only. Also, about 16% of the studies rely exclusively on secondary sources for collecting the data, while the remaining 13% depend on multiple sources. This analysis indicates that the subject matter and dimensions of the research projects in this research branch require data collection mainly from primary sources. However, the analysis also indicates that recorded data or secondary sources are largely unavailable for this field of study. Many researchers have utilized multiple data sources to understand the overall scenario of their study area.

Designing an appropriate sampling framework is crucial to ensure a proper representation of the studied population. We divided sampling design into four main categories: Probability sampling, Non-probability sampling, Mixed sampling, and Census (Fig. 2). Notably, more than half (51%) of the empirical studies preferred the non-probability

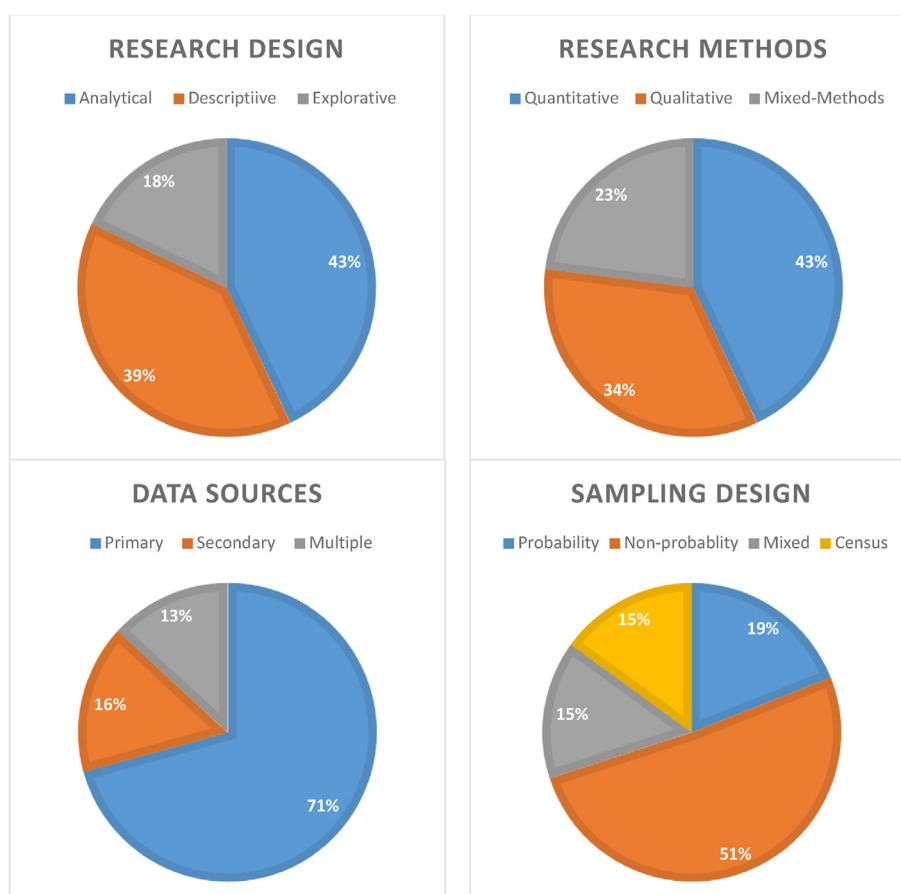


Fig. 2. Current trend of selecting a research design, research methods, data sources, and sampling design.

sampling framework. Researchers tend to select a non-probability sampling technique not only because reliable population records are scarce; the subject matter of the research projects also plays a role in sample selection process (Choudhury et al., 2021a,b,c; Hanson-Easey et al., 2018). Probability sampling design is selected only when a reliable dataset is available or prepared for that target population (in 19% of the studies reviewed here). Some researchers have selected probability sampling for the quantitative side and non-probability sampling for the qualitative side in their investigation, thus opted for the mixed methods approach. However, in community disaster resilience research, the application of mixed sampling design (15%) and census framework (15%) seems relatively lower than other two categories. This observation indicates that a rich database about community disaster resilience is still largely unavailable despite the global interest it has garnered.

