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Community resilience to the health and wellbeing impacts of environmental and climate change: a review

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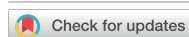


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Community resilience to the health and wellbeing impacts of
environmental and climate change: a reviewZ A Becvarik^{1,*} , Z Leviston² , E I Walsh¹ and A Lal¹ ¹ National Centre for Epidemiology and Population Health, Australian National University, Canberra, Australia² School of Medicine and Psychology, Australian National University, Canberra, Australia

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E-mail: zoe.becvarik@anu.edu.au**Keywords:** community resilience, climate change, health, wellbeing, frameworkSupplementary material for this article is available [online](#)

Abstract

Several frameworks and assessment tools exist to understand and evaluate community resilience to climate change and disasters. Yet limited research explicitly measures community resilience to health risks of a changing environment. This review aimed to identify and assess the dimensions and indicators of community resilience frameworks for the health and wellbeing impacts of environmental and climate change. Electronic databases (PubMed, Scopus and Web of Science), grey literature, and reference lists of included studies were systematically searched and screened using inclusion/exclusion criteria at the title and abstract level and then full-text, according to the preferred reporting items for systematic reviews and meta-analyses (PRISMA) Guidelines. Charted data was analysed using qualitative and quantitative synthesis methods, with dimensions and indicators coded and re-categorised to identify core resilience components and their co-occurrence. Across the 8243 studies screened, 11 unique dimensions and 41 indicator categories of community resilience were identified. The most common dimensions were economic, community capacity, social, and institutional and political dimensions, with no frameworks including both health and environmental dimensions. Consensus on how to measure common dimensions was lacking and many of the indicators required for a comprehensive assessment of health-related community resilience were inconsistently or infrequently employed. Overall, the capacity of the frameworks to account for socially differentiated impacts across a community, as well as factors relating to health and wellbeing, culture, communication and information, and knowledge, attitudes, and behavioural practices, was insufficient. Findings highlight the need for further studies focused explicitly on health impacts and hazards to establish greater consensus on core dimensions and indicators, including under-represented components and their interconnections. This review makes a strong case that community resilience frameworks for the health impacts of climate change will require greater integration of environmental and health dimensions; factors that more accurately reflect public health interests and dynamics; and equity considerations for unique place-based contexts.

1. Introduction

The concept of resilience has gained popularity over the last several decades across academic disciplines and government discourse, as a form of prevention and preparedness to shocks and stressors [1, 2]. The IPCC defines resilience as ‘the capacity of social,

economic and ecosystems to cope with a hazardous event or trend or disturbance, responding or reorganising in ways that maintain their essential function, identity and structure ... while also maintaining the capacity for adaptation, learning and transformation’ (p 7) [3]. This definition considers a system’s adaptive, absorptive, and transformative capacities

and reflects a community's ability to 'bounce back' (i.e. restore pre-disaster equilibrium) and 'bounce forward' (i.e. learn and transform) from crises [1, 4]. At the community level, resilience also reflects a community's inherent capacity to respond to crises, promotes local agency, and addresses nuanced processes that involve the individuals and networks of people directly affected by hazards [5–7].

The growing threat of disasters, climate change, war, and pandemics has driven development of community resilience frameworks and assessment tools in recent decades [2, 8]. Most of these frameworks and tools pertain to pre- and post-disaster contexts, and although many of their key components and specific measures map directly onto the social determinants of health, there is limited research specifically exploring community resilience from a public health perspective [2, 9–11]. In general, research exploring resilience from a public health lens has focused on the health system despite holistic health resilience also requiring 'capabilities to sustain physically, mentally, and socially healthy individuals and communities amid large-scale changes' (p 364) [12, 13]. A recent WHO report found few frameworks and tools for measuring health-related community resilience, as well as limited validated measures, a lack of consensus on indicators, and limited consideration of inequalities and diverse communities [10]. This highlights a deficit in research linking understanding of community-level health resilience with existing knowledge, frameworks, and tools for community disaster and climate resilience more broadly.

There are also a limited number of frameworks focussing on community health resilience in the context of environmental and climate change [9, 14, 15]. Walton *et al* for example, reviewed literature on interventions and evidence-based metrics implemented in the Northeastern United States to build and/or measure community resilience against climate-related disasters and found limited focus on the increasing regional climate-related health impacts, such as those associated with extreme flooding and heat, mental health, and vector-borne infectious disease [16]. There is a need to assess community resilience to these specific health risks in order to provide coherent evidence-based policy guidance for enhancing and evaluating the resilience and population health of communities at the level which these impacts manifest [14, 17]. To address the identified research gaps, this review aimed to identify and assess the dimensions and indicators of community resilience frameworks for the health and wellbeing impacts of environmental and climate change.

2. Methods

2.1. Study design

This review follows the preferred reporting items for systematic reviews and meta-analyses extension for

scoping reviews (PRISMA-ScRs) Guidelines [18, 19]. A protocol for this review is published online using Open Science Framework [20].

2.2. Eligibility criteria

Studies were included based on the criteria in table 1. Within this review, environmental and climate change refers to both rapid and slow onset processes (e.g. hurricane and loss of biodiversity), and the health and wellbeing impacts of environmental and climate change are defined as any direct or indirect impacts that diminish complete physical, mental and social wellbeing [21–24]. Human communities were defined based on geographic place-based boundaries ranging from neighbourhoods, counties, or specific urban or rural regions, and/or the collectiveness of a group of people similarly exposed to vulnerabilities from the impacts of environmental and climate change [2, 5, 23].

