Social Science & Medicine 284 (2021) 114246

Contents lists available at ScienceDirect

Social Science & Medicine

journal homepage: www.elsevier.com/locate/socscimed

Community engagement and vulnerability in infectious diseases: A systematic review and qualitative analysis of the literature

Jacob Osborne [a,*], John Paget [a], Tamara Giles-Vernick [b], Ruth Kutalek [c], David Napier [d], Christos Baliatsas [a], Michel Dückers [a,e,f]

[a] Nivel – Netherlands Institute for Health Services Research, Otterstraat 118-124, 3513, CR, Utrecht, Netherlands
[b] Anthropology and Ecology of Disease Emergence Unit, Institut Pasteur, 25-28 rue du Docteur Roux, 75015, Paris, France
[c] Department of Social and Preventive Medicine, Center for Public Health, Medical University of Vienna, Vienna, Kinderspitalgasse 15/1. Floor, 1090, Austria
[d] Department of Anthropology, Science, Medicine, and Society Network, University College London, 14 Taviton Street, WC1E 6BT, London, UK
[e] ARQ Psychotrauma Centre, Nienoord 5, 1112, XE, Diemen, the Netherlands
[f] Faculty of Social and Behavioural Sciences, University of Groningen, Groningen, Grote Kruisstraat 2/1, 9712, TS, Groningen, the Netherlands

ARTICLE INFO

Keywords:
Community engagement
Vulnerability
Infectious diseases
Interventions
Global health
Participation

ABSTRACT

The global response to infectious diseases has seen a renewed interest in the use of community engagement to support research and relief efforts. From a perspective rooted in the social sciences, the concept of vulnerability offers an especially useful analytical frame for pursuing community engagement in a variety of contexts. However, few have closely examined the concept of vulnerability in community engagement efforts, leading to a need to better understand the various theories that underline the connections between the two. This literature review searched four databases (covering a total of 537 papers), resulting in 15 studies that analyze community engagement using a framing of vulnerability, broadly defined, in the context of an infectious disease, prioritizing historical and structural context and the many ways of constituting communities. The review identified historical and structural factors such as trust in the health system, history of political marginalization, various forms of racism and discrimination, and other aspects of vulnerability that are part and parcel of the main challenges faced by communities. The review found that studies using vulnerability within community engagement share some important characteristics (e.g., focus on local history and structural factors) and identified a few theoretical avenues from the social sciences which integrate a vulnerability-informed approach in community engagement. Finally, the review proposes an approach that brings together the concepts of vulnerability and community engagement, prioritizing participation, empowerment, and intersectoral collaboration.

1. Introduction

Infectious diseases represent a broad and persistent challenge in public health around the world. The COVID-19 pandemic serves as a stark illustration of their far-reaching implications. With the threat of new pandemics emerging alongside other communicable and non-communicable diseases, compounded by existing inequalities in access to quality health care, focusing on individuals and communities that are most at risk is crucial to understanding and mitigating vulnerabilities.

Two subjects come to the fore here: vulnerability, a concept that can contain a multitude of factors (biological, social, or otherwise) influencing ill health, and community engagement, a related practice or structure that seeks to utilize social networks to mitigate threats to infectious diseases. The practice of community engagement has gained attention for its promise of reaching those groups that suffer the most from disease (Southall et al., 2017; Tindana et al., 2007). In the context of health and infectious diseases, the uses of this vary. From outside groups or research projects seeking to gain buy-in from local communities, to using community insights to help shape interventions, to simply spread information to groups about a particular health issue, the means and the ends of these processes are called into question (Reynolds and Sariola, 2018). What engagement actually means and the level of engagement during these processes and how communities are considered are contested by the various approaches used.

Social science scholarship on infectious disease responses is broad, covering every aspect of disease, from social aspects of transmission, to

* Corresponding author.
E-mail address: j.osborne@nivel.nl (J. Osborne).

https://doi.org/10.1016/j.socscimed.2021.114246
Received 23 February 2021; Received in revised form 1 July 2021; Accepted 19 July 2021
Available online 21 July 2021

cultural understandings of disease itself, to the impact of policy and international actions, including wide-reaching political and economic conditions (Stellmach et al., 2018). The ways in which these aspects of disease affect individuals and communities are rooted in multifaceted social and organizational mechanisms. Much of the social science literature on infectious diseases therefore recognizes the natural history of disease, but calls into question the primacy of individual biological risk in these discussions (Janes et al., 2012). Instead, social scientists explore challenges to disease containment and their connections to specific forms of vulnerability from social and historical perspectives. Successful community engagement may therefore address those vulnerabilities associated with differing historical, social, political, and economic worldviews and situations (Osborne et al., 2021).