3.4. Primary data collection techniques

We coded all primary data collection techniques of the reviewed articles to understand the current tendency in adopting diverse data collection techniques for social research. Fig. 3 represents the frequency distribution of the data collection techniques utilized by community disaster resilience researchers in the last 12 years. The general trend shows that most empirical studies have employed multiple data collection techniques to collect primary data from the target population. The interdisciplinary nature of this research segment requires using multiple primary data collection methods and researchers use different data collection techniques and tools according to the context and objectives of the studies. Also, our study shows that scholars show a preference to collect data face-to-face by using questionnaires, checklists, and guide questionnaires. Predominance of survey (n = 32) method over other techniques is evident though. Researchers use this method as it can include both quantitative and qualitative aspects of community disaster resilience. Although household survey was the most common survey method, researchers have also used other types of survey including community survey, longitudinal survey, cross-national survey, or mail survey. Investigators have also used interviews (n = 19), focus group discussions (FGDs) (n = 15), national and institutional databases (n = 10), key informant interview (KII) (n = 8), official documents (n = 7), in-depth interviews (n = 4), participant observation (n = 4), oral history (n = 5), case study (n = 3), ethnographic interviews (n = 3), and observation methods (n = 3) for collecting their data.

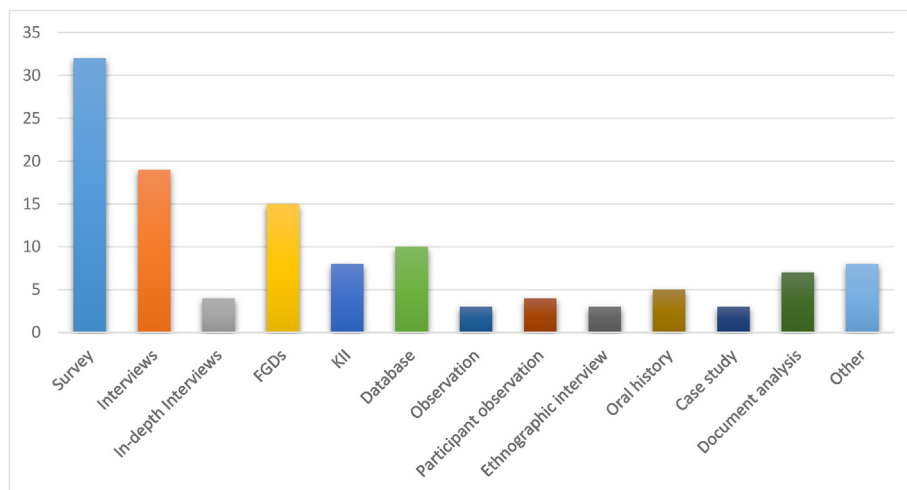


Fig. 3. General trend of employing various data collection methods.

3.5. Link between methods and dimensions

We found a prevailing trend of adopting research methods according to different dimensions of studies (Table 3). Generally, when scholars examine the causal relations between various concepts or measure/assess the capabilities of disaster-prone communities from diverse perspectives, they choose a quantitative research approach. However, when they conceptualize community disaster resilience as a dynamic composite process and investigate complex subjective issues, they prefer a qualitative research method. On the other hand, researchers apply a mixed-methods approach when they investigate community capabilities, social practices, and coping/adaptational strategies in a single study.

We categorized the dimensions of community resilience to natural disasters into four broad groups that exclusively demand a quantitative method: a) Community resources and capacity assessment; b) Disaster preparedness, risk, and loss assessment and planning; c) Social capital assessment; and d) Perception, risk communication, and psychological investigation and assessment. Most of these explore the state of communities' strengths or weaknesses at a certain period with numeric expressions and draw causal relations.

On the other hand, many scholars find qualitative research methods more effective than other methods to study community disaster resilience (Cox and Hamlen, 2015; Mottershead et al., 2020; Choudhury et al., 2019). We also categorized some of the issues that require the qualitative method. Several research articles indicate that a qualitative method is suitable for examining four dimensions: a) Social learning, indigenous knowledge, and adaptation process; b) Governance, institution, and power dynamics; c) Place attachment, culture, and constraints; and d) Building social capital, risk communication, and collective action.