Within this review, dimensions refer to the main overarching components, domains, or attributes that comprise multi-dimensional conceptualisations or frameworks for understanding and/or evaluating community resilience, and indicators refer to both qualitative and/or quantitative factors (e.g. variables) that can be used to measure community resilience under resilience dimensions [8, 25, 26].

Due to limitations in the number of studies that explicitly focus on the health and wellbeing impacts of climate change, frameworks that focused more generally on disaster and climate change resilience were considered for inclusion if they specifically stated that this included or was relevant to health hazards and impacts. We also considered papers for inclusion if they focused on established health and wellbeing impacts of climate or environmental change, even if they did not specifically address this connection in the paper itself. This is similar to a review by South *et al* which had to expand its criteria to capture health resilience within the heavily disaster-dominated resilience literature [10].

2.3. Information sources

Our search strategy employed medical subject headings terms and keywords as per the search strategy in appendix 1. We searched PubMed, Scopus, and Web of Science on the 30th of August 2024.

2.4. Search strategy

The search strategy included the search terms outlined in appendix 1 and was conducted by two reviewers. Forward and reverse screening was conducted by searching the reference lists of included papers and by using the Connected Papers Software (where a visual literature map of papers similar to the included papers is created and was screened) [27].

Table 1. Inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria
Focuses on the dimensions and/or indicators of community resilience to the health and wellbeing impacts of environmental and/or climate change, including through direct or indirect impacts	Does not focus on the dimensions and/or indicators of community resilience to the health impacts of environmental and/or climate change (e.g. focuses solely on defining resilience, assessing vulnerability, or on assessing health impacts for communities)
Focuses on at the community level	Does not focus on community resilience (e.g. is focused on entire cities or broad geographic regions, or focuses primarily on individual psychological or emotional resilience)
Presents a framework for community resilience that reflects a multi-dimensional approach	Does not present a framework for community resilience that reflects a multi-dimensional approach (e.g. is just focused on social capital or disaster infrastructure or only identifies potential determinants of community resilience)
Has a human health focus	Does not have a human health focus (e.g. focuses on ecological resilience or ecosystem health or health system resilience)
Is a peer-reviewed original research article or a relevant and reputable grey literature publication available in English	Is an article in the media, commentary, letter to the editor, conference abstract or proceeding, opinion piece, or other form that is not a peer-reviewed original research article or a relevant and reputable grey literature publication

2.5. Selection process

The results of this ScR were compiled using EndNote and then uploaded to the Covidence platform where further duplicates were removed. Two reviewers independently screened titles and abstracts based on the eligibility criteria, with eligible studies included in full-text review. The reason for exclusion was recorded in Covidence and disagreements between reviewers were resolved through discussion.

2.6. Data charting

Data was charted for the primary and secondary outcomes of interest. The primary outcome of interest was the dimensions and indicators of community resilience to the health and wellbeing impacts of climate change. Secondary outcomes included relevant differences or commonalities in dimensions and indicators across different environmental and climate change processes, health and wellbeing processes or outcomes, geographic locations (e.g. rural vs urban), temporal scale (e.g. rapid and slow onset hazards/processes), and social and cultural groups (e.g. women, the elderly, ethnic and religious minorities and indigenous communities), as well as conceptual and methodological variation across studies.

2.7. Data synthesis and management

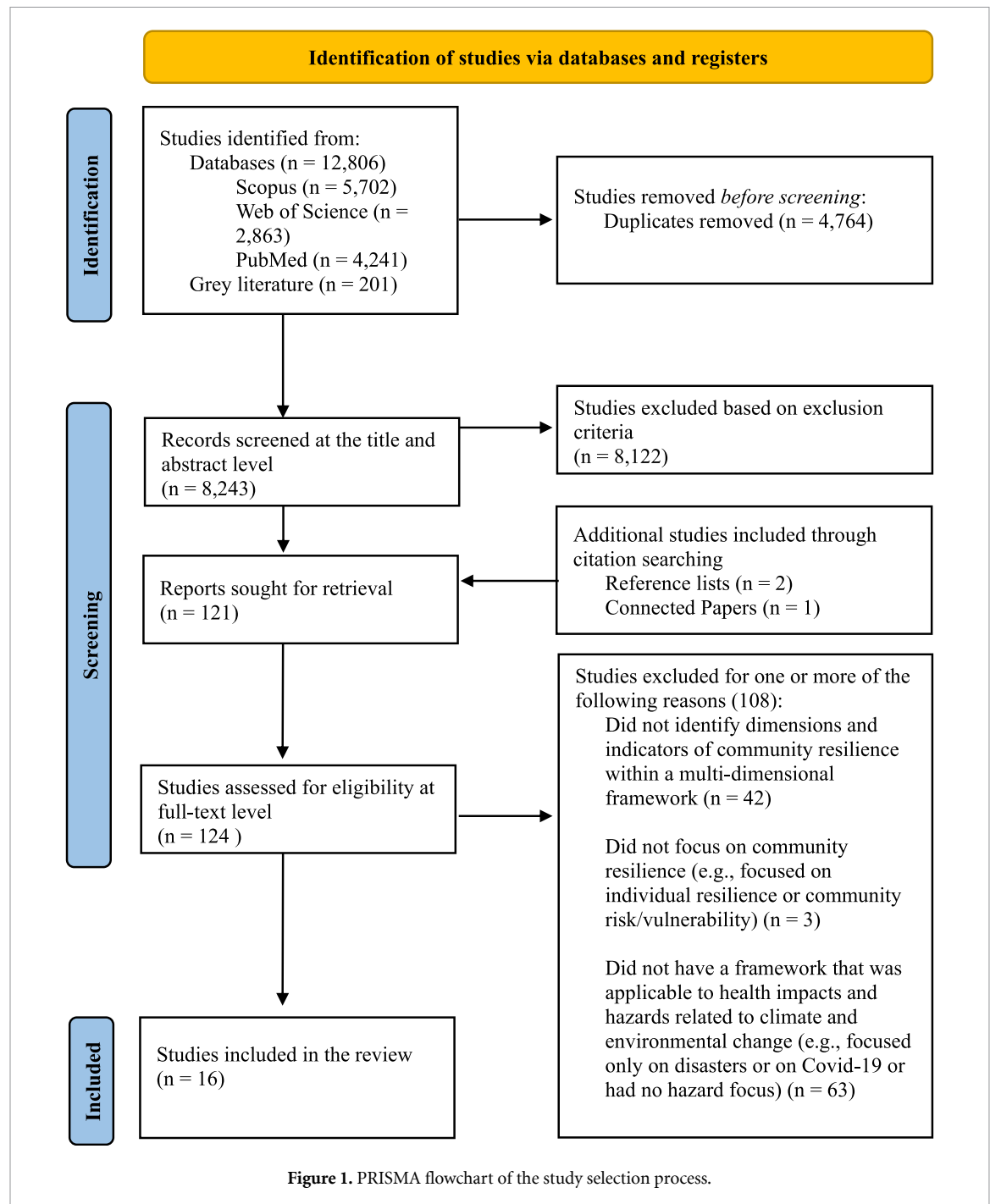
This ScR qualitatively synthesised the included studies, for which key characteristics are outlined in appendix 2. Based on the information charted, the dimensions and indicators in the included studies were re-categorised under key dimensions