This understanding of community engagement and the necessity for establishing connections to specific theoretical and practical patterns from the literature, which lends to the objective of this review, namely: to build on evidence from and observations of community engagement studies using vulnerability from a social science perspective. This question is at once general and specific, as it attempts to survey a wide body of literature, while finding studies within the literature that take up a social science informed understanding of vulnerability and framing community engagement within a particular infectious disease threat. This review will then explore the intersection of community engagement and vulnerability within a particular infectious disease threat in order to disentangle how the two concepts can be instrumental to each other in practice.

The two concepts that this review takes up, community engagement and vulnerability, are both subject to a wide area of study, yet lack clearly agreed upon definitions, and uses of the terms vary across disciplines. Ther are, however, some well-considered conceptions that may be useful, which are further discussed below. The two concepts do however benefit from an increasing interest in social science and public health scholarship and practice, as research programs, government bodies, and NGOs increasingly call for community engagement in some form. To avoid lack of clarity in this review a brief introduction building on the recent study of community engagement and vulnerability is presented here.

Community engagement has been used in various contexts including health promotion and disease prevention activities, environmental protection, and disaster studies, to name a few. Operational uses of these terms are present in many organizations. One example is the WHO'S risk communication and community engagement (RCCE) strategy, which outlines an approach for including socio-behavioral analyses for community engagement efforts (WHO, 2020). Brunton et al. (2017) point to several significant concepts within community engagement, including the definition of community, participation, and motivation. They also present the uses of community engagement as "utilitarian" or "social justice"-oriented, with engagement used instrumentally to increase participation in or acceptance of an intervention in the first case, and activities that foster empowerment and focus on inequalities in the second. In this sense, engagement is a framework that can be used as an intervention, a strategy, or an ideal to work toward – it is both a process and a state. It recognizes that communities are not homogenous but are rather made up of complex hierarchies and sub-communities, and individuals may belong to multiple communities (Wilkinson et al., 2017).

Wilkinson et al. (2017) also advocate for engaged responses to health threats that include an analysis of the varied interests and relationships both internal and external as a way to "bring sociopolitical orders and relationships more sharply into focus" (p. 5). Calling into question an oversimplified notion of community, they highlight the importance of nuance and adaptation in future epidemic responses, as well as focusing on the particular social dynamics within a community that allow interventions to work better. Other accounts of the recent uses of community engagement offer more nuanced histories (see, for example, Reynolds and Sariola, 2020), whose key messages point to engagement as a form of knowledge brokerage, shifting power imbalances in the research process, and an opportunity to create and sustain meaningful collaborations.

Indeed, community engagement taken from a social science perspective has focused on the differing priorities and perspectives of communities and those who "engage" with them. Little (2009) presents an example from the anthropology of environmental health and illustrates the sometimes incongruent epistemologies of epidemiological or public health research within an environmental agency on one hand and the adaptive approach necessitated by community engagement on the other. This was also evident in the West African Ebola epidemic, where community engagement was often cited as a crucial element of epidemic response. However, there was a clear lack of coordination between epidemiological and social and behavioral science research in this area (Abramowitz et al., 2018).

Despite the breadth of literature on community engagement from various disciplines, there remain few clear and comprehensive guidelines for community engagement that fairly consider the different perspectives and actors involved in the process. The wide range of potential engagement activities requires an understanding of what constitutes community engagement and what not. UNICEF proposes a set of minimum quality standards and indicators that answers the demand for a cohesive approach to community engagement (UNICEF et al., 2020). Created based on a survey of a broad body of literature and consultative processes with various actors, the UNICEF guidelines offer a common language for understanding community engagement and a framing of the engagement process in the context of global public health priorities, proposing a clear definition of community engagement, as follows:

"A foundational action for working with traditional, community, civil society, government, and opinion groups and leaders; and expanding collective or group roles in addressing the issues that affect their lives. Community engagement empowers social groups and social networks, builds upon local strengths and capacities, and improves local participation, ownership, adaptation and communication. Through community engagement principles and strategies, all stakeholders gain access to processes for assessing, analysing, planning, leading, implementing, monitoring and evaluating actions, programmes and policies that will promote survival, development, protection and participation."