However, we also traced an emerging tendency to adopt a mixed-method approach that provides the researcher comprehensive insights from both quantitative and qualitative analyses. It is apparent that while researchers and practitioners assess and clarify any dimensions of community resilience to disasters at the same time in a single study, they use a mixed-method approach.

3.6. Theoretical dimensions and contemporary trends

The diversity of theoretical approaches is evident in the selected literature. Fig. 4 shows various theoretical standpoints of research articles through frequency distribution. The general trend indicates that

Table 3
The link between methods and conceptual dimensions.

Research Method	Broad Issues	Dimensions	Few Reference
Quantitative	Community resources & capacity assessment	Social, economic, institutional, infrastructure, environmental, community capital/resources	Ainuddin and Routray (2012); Cutter et al. (2010); Song et al. (2018); Taylor et al. (2015); Yoon et al. (2016)
	Disaster preparedness, risk, and loss assessment & planning	Interaction, awareness, efficient planning, optimal resources allocation, organizational network, centrality	Cui et al. (2018); Ma et al. (2021); Sapkota et al. (2021)
	Social capital assessment	Network characteristics (size, network density, proximity, length of relationship); civic engagement, contact with neighbors, trust, institutional network	Carrico et al. (2019); Cohen et al. (2013); Paton et al. (2010); Schwarz et al. (2011)
	Perception, risk communication, Psychology investigation & assessment	Risk perception, communication, early warning system, information sharing, self-efficacy, collective efficacy	Aksha and Emrich (2020); Mavhura et al. (2013); Mottershead et al. (2020); Onstad et al. (2012)
Qualitative	Social learning, Indigenous knowledge, and adaptation process	Social memory, local/traditional knowledge, Institutional learning, and community planning & practice	Choudhury et al. (2021a); Choudhury et al. (2021b); Gómez-Baggethun et al. (2012); Wung and Aka (2019)
	Governance, Institution, and Power dynamics	Local institutions, good governance, participatory governance, adaptive governance, power-elite dynamics	Barrett et al. (2011); Choudhury et al. (2019); Choudhury et al. (2021); George and Stark (2016)
	Place attachment, culture, and constraints	Identity, disaster subculture, religious beliefs, uncertainty, barriers, disconnect	McNamara (2020); Cox and Perry (2011); Engel et al., 2014; Kiem and Austin (2013)
	Building social capital, risk communication, collective action	Bridging ties, neighborhoods, cooperation, community psychology, community preparedness, community response, migration	Hanson-Easey et al. (2018); Howard et al. (2017); Madsen and O'Mullan, 2016; Nolet (2016)
Mixed-Method	Both assessing and exploring	Livelihood reconstruction, livelihoods adjustment, tourism impacts; participatory planning, people-place connection	Kamal et al. (2018); Nurzaman et al. (2020); Tsai et al. (2016); Uddin et al. (2020), 2021
	Governance approaches and Strategies	Power relation, power dimension, multi-level governance, relocation, reconstruction,	Brokopp et al. (2015); Choudhury and Haque (2016); Hambati and Yengoh (2018); Zhong et al. (2020)

Table 3 (continued)

Research Method	Broad Issues	Dimensions	Few Reference
		informal settlements, strategy selection, transformative adaptation	

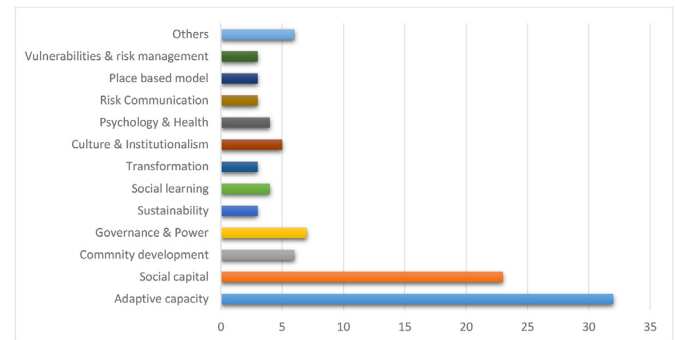


Fig. 4. Contemporary trend of theoretical dimensions of community resilience to natural disasters.