and indicator categories for quantitative assessment of count frequency, co-occurrence, and key gaps in the frameworks. This enabled comparison across studies that used slightly different terminology for the same underlying components of resilience.

As this was a ScR and not a systematic review, an assessment of risk of bias was not conducted [18, 28]. Whilst this is considered normal practice for ScRs, we do acknowledge that this limits our capacity to systematically account for weaknesses in the included evidence and may therefore introduce unidentified biases.

3. Results

16 studies were included in the final review (figure 1). The studies were diverse in terms of the on general health and wellbeing impacts of climate change and/or disasters, and less frameworks used and the components of community resilience explored (see appendix 2). Most studies developed or employed indices and spatial mapping (56%), with others developing conceptual frameworks through literature reviews and qualitative case studies (31%) or applying their framework through quantitative assessment such as surveys and modelling case studies (13%). Most studies were also published in the past decade, with a greater focus on the United States of America compared to other geographic regions. As seen in figure 2, there was a stronger focus on specific climatic and health hazards in the development of community resilience frameworks.

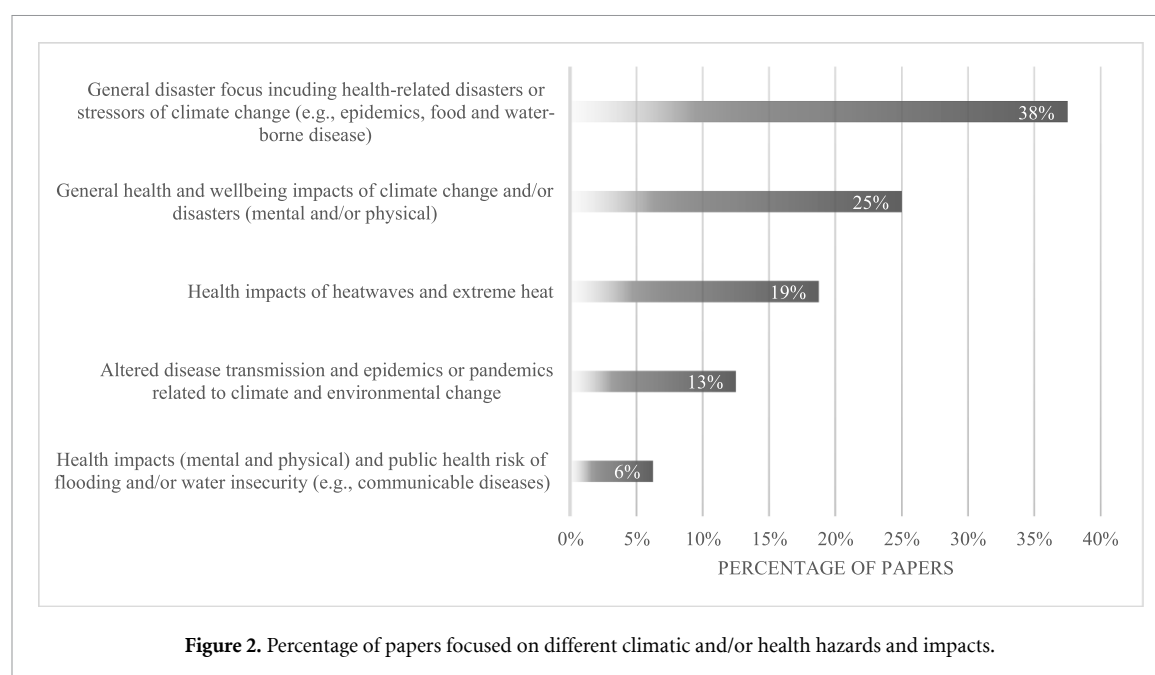


4. Framework conceptualisation and structure

All included studies employed multi-dimensional frameworks for understanding and/or measuring community resilience. Most of the studies conceptualised resilience as a process rather than an outcome itself, with the resilience process resulting in outcomes such as adaptation and community functioning; social and health functioning; and resistance, absorption, and/or recovery [14, 29–32]. Studies also generally focused heavily on pre-event conditions or ‘inherent resilience’ (i.e. the antecedent conditions)

as the measurable factors comprising resilience, however, several studies also pointed to factors such as self-organisation, non-linearity, and feedback loops that arise under stress and suggest that antecedent conditions only have predictive value for resilience [29, 32–36].