This definition is followed by four domains and 16 areas which can be used to shape and analyze community engagement (Fig. 1). A clear and useful description for understanding community engagement in practice, it serves as a frame by which this review identifies what can be considered as community engagement.

Social, political, and economic analyses of institutions and communities are important in understanding disease transmission and community responses (Abramowitz et al., 2018). The concept of vulnerability is used in this review in order to identify studies that employ such framings in their uses of community engagement.

Vulnerability as a concept in public health scholarship has changed over the years and can be traced from its uses in the study of infectious disease presents an individual (biological) vulnerability to a vulnerability of systems or structures (Ezard, 2001; Stephenson et al., 2014), although with some notable caution against less careful uses of the term (Marino and Faas, 2020). In the context of diabetes, Linder et al. (2018) identify social and cultural aspects of vulnerability and how they vary across different types of community members. They use the differences between groups to argue for responses that are adapted to "composite vulnerability, that is, vulnerability that encompasses social, neighborhood and individual-level attributes" (p. 2). Here, connections to socioecological understandings of vulnerability also come to the fore. The similar concept of resilience is a counter to vulnerability, asking what it is that allows groups to prevent or mitigate vulnerabilities (Perez-Brumer et al., 2017).

Related concepts have been used in infectious diseases research in the social sciences, such as structural violence (Wilkinson and Leach, 2014, citing Galtung, 1969), social inequality (Farmer, 1996), structurally produced risk (Rhodes et al., 2005), or structural and social

Fig. 1. Summary of minimum standards for community engagement (UNICEF et al., 2020, 12).

capital (Wallace et al., 2015). The focus on systems and structures here provides a view of vulnerability that prioritizes processes that are often broader than the community itself, indicating that power structures and political and economic systems have profound effects on local circumstances. Importantly, some have called into question the uncritical use of structural violence for its potential reduction of context and loss of agency (Napier, 2014). The dynamic nature of vulnerability is further stressed by Zarowsky et al. (2013), while others have noted the importance of the role of power in understanding vulnerability (Katz et al., 2018).

Jeleff et al. (2019) reviewed tools for assessing vulnerability within an infectious diseases threat context, further highlighting the need to understand local conceptions of vulnerability, temporal and spatial aspects of risk and exposure, and the inclusion of both qualitative and quantitative methods. Indeed, assessing vulnerability or using it as a strategic concept within community engagement could offer theoretical avenues from the social sciencesa place in the research and practice of community engagement globally. Napier (2014) manual for assessing vulnerability is one such application of these principles, while at the same time very much grounded in social science-informed concepts and methods.

Since community engagement, as we consider it here, is predicated by social and behavioral science, intersectoral collaboration, and notions of participation and inclusion, framing community engagement through the lens of vulnerability may be a natural entry point for deeper integrations of social scientific concepts. Some questions arise from this proposition, including: how and whether studies using community engagement assess vulnerability; what concepts are used to connect vulnerability and community engagement; and how social science concepts can strengthen community engagement research and practice. These questions form the basis of this review and are clarified in the methodology below.

2. Method

The objective of this review is to build on evidence from and observations of community engagement studies using the framing of vulnerability from a social science perspective. This initial broad objective was formulated in order to scope the current landscape of literature on community engagement that utilize the concept of vulnerability, while then taking up the various framings of the connection between community engagement and vulnerability to shape an approach that can be used in practice. This gave rise to two main research questions: How is community engagement conceptualized and operationalized within the context of vulnerability of communities and infectious disease? How can social science research contribute to community engagement in infectious diseases, in terms of both theory-building and practical work? These questions provided enough specificity to search for a well-targeted collection of studies, but general enough to allow the search process and eventual analysis to be flexible and adaptive.

The following databases were included to identify relevant studies published up to April 2020, when the search was carried out: PubMed, MEDLINE, Web of Science, and PsychInfo. The search terms include three concepts: (1) community engagement and other iterations thereof; in the context of (2) infectious diseases or epidemics; and using (3) concepts from social science to search specifically for those studies which take up the concepts of vulnerability, resilience, power, etc.