different contexts and components guide the research trajectory and not a single theoretical framework. For the last two decades, theoretical triangulation is a common characteristic of the published articles. It is evident that many scholars incorporate a couple of theories to operationalize the definition and select the variables. We observed that more than half of the empirical research projects ($n = 32$) were conducted by through adaptation/adaptive capacity as the central theoretical framework. Social capital ($n = 23$) is another significant theoretical standpoint that researchers frequently include in community disaster resilience investigation. Besides, the perspectives of governance and power ($n = 7$) and community development ($n = 6$) of community disaster resilience are emerging too. However, many scholars have addressed the significance of culture and institutionalism, social learning, psychology and health, and other diverse theoretical standpoints of community resilience to natural disasters (Fig. 4).

3.7. Trends in conceptual definitions of community resilience to natural disasters

Even after several decades of studies, the concept of resilience in social sciences remains a puzzle. Walker et al. (2004) and Folke et al. (2010) state that resilience is the ability of socio-ecological systems (SES) to persist within critical thresholds despite continuous modification and adaption. Norris et al. (2008) state that the meanings of community resilience and resilience are almost similar even though heterogeneity in the definition of the community has further complicated this concept (Norris et al., 2008). Therefore, we analyze and outline the general trend of current literature to define the concept of community.

We find that most of the studies agree with Räsänen et al. (2020) regarding conceptualizing community. They draw three approaches to classify different types of community from the general literature in social sciences and fit them within the context of disaster resilience: a) Place-based community, b) Interaction-based community, and c) Community of practice and interest. The first categorization refers to a (small) geographically defined group. Most of the research articles consider small administrative units as a proxy for communities (Choudhury et al., 2021a; Dean, 2015; Nolet, 2016). Some scholars also select interaction-based community, emphasizing social interaction and social networking. The influences of social capital has received a significant attention in studying such communities (Barrett et al., 2011; Cohen et al.,

2013; Hanson-Easey et al., 2018). Community of practice and interest refers to the organized actions of actors who regularly interact and react collectively. Such conceptualization of community becomes apparent when scholars explore social learning, knowledge transmission, or community development (Barrios, 2014; Xu et al., 2020; Zhong et al., 2020).

In the existing literature, many scholars examine the various definitions of community resilience to disasters according to the core elements and dimensions of resilience and attempt to categorize them (Patel et al., 2017; Koliou et al., 2020). However, we identified two general trends in conceptualizing community disaster resilience: a) as a dynamic process of societal transformation (Fantechi et al., 2020; Gawith et al., 2016; Kulig and Botey, 2016; Taylor et al., 2012) and b) as a set of fixed capabilities (Aksha and Emrich, 2020; Moreno and Shaw, 2019; Taylor et al., 2015; Tsai et al., 2016). Definitions of both kinds have conceptual limitations too. The involvement of different concepts from multiple disciplines and multidimensional development action programs creates this situation. If community resilience to disasters is considered as a dynamic process, it will be challenging to combine and operationalize all related concepts into one definition. Alternately, when defined as a combination of fixed capabilities, critical interconnected dynamic relations among various concepts remain ambiguous. Although researchers and academicians showed their tendency to define community resilience to natural disasters by adopting both ideas of dynamic process and set of capabilities, practitioners emphasize the second criterion as they try to strengthen community resilience by improving community capabilities.

After reviewing all available definitions from the reviewed articles, we found that two conceptualizations are at the center of all definitions. The first is provided by Norris et al. (2008), who define community resilience as “a process linking a set of networked adaptive capacities to a positive trajectory of functioning and adaptation in constituent populations after a disturbance.” The second is provided by the United Nations International Strategy for Disaster Reduction (UNISDR), which defines community resilience as “the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions” (UNISDR, 2013).