Most studies (10) used diagrammatic or conceptual visualisation to present their framework, with the remaining studies (6) using tables to present the components of resilience. Many of the frameworks using visualisation methods beyond table formats did so to demonstrate how community resilience is embedded within wider system or contextual factors. For



example, Nurisjah *et al* conceptualised urban community resilience to be affected by the context of city vulnerability and individual preparedness, with individual capacity, risk readiness, and economic resources either weakening or strengthening community level resilience (e.g. community level mitigation measures being hindered by limited individual knowledge or low motivation for proactive behaviour change) [37].

5. Dimensions and indicators of community resilience frameworks

Twelve of the 16 studies presented frameworks with clear dimensions of community resilience, with the remainder being indices that used other means to integrate the indicators (e.g. PCA and stochastic dynamic modelling) [30, 33, 38, 39]. Eleven unique categories of dimensions were identified and are presented in figure 3 and defined in appendix 3.

The size of the box represents the frequency of citation, with larger boxes depicting more frequently cited dimensions and smaller boxes depicting less frequently cited dimensions.

Figure 4 presents the co-occurrence of dimensions in the included frameworks. The most frequently cited dimensions—economic, community capacity, social, institutional and political—frequently co-occurred. Frameworks also often included the built environment and infrastructure dimension. The least frequently cited dimensions (e.g. cultural, communication and information, community disparities, and knowledge, attitude, practices and behaviour) were included in frameworks with generally less dimensions overall, as they co-occurred with fewer other dimensions. The health

and wellbeing dimension was not in frameworks that also included environmental; cultural; community disparity; or knowledge, attitude, practices, and behaviour dimensions.

A total of 434 different indicators were identified from the included papers, with only 180 of these being directly measurable (e.g. percentage of owner-occupied housing units) and the others providing more general indicators (e.g. household composition). Following analysis and re-categorisation, 41 indicator categories were identified across the studies. As seen in appendix 4, the most frequently cited indicator categories and the percentage of papers that cited them included: healthcare facility and staff capacity, access, and equity (63%); income, financial resources and wealth distribution (56%); educational attainment, management, access and related infrastructure (56%); and housing occupancy, ownership, quality and governance (56%).

Figure 5 shows the number of studies that cited each indicator category under each dimension, demonstrating the most frequently cited indicator and dimension combinations were social connectedness under the social dimension, followed by housing indicators for the built environment/infrastructure, and financial resources/distribution under the economic distribution. Few indicators were consistently used under the following dimensions: health and wellbeing, cultural, communication and information, knowledge, attitude, practices, and behaviour. Community disparity and environmental dimensions were also not particularly well populated.

Some dimensions had a highly diverse variety of indicator categories. For example, the social dimension had citations for indicator categories such as social connectedness, civic involvement/advocacy,

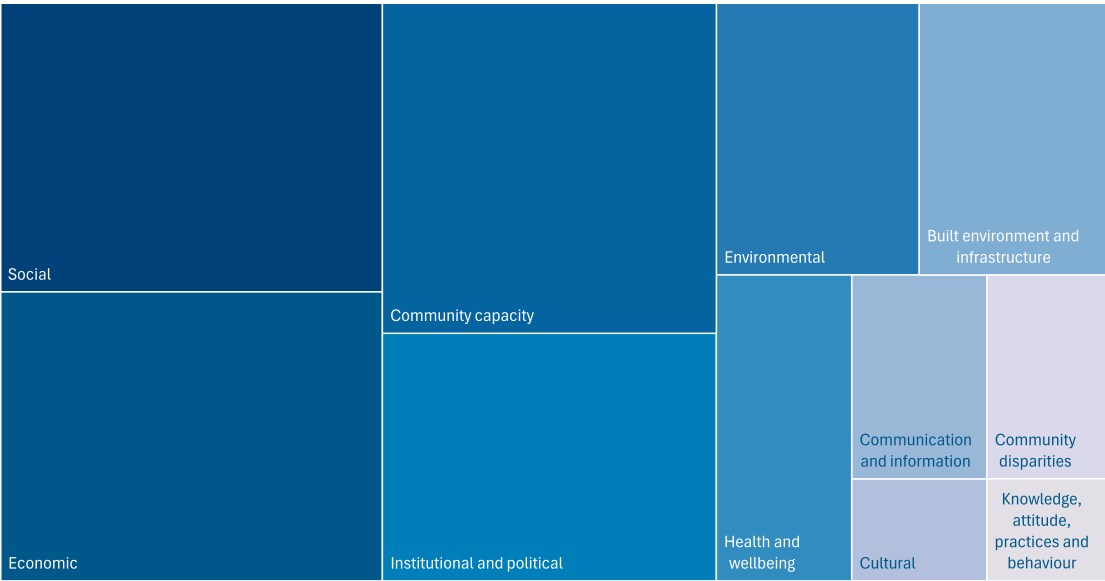


Figure 3. Frequency of community resilience dimensions cited in included papers.