- Community engagement, community engaged, public engagement, citizen engagement, community participation, public participation
- Infectious disease*, communicable disease*, endemic, epidemic, pandemic, outbreak, preparedness
- Vulnerable, vulnerability, resilience, resilient, sociocultural, sociocultural, political, economic, power, empower*, marginalized, marginalized, marginalization, marginalization, risk perception, qualitative

2.1. Eligibility criteria

All types of research studies were included, with a special focus on qualitative methods and observations or other social science studies on community engagement. The following eligibility (inclusion/exclusion)

criteria were selected for:

- Inclusion: Primary scientific studies on original data (e.g., no reviews or "opinion" papers); written in English; community engagement is the focus or method of published in peer-reviewed journals; full text available; only human studies
- Exclusion: type of publication (reviews, commentaries, opinions); not about infectious diseases; does not ground community engagement's concepts in a social science field; gray literature; not written in English; no full text available

2.2. Procedure

After running the search in the designated databases and duplicates removed from the results, two reviewers (JO and MD) independently screened titles and abstracts using Rayyan software (Ouzzani et al., 2016). Disagreements were discussed among the two reviewers and if consensus could be reached, a third researcher (JP) was consulted. The selection process was guided by the PRISMA checklist (Moher et al., 2009), as illustrated in Fig. 2A total of 537 results were found in all databases. When duplicates were removed the records were screened for eligibility, after which 30 full text articles were assessed, resulting in a final total of 15 articles.

Analysis was carried out using thematic coding with MAXQDA software. A code book of themes and subthemes was developed by the first author (JO) after the initial screening of results. The themes were agreed upon by the reviewers prior to coding, and included two major subthemes of community engagment (community engagement framing and community engagement activities) and two major subthemes of vulnerability (history and situatedness and systems and structures). The first author independently coded each document and discussed intermediary findings with other researchers. Text-based searches in the documents were also carried out to capture missed data.

3. Results

The results of the search yielded a total of 15 articles, which examine

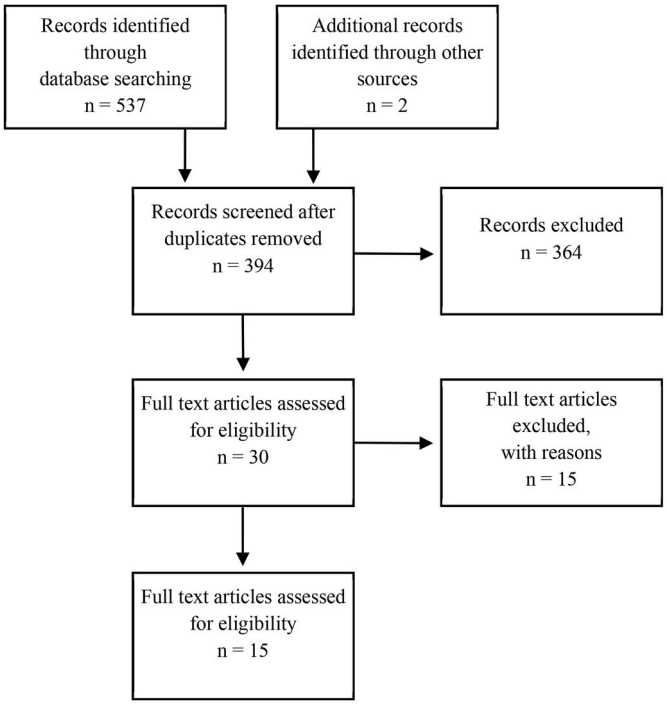

Fig. 2. PRISMA flowchart showing the study selection process.

community engagement in a variety of geographical contexts and for various infectious diseases. The articles included cover a wide spread of high-to low-income countries including Canada, Liberia, Myanmar, Poland, Sierra Leone, USA, Vanuatu, and Zambia. All of the studies were published between 2009 and 2020. Table 1 shows the study characteristics in more detail.

The studies included here built their framings of community engagement through a careful consideration of how individuals make up a community, and how "engaging" with those communities necessitates an approach that relies on understanding their embeddedness within specific social/historical systems and structures. The two analytical categories of this review, community engagement and vulnerability, frame the following description of the review findings in two sections. However, it should be noted that these categories are not rigid and the studies detailed here do not necessarily consider them as such. The subsections of vulnerability, for example, are descriptors signposting the multiple levels of vulnerability identified generally in all of the studies. Starting first from the descriptions and uses of vulnerability, we then illustrate the various framings of community engagement and how it is taken up in practice. Finally, the conceptual connections between the two and the mechanisms discussed in the studies are presented in the third section.