However, this study identified (see Table 3) that methods and theories of a study vary due to distinct manners of defining the term community resilience. Therefore this study infers that because of such distinctions, this research wing encounters a lack of shared methods and theories. To get a shared framework, the concept of community resilience should be considered both as a dynamic process and a set of capabilities.

4. Insights for future research

Table 2 shows different dimensions that social scientists have investigated in the last 12 years. It is clear that some social issues remain empirically understudied (local politics and governance, gender role and agency, inequalities and social justice) and need more attention in future research.

4.1. Politics and governance

The current theoretical frameworks offer a window to study community disaster resilience from the institutional and governance perspectives (Norris et al., 2008; Ziyath et al., 2013); nonetheless, the influences of power relations and political dynamics in shaping community resilience to natural hazards has received less attention in both theory and practice. It is clear from the existing literature that external interventions are crucial to increase human agency in strengthening community disaster resilience (Liu and Ni, 2021; Choudhury et al., 2021a,b,c; Villagra and Quintana, 2017). Many studies explain the contribution of governmental institutions at the macro level through the designing of policy and action programs (Nurzaman et al., 2020; Uddin

et al., 2020; Yoon et al., 2016). However, the functions of local power elites and the social dynamics of local political institutions are not discussed as in detail as the central power body is. Some studies do, however, mention that local power elites limit the access of marginal people to public goods or common pool resources (Choudhury and Haque, 2016; Choudhury et al., 2019) and suggest conducting more research in this regard. Likewise, Mavelli (2017) uses Michel Foucault's theory of governmentality, biopower, and disciplinary technology, which could provide a solid theoretical background to study multi-level power dynamics for future research.

Knowledge (both local and expert) is important for governance and has a critical significance in climate-induced disaster resilience-related decision-making (Beauchamp et al., 2020). Many research outcomes have suggested that local knowledge and informal learning play a significant role in climate adaptation and disaster resilience. Also, researchers emphasize the necessity of both scientific and local knowledge in policymaking (Choudhury and Haque, 2016; Choudhury et al., 2021a,b,c). However, research has yet to provide a model that could effectively combine scientific and local knowledge to increase community disaster resilience. The merger of local and scientific knowledge is not seen in the disaster policies of many developing and underdeveloped countries and future researchers should investigate why local and expert knowledge remains outside the policymaking in many countries and what could be the best way to make it a part of policymaking.

4.2. Gender role and agency

Gender is a crucial dimension that is almost absent in the literature on community resilience. Although some articles attempted to explain the status and contribution of women in community disaster resilience, detailed analysis from feminist perspectives was missing (Choudhury et al., 2019; Jordan, 2019). The literature on disaster shows that women are more vulnerable in the contexts of disaster than men (Cox and Perry, 2011). Both disaster and resilience literature have overlooked the contributions of women to climate and disaster adaptation processes; even community disaster resilience literature has undervalued women's agency and social networks (Jordan, 2019). Also, in many societies, especially in developing countries, women are not welcomed in disaster-related decision-making and activities; they remain excluded from both community and family decision-making processes (Choudhury et al., 2018). This study posits that after experiencing a severe environmental shock, like men, women actively try to recover from the loss quickly by utilizing their networks and capabilities.

Therefore, this study acknowledges the importance of a feminist theoretical standpoint in examining gender-related dynamics in community disaster resilience. Particularly in future research, it should be outlined how and to what extent women can apply social networks, practical knowledge, and skills in strengthening household and community resilience. Also, in the context of rural under-developed societies, it should be figured out how women can participate in the decision-making process at the community level.

4.3. Inequalities and social justice

The effects of climate change-induced shocks and stresses are socially differentiated (Adger, 2003). Women, disabled persons, and older people are much vulnerable to natural disasters. While not all groups and classes of people are likely to experience the effects similarly, it is important to understand climate change adaptation from the points of view of social equity and social justice. However, we find in our review that this dimension of climate change and disasters is still understudied. A major question remains though: how to ensure social justice and equity in climate change adaptation and extreme weather events while social differentiations are universal? Often, development interventions to enhance adaptation capabilities are guided by a deficit model in which communities are considered weak and vulnerable. For example, some

scholars suggested examining three types of social justice: a) distributional justice; b) procedural justice, and c) recognition justice (e.g., Popke et al., 2016) using the capability approach (Sen, 1999) and ask the question how disadvantaged groups like women can be a driver of change instead of being a mere victim of climate change? Future studies should concentrate on the processes that shape access to natural resources and community disaster resilience through socially embedded institutions such as norms, roles, values, and cultural practices.