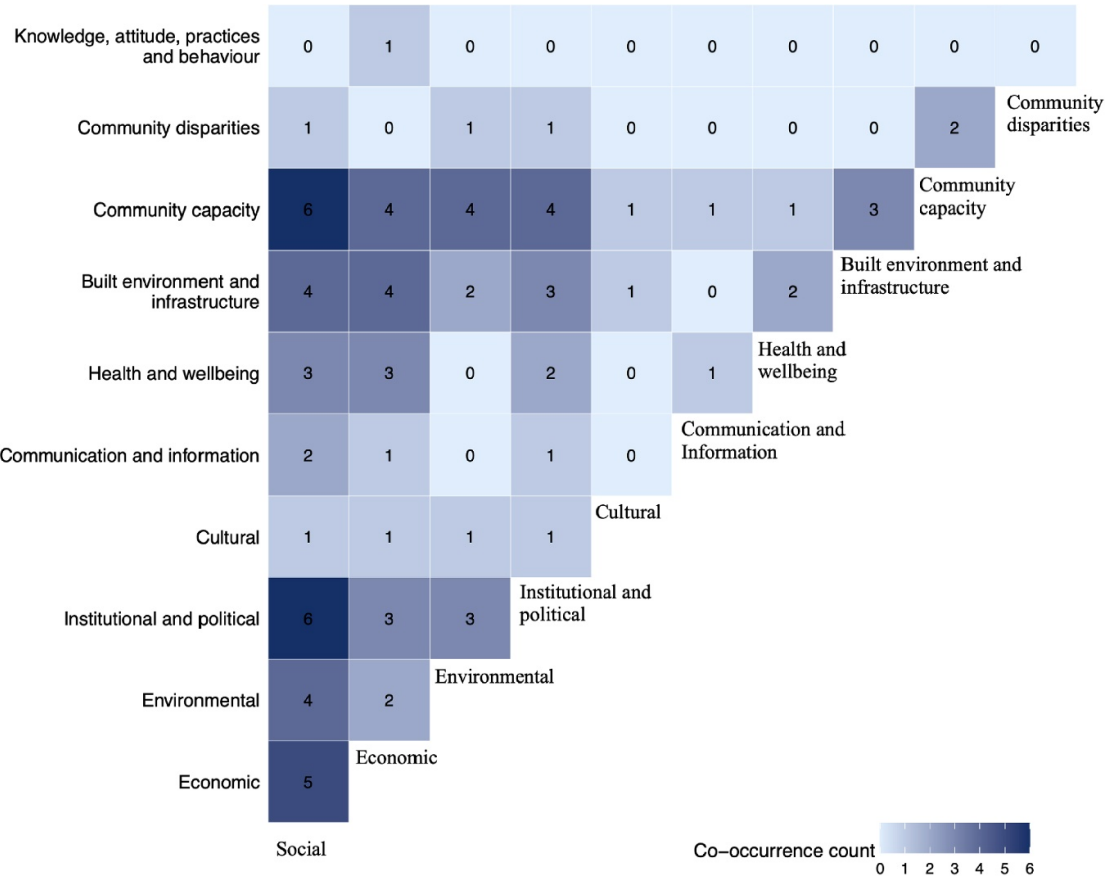


Figure 4. Co-occurrence of community resilience dimensions. The x and y axis both present the dimensions of community resilience, with the count in the individual tiles (and their colour) representing the number of individual studies that included frameworks with both dimensions together (i.e. the number of times dimensions co-occurred across frameworks in the included studies).

religious adherence/organisations, health insurance, housing and household composition, literacy and language, government and non-government capacity, and demographic. Other dimensions had more targeted indicator categories e.g. mobility and transport, shelter capacity, and commercial and government