3.1. Vulnerability

3.1.1. History and situatedness

In order to understand the communities' embededness within an infectious disease outbreak or threat, all of the studies here described the history of the group and their particular situtatedness within that history and broader context. Some study groups shared a specific characteristic, such as belonging to a certain social group or considered as having a high risk for the disease in question (Adams et al., 2018; Burns et al., 2020; Charania and Tsuji, 2012; Hussen et al., 2018; Owczarzak, 2009; Tangseefa et al., 2019). It was clear that for these studies, an understanding of historical situatedness frames community engagement from the onset. Burns et al. (2020) frame their target group of Black men who have sex with men in detailed historical terms, highlighting the social and structural particularities that emphasized the situation of many of the individuals in their study group:

> "The twin legacies of slavery and Jim Crow, along with contemporary structural forms of institutionalized racism, have resulted in a range of adverse social conditions and policies (e.g., concentrated poverty, low educational attainment, high rates of incarceration, unemployment, and limited access to health care due to lack of Medicaid expansion) [12, 13] that have created barriers to access and uptake of HIV prevention, care, and treatment services, particularly among African Americans living in the South [14–18].
>
> Burns et al. (2020, p. 194).

Ultimately the authors relate these factors back to a social determinants of health framework, concluding that by working through community-based initiatives and recognizing the multiple and multisectoral forms of vulnerability that their study group faced, in this case Black MSM, their program was better able to address these vulnerabilities through their engagement activities. Similarly, factors noted as affecting vulnerability to infectious disease included homophobia, racism, and other forms of stigma, which were enacted upon communities, as well as within communities. Adams et al. (2018) detail these "multidimensional" processes that contributed to the context in which their study population was situated, noting that "HIV–positive participants who were out of care noted significant within-community HIV stigma, which they reported as a contributory factor to their not receiving HIV care" (p. 316).

Consideration of historical context plays a role in Owczarzak (2009) analysis of the Polish state's response to HIV for the community of men

Table 1
Study details.

Article details	Country	Focus	Target population	Type of community engagement in study		Vulnerability		Explicit concepts or theory used
				Community Engagement framing	Community Engagement activities	History and Situatedness	Systems and Structures	
Aantjes et al. (2016)	Zambia	HIV	General population	Engagement as an ongoing process of adaptive health systems	Health system responsiveness	None explicitly mentioned	Infrastructural challenges, economic inequalities, health system shortcomings	Building on social networks
Abramowitz et al. (2017)	Liberia	Ebola Virus Disease	General population	Context-driven communication and social learning	Community mobilization, mass communications	Historical relationship with government, incongruence of behavior change messages with practical daily life	None explicitly mentioned	Cognitive dissonance between beliefs and practices, behavior change in epidemics
Adams et al. (2018)	Pittsburgh, Pennsylvania, USA	HIV	Young black men who have sex with men and transgender women	"Activities and processes to guide the program based on input and ideas from the target population" (pp 312)	Creation of a recreation-based community health space	Stigma and other social phenomena such as homophobia and racism	Various types of insecurity such as food, housing, and employment	Fundamental cause theory
Barker et al. (2020)	Liberia	Ebola Virus Disease	General population in seven counties	Continuum of types of community engagement approaches	Analysis of information provision, consultation, participation, community empowerment, necessitated CE	Trust in health system	Health system characteristics and functioning	Health system resilience
Baum et al. (2009)	USA	Pandemic preparedness	General population	Public deliberation (citizen discussions to investigate points of view and make recommendations)	Focus groups on pandemic preparedness	Public trust in pandemic response	Economic burden	Individuals as citizens
Bedford et al. (2017)	Liberia	Polio immunization (in the context of Ebola Virus Disease)	General population	Engagement and social mobilization based on structures established during Ebola epidemic	Group discussions assessing information campaigns, interpersonal communications	Suspicion and lack of trust of health workers and routine vaccines	Health system infrastructural challenges	Local perceptions of intervention
Burns et al. (2020)	Jackson, Mississippi, USA	HIV	Black men who have sex with men	Community-identified priorities, community-led partnerships	Two case studies of community-based organization-led interventions engaging target population, support community partnerships, develop recommendations based on lessons learned	Institutional racism, discriminatory policies, lack of trust in health system, and homophobia and HIV stigma (social determinants of health)	Economic stability	Social determinants of health (socioecological)
Charania and Tsuji (2012)	Sub-arctic Ontario, Canada	Influenza (H1N1p)	First nations communities	Mitigating inequity for disadvantaged populations	Development of a pandemic plan using interviews and community meetings	Community social networks	Health system and other infrastructural challenges	Community as leader, clarifying local applicability
Enria et al. (2016)	Sierra Leone	EBOVAC-Salone vaccine	General population	Community advising strategy complemented by ethnographic methods	Conducted public meetings, home “sensitisation visits”, radio, participant advisory group	Power between and within groups, other context-specific social dynamics	Political instability	Power relations and political economy
Hassaballa et al. (2019)	Liberia	Ebola Virus Disease	General population	Social mobilization that identifies community priorities and promotes context-driven behavior change	Analysis of social mobilization and community engagement including intersectoral collaboration, health promotion,	Social determinants of health, other context-specific social dynamics	Spatial and infrastructural challenges	Health in all policies