Finally, while the idea that social capital positively influences human agency and community capacity dominates the community disaster resilience literature, a few researches (Jordan, 2015; Murphy, 2007) also show that due to misuse of social networks, some people remain excluded from post-disaster assistance programs. Social capital might be dysfunctional while affected by adverse effects of local power dynamics, ethnicity, religion, nepotism, and corruption. More intensive research, however, is required to explore the intensity of adverse effects of social capital on different marginal and minority groups, which continuously produce and reproduce social exclusion, intensive social inequality, and hinder the resilience of communities to disasters.

4.4. Proposed methodology for future research

Holling and Gunderson (2002) illustrate that panarchy (interaction of multiple socio-ecological systems at various scales of space, time, and social organization) is one of the central characteristics of resilience thinking. Berkes and Ross (2013, 2016) emphasize the necessity of an integrated approach in both theory and practice. We agree with these studies that it is challenging to develop effective policies from theoretical conceptions without an integrated strategy that involves multilevel participation and multidimensional contexts. Haas et al. (1977) and Kates et al. (2006) identified some phases of reconstruction and recovery after extreme external forces. Inspired by these studies and keeping in mind that natural disasters have multi phases of impact, we trace the different phases of disaster resilience that researchers have studied in the last 12 years. Fig. 5 shows the frequency distribution of the phases of community resilience to disasters that are studied. It is apparent that researchers emphasize the post-disaster period to investigate community resilience to natural hazards and extract the insights from that period. Some studies also include pre and post-disaster periods, but only a few studies have conducted investigations by focusing on all three general phases of disaster. Based on this, we conclude that the lack of research that examines all phases and all dimensions of disasters is a limit in creating a general shared framework of studying community resilience to a particular natural disaster in a specific socio-ecological context.

We conceptualize community disaster resilience-centered research issues as five distinct but interrelated phases and propose an integrated phase research model to guide the future research (see Fig. 6). The main

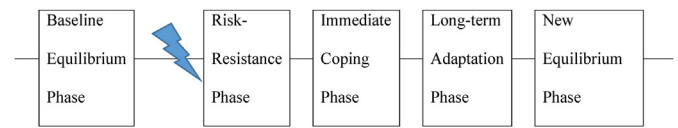


Fig. 6. Integrated multi-phase research model for community resilience to disaster.

objective of the proposed model is to translate interconnected and comprehensive facts of sequential phases of disasters in a particular socio-ecological context.

The model starts with a pre-disaster baseline equilibrium phase. At this phase, the community has both inherent vulnerabilities to natural hazards and capacities to recover from them. Therefore, it is essential to measure both micro- (individuals, households, and place-based communities) and macro- (infrastructure, governmental, and various non-governmental organization) level vulnerabilities and capabilities to determine the baseline equilibrium phase.

The next phase, the risk-resistance phase, refers to the onset-disaster conditions. In this phase, it is crucial to identify how various social systems respond to disasters to manage the risks of that geographic system. By identifying the weaknesses of a system, further effective policy can be then included in the emergency response system.

In the third phase, both micro- and macro-level actors adopt different short-time coping strategies to recover from the loss. Some coping strategies bring positive outcomes and convert them into formal or informal adaptive practices. On the other hand, some coping strategies bring positive outcomes and become transformed into formal or informal adaptive practices. Researching coping mechanisms after a disaster can enable communities and governments to implement appropriate post-disaster recovery strategies and policies.

In the fourth phase, which is the long-term adaptation phase, households, communities, and governments adopt long-time approaches to reduce the loss and protect communities from the future threats. Research studies across socio-ecological settings regarding long-term disaster prevention and recovery strategies are required to develop a state-wide model and to bring significant positive changes in systems, organizations, institutions, and actions. Such an adaptation leads a society from one equilibrium to another with minor or remarkable changes.