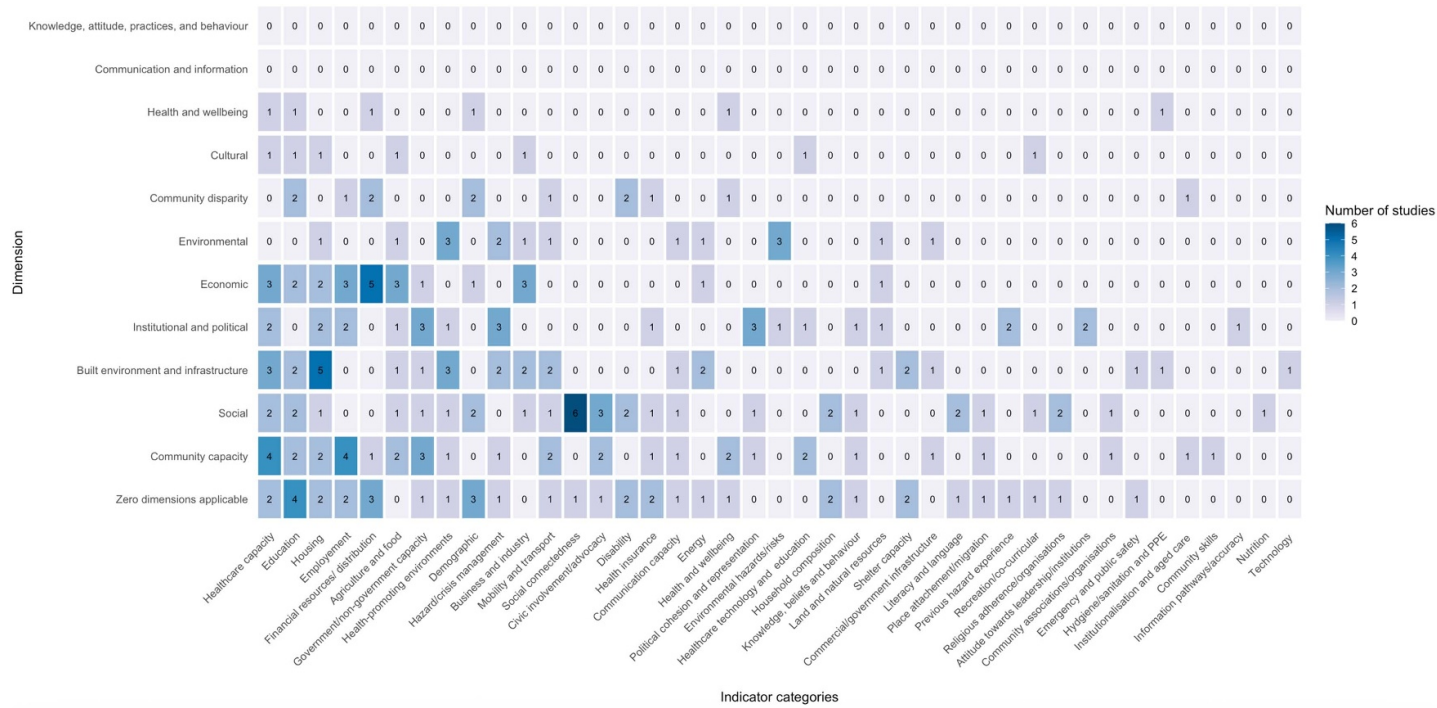


Figure 5. A heatmap showing the number of studies for each dimension and indicator category combination.

infrastructure under the built environment and infrastructure dimension.

Figure 5 also highlights that indicator categories span multiple dimensions and are not consistently applied to the same dimension across frameworks. For example, the indicator category ‘healthcare capacity’ is used most frequently in the community capacity dimension but is also employed in the built environment and infrastructure, economic, cultural, health and wellbeing, institutional and political, and social dimensions. Example indicators for the indicator category ‘healthcare capacity’ include: number of physicians per 10 000 population (economic) [34], mean walking time to nearest healthcare (health and wellbeing) [40], ratio of population to mental health care providers (community capacity) [29], parking at healthcare facilities (built environment and infrastructure) [8], and minority representation on board related to healthcare (institutional and political) [41].

6. Commonalities and differences in frameworks and findings across geographic, social, or other groups

Most of the studies (10) focused on urban regions or larger geographic regions that contained both urban and rural regions, with other studies being non-specific to geographic location, and limited attention awarded to rural communities overall. Only one study had rural specific indicators [41], with another suggesting that there may be important differences across urban and rural areas (e.g. agriculture and food security may be more important in rural communities and mass transportation may be more important in urban communities) [8]. Narayanan *et al* however, suggested that special considerations should be made when applying their framework to indigenous and tribal nations in the United States, as they may have unique governance structures, legal systems, and decision-making processes that impact resilience and recovery [34].

Several of the studies found differential levels of resilience for certain groups within a community, depending on socio-spatial and vulnerability factors, and Wright *et al* [39] suggested that certain groups may have higher community vulnerability due to the increased risk profile of children, the elderly, and people with disabilities [33, 40]. However, while several of the studies also acknowledged that a core component of community resilience is ensuring equitable resource distribution and incorporated equity factors within their framework, no studies specifically identified relevant differences in the framework or its application for certain high-risk or vulnerable groups [14, 36, 39]. Only one of the studies explicitly discussed the application of their framework to slow-onset climate events, which they claimed would

engender community resilience through the same core components [14].

7. Discussion

Over the last two decades, there has been an exponential growth in the number of studies on community resilience, with a large number of frameworks that focus on disaster resilience and climate hazards [1, 2]. To the best of our knowledge, ours is the first comprehensive review of the dimensions and indicators in community resilience frameworks that focus on the health and wellbeing impacts of climate and/or environmental change. To effectively synthesise the findings and highlight key research gaps, we organise this discussion into the following three broad themes.

7.1. Dimensions of community resilience

In disaster and community resilience literature, the most commonly cited dimensions of community resilience suggest that the core components of community resilience are comparable across health and non-health related hazards and stressors. For example, Güngör and Elburz [26] found social, economic, physical, and community capital dimensions were the most common dimensions for measuring resilience, and van Kessel *et al* [6] found social resources were identified as a main component of community resilience in 30 out of the 35 papers they reviewed. Extensive research has been conducted on these dimensions individually [42]. For example, social capital was one of the most valuable assets in the Ebola Virus Disease (EVD) outbreak response in Liberia between 2014–2016, as it enabled increased effectiveness and timeliness of bottom-up interventions through tight bonds and sense of kinship among community members, in turn facilitating community ownership of the problem and collective actions to address the spread of EVD (e.g. transporting sick individuals to health facilities or pooling economic resources) [43]. Other studies highlight the importance of institutional, infrastructural, and economic conditions in providing the foundational assets, support, and structure within which communities can collectively mobilise and adapt (e.g. social security support networks, emergency savings, and disaster shelters and healthcare capacity) [33, 37]. As community resilience deals with the collective, community capacity (or what is often referred to as ‘community capital’ in other studies) is also commonly employed because it reflects capacity for collective action, community networks, and the role of community members in ‘activating’ their resilience resources through formal and spontaneous pathways [26, 44, 45].