(*continued on next page*)

Table 1 (*continued*)

Article details	Country	Focus	Target population	Type of community engagement in study		Vulnerability		Explicit concepts or theory used
				Community Engagement framing	Community Engagement activities	History and Situatedness	Systems and Structures	
					community action, and evaluation			
Hussen et al. (2018)	USA	HIV	Young black gay and bisexual men living with HIV	Community advising	Development of an intervention focused on building social capital and sustaining connections, with input from a community advisory board	(Lack of) Social capital, challenges in holistic psychosocial support	None explicitly mentioned	Social capital and resilience
Owczarzak (2009)	Poland	HIV	Men who have sex with men	Citizen-state relationship	Analysis of state communication policy and organization of disease-specific care	Political and social marginalization	Health care access	Democracy and its contestations
Sahan et al. (2017)	Myanmar	Malaria	General population	Social and cultural factors that lead to intervention success	Communication strategies to promote program adherence	History of conflict	Infrastructural challenges	Trust and local attitudes toward biomedicine
Tangseefa et al. (2019)	Myanmar	Malaria	Karen/Kayin community	Authors explicitly state that no framework is used, but point to nine key basic notions	Conducted stakeholder engagement, involvement of local networks, shared decision-making	Heterogeneous communities, social and political unrest, power relations	Negative effects of capitalism	Investment in people and investigation of all aspects of everyday lives
Watanabe et al. (2015)	Vanuatu	Malaria	General population	"The process of working collaboratively with and through groups of people affiliated by geo- graphic proximity, special interests or similar situations to address issues affecting their well-being" (pp 2)	Analysis of mass communication, workshops, community meetings	Various context-specific social dynamics, lack of social capital	Infrastructural challenges	Health empowerment theory

who have sex with men (MSM). Here, a higher level of analysis is taken up both in terms of broad social and political processes in the country, as well as the consideration of MSM as a social category, rather than a geographically bound group. Standing apart from the rest of the studies in this review, this study importantly highlights the limits of engagement in certain contexts that operate under a centralized governing structure. The relationship between state and citizen are highlighted as creating or exacerbating vulnerabilities due to discriminatory policies, othering health care practices, and politicized communications to and from the community. Situating these processes within the context of a transitioning government structure and a moralizing Catholic church, Owczarzak concludes:

> "Through institutionalization of HIV/AIDS prevention and care, the state became responsible for providing moral guidance on the issue of AIDS and providing citizens with access to information about this virus. Fledgling NGOs and individuals played key roles in establishing these new boundaries and roles, but the inclusion of the Catholic Church was seen as a key step in this process. The involvement of the Church served to recast how morally controversial topics were addressed, resulting in a context in which the specific issues facing sexual minorities in Poland remain outside the purview of state-level prevention efforts in favor of prevention based on information dissemination."
>
> Owczarzak (2009, p. 17).

Complex histories of state intervention are also present in Abramowitz et al. (2017) analysis of Ebola-related communications and community responses during the epidemic in Liberia. Amidst a barrage of mixed messages from government authorities regarding Ebola, some members of the public held beliefs about transmission and prevention that were inconsistent with scientific knowledge. This approach reinforced existing tensions between the government and communities: "Many community members were distrustful of government messages due to historical factors (wartime experiences), but during a rapidly accelerating emergency, government messages also had considerable reach and influence" (p. 63). Ultimately the rumors and incorrect information circulating within communities was shown to have a minimal effect on their readiness to accept public health messages. Here, the process of how individuals or groups are made vulnerable is emphasized, set against a particular historical context.