The last phase is the new equilibrium phase, which is similar to the first phase but also has features of other phases. At this phase, just as in the first phase, it is crucial to assess the capacities and vulnerabilities of the changed societies. By comparing the first and final phases, scholars can understand and measure the extent of social changes that are due to natural disasters.

Since different natural disasters result in distinct shocks and distress,

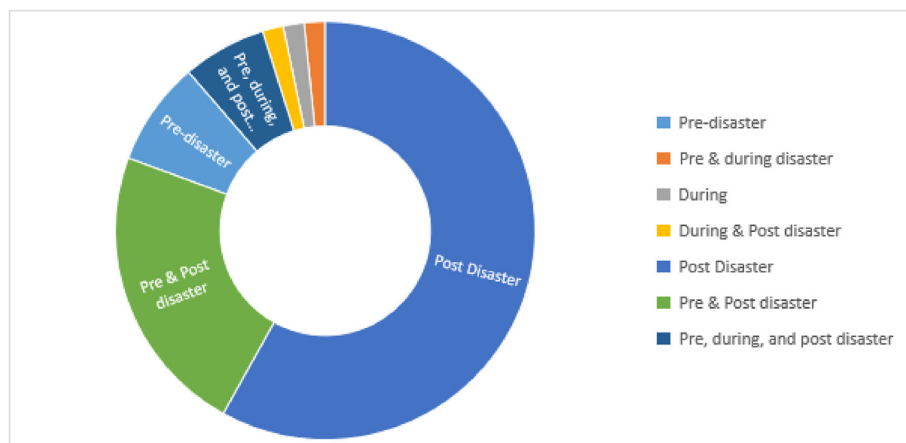


Fig. 5. Phases of disaster investigated in the last 12 years.

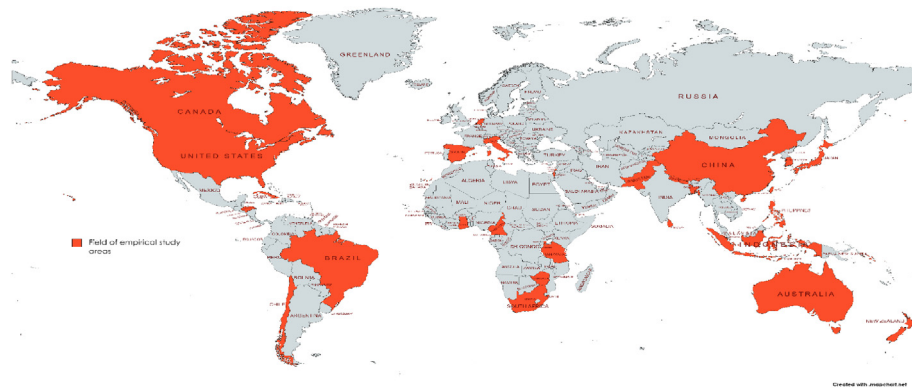


Fig. 7. Study areas (highlighted countries) of reviewed empirical studies.

continual and multi-phased cumulative research projects for each natural hazard are essential to initiate appropriate policies. We believe that in addition to single-phase studies, multi-phased research projects are also necessary to observe the overall scenario from the baseline equilibrium to the new equilibrium. Such multi-phased research projects for community resilience to a specific natural disaster can provide a common theoretical perspective that is lacking in the literature. However, the authors of this study assume that the execution of this proposed multi-phased research model will be challenging in many countries because of the lack of enriched secondary data sources regarding community disaster resilience. In addition, for such extensive and longitudinal research projects, both organizational and financial aids are essential to acquire expected outcomes. Also, for diverse socio-ecological settings and natural disasters, various multi-phased cumulative research projects are required. The careful combination of the outcomes from several such research projects can be the foundation of a shared community disaster resilience framework.