The dimensions that were less commonly cited in this review—cultural, communication and information, community disparities, and knowledge, attitude, practices and behaviour—are not as well represented

in the wider disaster and community resilience literature [2, 6, 46–51]. This lack of representation in community resilience frameworks is at odds with other research establishing the value of these dimensions. For example, ‘information and communication’ was a core domain for improving community resilience in China during the COVID-19 pandemic, as it contributed to the strengthening of bonding-type social capital and the timely distribution of information critical to disaster and risk management [52]. Knowledge and attitudes towards risks and protective measures, and health-seeking and health-promoting behaviours such as vaccination, WASH interventions, or covering water containers during mosquito season, are also critical to mitigating the health impacts of climate-sensitive hazards such as malaria and water-borne diseases for example [53, 54]. Furthermore, a study by Isetti *et al* [55] demonstrates the value of the cultural dimension during health crises as existing cultural diversity and vibrancy in Merano Italy during the Covid-19 pandemic, as well as active efforts to support the cultural fabric of the city, supported more resilient communities. The limited focus on these less frequently used dimensions, as well as the dynamic inter-relationship between them, undermines the comprehensiveness and depth of current understanding and calls for further research to ascertain in what ways they vary for health-related hazards compared to existing disaster resilience literature and generalist community resilience frameworks [6, 26].

Whilst the environmental dimension was reasonably well represented in our review, none of the included studies incorporated both health and environmental dimensions in their frameworks. Health is well documented to be under-represented in the community resilience literature, with another study also finding that the health dimension does not readily co-occur in frameworks with an environmental or ecological dimension [10, 56]. This highlights a key limitation in existing frameworks: that they may not be adequately developed for the purpose of measuring and improving resilience to the health impacts of environmental and change. In addition, the lack of specific attention awarded to slow-onset processes of environmental and climate change highlights the focus of community resilience frameworks and measures on short term, largely acute events, and pre and/or post disaster evaluations. Existing frameworks therefore have limited suitability and adaptability to complex climate change scenarios where environmental and health impacts may accrue over time, or where hazards impact the community in temporally distal or chronic ways [57, 58].

In turn, the lack of co-occurrence of certain dimensions and under exploration of less common dimensions highlights another critical research gap as it limits our understanding of how these dimensions intersect in co-dependent or causal ways (e.g. how social cohesion may support enhanced community

capacity), as well as potential trade-offs between dimensions [59, 60]. As some of the critical dimensions are not presented together in the frameworks (figure 4), further research is needed to comprehensively explore their interplay from a public health perspective. The lack of consistency and consensus on what each dimension conceptually represents and how it may be measured with indicators further exacerbates this issue as we cannot be certain we are comparing like with like.

7.2. Indicators of community resilience

The most frequently cited indicator categories were supported by similar findings in the literature. For example, education level, social characteristics, the physical environment, and medical capacity were also found by Gungör and Elburz to be widely used [26]. The studies conducted by the National Institute of Standards and Technology also found that social and economic indicators were more common than indicators of the natural environment and health [46, 61]. Furthermore, a study by Cutter found that the majority of studies they reviewed considered income and education to be important components of resilience, especially inequality in these areas [7]. Less commonly used indicator categories in our review also aligned with indicator categories that lack consensus or are infrequently used in the wider literature, such as attitudes towards leadership and institutions (e.g. trust), previous hazard experience, and more specific community wellbeing indicators including institutionalisation and aged care attendance and capacity, and hygiene, sanitation and personal protection [6, 7, 62]. Importantly, while indicators for ‘health-care facility and staff capacity, access, and equality’ were used in 63% of papers, the health and wellbeing indicator category which included indicators such as percentage of asthma cases, percentage of adults with mental distress, and infection and death rate, was only included in 31% of the studies we reviewed. This reflects the under-representation of the health dimension, as well as a potential bias towards health system indicators and away from indicators that reflect underlying community vulnerability [10, 62, 63].

Although some of the most frequently cited dimension-indicator pairs found in this review were supported by the wider literature, there was a significant level of diversity and lack of agreement on how to measure some of the most common dimensions, such as social and community capacity [6, 8, 62, 64]. The diversity in indicator categories for the social dimension for example, may be a result of the social dimension often including both socio-economic and demographic variables, as well as social processes and factors that reflect genuine social capital in the community resilience literature [8, 51, 65]. Refining what the social dimension is trying to measure, whether it be demographic information or social capital and processes, will facilitate greater agreement on what

measures are valid and how the dimension is conceptually and pragmatically distinct. This will also likely help prevent indicators such as healthcare capacity from creating unnecessary confusion by being employed across so many dimensions (eight in our review) [62]. For the community capacity dimension, the frequent use of indicator categories such as healthcare capacity, employment, and government/institutional capacity, and the limited use of highly relevant indicator categories such as community skills, raises the issue that, just because there is more common use of certain indicators for a dimension, this does not necessarily reflect the validity or suitability of those indicators [62, 66]. If the community capacity dimension is the 'networked equivalent of human agency' (p 141) that enables the community to 'activate' their resilience resources through community action, problem solving, and collective efficacy for example, then our findings suggest that the indicators most commonly used may be inadequate to demonstrate the complexity and dynamism of the concept [5, 14].