5. Limitations

As the central objective of this study is to outline current trends in applying social methods and theories to investigate community resilience to natural disasters, this study focuses less on critical analysis of the reviewed literature. Although there are many aspects of social research, this study focuses only on some aspects of social research (research approaches, research design, sampling design, sources of data collection, and data collection techniques) and supposes the necessity of another review study to investigate the rest of multiple issues. For example, this study does not cover ethical considerations of research, analysis tools, and techniques. Different ethical considerations and distinct modes of data analysis can significantly influence the outcomes of any study. Also, this study follows a descriptive manner of analysis and digs out some societal aspects that received less attention in the existing literature. However, the authors strongly recommended another literature review that will critically evaluate the progress and limitations of this research field from the social perspective.

6. Conclusion

Community resilience to natural disasters is a multidisciplinary

research branch and social scientists include several social issues from different theoretical perspectives and use various techniques to investigate them. Because of its multidimensional nature, it is challenging to draw out a general trend of the contemporary methods and theories. However, we found that researchers have employed both quantitative and qualitative approaches in empirical research with almost equal emphases and the frequency of following explanatory/analytical and descriptive research design is equivalent.

The general trend implies that the reviewed research articles depend on primary sources for collecting raw data. It is evident that researchers have used a wide range of data collection methods; however, surveys, interviews, and FGDs are more frequent than other methods. Also, a preference for using non-probability sampling is seen. In addition, it was found that adaptive capacity and social capital remain the major theoretical dimensions of community resilience to natural disasters, and local power dynamics, gender, and social justice are generally unstudied.

The focus only on a particular phase (e.g., post-disaster phase) of community disaster resilience-centered research limits deriving a comprehensive model for the field. Therefore, we suggest a multi-phase cumulative research approach to study a particular socio-geographical context that will enable researchers to come up with a holistic model that could be applicable across the board. However, as this systematic review only focus on the current trend of social research from the methodological and theoretical perspectives; it remains within its own boundaries. Future review researches have the opportunity to focus on other aspects of social research to draw the overall evolution of societal part of community resilience to disasters.

Declarations

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- These authors contributed equally to this work.
- The authors have no competing interests to declare that are relevant to the content of this article.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix. List of selected articles

Year of Publication	References of the selected articles	Number of reviewed articles
2010	Cutter et al. (2010); Paton et al. (2010); Sherrieb et al. (2010)	03
2011	Schwarz et al. (2011); Cox and Perry (2011); Barrett et al. (2011)	03
2012	Taylor et al. (2012); Onstad et al., 2012; Gómez-Baggethun et al., 2012; Ainuddin and Routray (2012)	04
2013	Cohen et al. (2013); Kiem and Austin (2013); Mavhura et al. (2013)	03
2014	Barrios (2014); Pujadas Botey and Kulig (2014); Engel et al. (2014); Fois and Forino (2014)	04
2015	Razafindrabe et al. (2015); Binder et al. (2015); Dean (2015); Kim and Marcouiller (2015)	04
2016	George and Stark (2016); Tsai et al. (2016); Kotzee and Reyers (2016); Cagney et al. (2016); Nolet (2016); Kulig and Botey (2016); Yoon et al. (2016); Gawith et al. (2016); Madsen and O'Mullan (2016); Choudhury and Haque (2016)	10
2017	Howard et al. (2017); Villagra and Quintana (2017); Hambati and Yengoh (2018)	03
2018	May 2018; Kamal et al. (2018); Hanson-Easey et al. (2018); Song et al. (2018); Sadri et al. (2018); Cui et al. (2018); Kim and Marcouiller (2018)	07
2019	Wung and Aka (2019); Carrico et al. (2019); Choudhury et al. (2019); Moreno and Shaw, 2019	04
2020	McNamara (2020); Nurzaman et al. (2020); Mottershead et al. (2020); Uddin et al. (2020); Chen et al. (2020); Xu et al. (2020); Aksha and Emrich (2020); Zhong et al. (2020); Fantechi et al. (2020)	09
2021	Uddin et al. (2021); Choudhury et al. (2021); Sapkota et al. (2021); Ma et al. (2021); Liu and Ni (2021); Hwang and Joo (2021); Choudhury et al. (2021a); Choudhury et al. (2021b)	08

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