The limited capacity for the most common indicators to reflect the complexity and depth of community resilience is also seen in the small number of indicators for the following dimensions: communication and information; knowledge, attitude, practices, and behaviour; cultural; and health and well-being. These findings may reflect the limited (yet growing) resilience literature that relates to psychosocial and collective behavioural factors [67, 68]. As seen in the Covid-19 pandemic, there are important behavioural and psychological factors at the community level that can either strengthen or undermine collective responses and adherence with government advice (e.g. vaccination or quarantine orders) [69–71]. These factors, which have also been found to have few indicators in another study [62], are directly related to the dimension of communication and information, as this effects a community's understanding of their own risk, why they need to take certain action, and can also inform and facilitate organisation of spontaneous and dynamic community activities during crises (e.g. organising a clean-up using Facebook) [72–74]. These under-represented dimensions may also become increasingly important as the impacts of slow moving environmental and climate change processes become more pronounced, requiring continual cycles of engagement in risk mitigation and adaptation, or increasing the likelihood of information fatigue and disengagement with public health promotion [4, 75].

Across all indicator categories there was a discrepancy between indicators that were directly measurable (e.g. percentage of owner-occupied units) and those that provided more of a 'variable type' (e.g. household composition) that was not directly measurable. Only 180 of the 434 different indicators that were categorised into our 41 indicator categories were

deemed directly measurable. This highlights a critical gap in the operational readiness of existing frameworks and the need to further develop quantifiable indicators for effective monitoring and evaluation of health-related community resilience.

7.3. Equity and distribution of resilience

Despite much evidence found in this review and in extant literature that vulnerability is a critical factor in the distribution of resilience, and that there are community subgroups who may be less resilient (e.g. the elderly, women, migrants, children, and those with chronic illness and disability), we found limited use of the 'community disparity' dimension, and no advice on how to adapt the frameworks for subgroups that may experience unique vulnerabilities and socially differentiated climate impacts [76–81]. The lack of consideration of how frameworks need to be operationalised for different community subgroups in this review, highlights that there is a need for greater consideration of who within a community can effectively mobilise resources or may face additional barriers [64, 77, 82, 83]. Importantly, some of the frameworks did include equity-oriented indicators (e.g. equitable job opportunities, equitable citizen's access to food and health equipment, percentage of female labour force participation), which aligns with recent literature identifying a focus on mitigating inequalities as an emerging theme in community resilience [8, 34, 41, 63]. We need to assess the comparative value of embedding equity-oriented indicators across all dimensions versus including a specific equity-centred dimension (e.g. community disparity). This research is critical given that community resources (e.g. human, financial, etc) typically erode during crises and over time, with limited studies looking at how resilience over the long-term (e.g. in later stages of community recovery from a disaster) interacts with underlying vulnerabilities for community subgroups [6, 66].

Our review also identified that the extant literature is dominated by U.S. studies, with a lack of studies and frameworks based in low-and-middle-income countries (LMICs). This introduces potential biases as frameworks may overlook the preferences and unique strengths of countries in the Global South. There is growing evidence that existing resilience frameworks require customisation to local contexts to better reflect the preferences of such communities, as well as the importance of diverse forms of knowledge and cultural frameworks [84, 85]. The scarcity of locally tailored community resilience frameworks, especially in LMICs, ultimately leaves such communities unnecessarily vulnerable to the disproportionate disaster risks and public health crises they face [84, 86]. If community resilience is more than adaptation and reflects transformative capacity, then it is critical to garner greater in-depth understanding of community factors and processes required to do so contextually,

as well as the potential unique trade-offs or interdependencies that affect this process for certain communities. Such knowledge development and translation requires greater strength-based co-creation with communities beyond the Global North, as well as further research on diverse community sub-groups such as migrants who represent and re-create the customs, knowledge, and cultural strengths of other communities elsewhere [49, 85, 87].

8. Conclusion and future research directions

Our review highlights critical gaps in current research, making a strong case for further studies and framework development focused on specific health impacts and hazards across diverse global regions, including rural and remote areas. These studies should explore the role of under-represented dimensions and indicators, especially the health and wellbeing dimension; seek consensus and validation of the core dimensions and indicators; and explore how frameworks should be adapted to or integrate equity factors that account for the unequal distribution of resilience across a community. In addition, the overall focus on conceptualising resilience as a process rather than an outcome highlights the need for a clearer definition of what the measurable outcomes of community resilience are so that we can more comprehensively measure resilience ‘end-to-end’ [29, 32]. The included studies preferred outcomes such as community health and social functioning and adaptation, which supports existing understandings that centre community wellness as key products of a resilient community—thus positioning the public health field to be a potential leader in this debate [5]. Drawing from existing literature, which often asks the questions of resilience ‘to what’ and ‘for whom’, this review poses a new question and suggests that investigating community resilience from a health perspective ultimately necessitates consideration of resilience ‘for what’ (i.e. to what end?) [64, 88]. Public health research will likely enhance the strategic value of community resilience by enabling it to be used in policy sectors as both a predictive tool that informs how to strengthen communities, as well as a tool for assessing the practical implications of these measures for public health [5]. From a technical perspective, further research should focus on developing longitudinal indicators to track the progress and outputs of resilience building across both sudden and slow-onset hazards and assess how these intersect with indicators of community resilience defined here. Given the increasing popularity of resilience discourse across academic and policy sectors, the field would also benefit from research exploring how communities themselves understand the utility, trade-offs, and interdependence of policy action across the dimensions of community resilience.

Data availability statement

No new data were created or analysed in this study.

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