3.1.2. *Systems and structures*

Closely linked to the previous section, systems and structures are considered here as those processes and conditions that are generally larger than and originated outside of the bounds of a local community. Infrastructural challenges and various types of insecurity due to a lack of resources is also considered part of this category. One example of how economic inopportunity led to difficulty in the community engagement processes comes from Tangseefa et al. (2019), who connect financial hardship with access to private health services.

> "A variety of peoples had migrated seeking economic opportunities. This also had the effect of greater fragmentation observed in Village D with smaller, heterogeneous communities. Villagers often had financial means allowing them to meet health needs independent of

> the free services offered by SMRU or other international nongovernmental organisations. This heterogeneity and self-sufficiency resulted in a lack of a sense of belonging that affected the village's sense of "community" as a whole or perceived need for SMRU services or the TME programme."

Tangseefa et al. (2019, p. 8).

Differential access to important resources, not only health facilities, but economic and political power are predominant. Similarly, Baum et al. (2009) include high-income and highly educated participants in their dialogue groups for pandemic preparedness, but still questions of economic stability came to the fore. Communities in their influenza pandemic prevention study noted that those who are most vulnerable to loss of income, for example, would find it harder to cope with strict stay-at-home measurements and face even more strained family resources. They specifically noted strains in their "everyday lives – concerns about job stability, financial fragility and their abilities to truly keep children and teens in safe, isolated environments" (Baum et al., 2009, p. 10).

Concluding, Baum et al. argue that those who bear the burden of income loss during an epidemic may also lack the resources to navigate systems to obtain information about an outbreak when social networks may become strained. Other, physical, infrastructural challenges are present in some study settings, particularly for communities located in geographically remote locations (Charania and Tsuji, 2012; Hassaballa et al., 2019; Sahan et al., 2017; Tangseefa et al., 2019; Watanabe et al., 2015). The ability to reach and engage with communities proved difficult for some, not only in terms of physical logistical challenges, but equally infrastructural barriers related to the health system.

> "Some participants reported that there was confusion about which health care facility was responsible for receiving and distributing antivirals. Thus, in the 'antivirals and antibiotics' category, specific detail of how antivirals are transported, received, stored, and who to contact when more medication is required was added. Furthermore, participants from all of the study communities stated that there was a general lack of community awareness during the pandemic response."

Charania and Tsuji (2012, p. 5).

Infrastructural challenges were explicitly mentioned in six studies, where issues surrounding geographic remoteness and other physical challenges were particularly difficult within disasters or complex emergencies. A further five studies addressed the matter of adaptive and smoothly functioning health systems or access to care (Aantjes et al., 2016 Barker et al., 2020; Bedford et al., 2017; Charania and Tsuji, 2012; and Owczarzak, 2009). These studies explicate some the ways in which individuals struggle to navigate the system, a problem that is exacerbated during times of acute emergencies or for those who rely on an under-resourced health system. Owczarzak (2009) illustrate this point through a description of the Polish state's inadequate engagement with those most vulnerable to HIV at the onset of its epidemic.

> "Polish condoms were said to be of shoddy and inadequate quality and the Polish Red Cross, rather than the state, provided care for people living with AIDS. Health care workers felt vulnerable to infection because they did not have adequate supplies (needles, syringes, protective clothing such as rubber gloves, analytical and testing equipment, and sterilization and disinfectant materials) to follow sanitary guidelines and protect themselves."

Owczarzak (2009, p. 5).

3.2. Community engagement

3.2.1. Framing community engagement

Studies detail a wide range of community engagement activities and characterizations. Some uses of community engagement were part of another larger intervention (Tangseefa et al., 2019) or study to strengthen the methodology or gain buy-in from community members (Sahan et al., 2017). Further, some studies used community engagement directly as a method (Tangseefa et al., 2019; Sahan et al., 2017), while others examined existing or historical community engagement structures (Abramowitz et al., 2017; Aantjes et al., 2016; Owczarzak, 2009). In terms of contributing to a broader infectious disease response, all the articles frame community engagement as consisting minimally in some way of "activities and processes to guide the program based on input and ideas from the target population." (Adams et al., 2018, p. 312). Other studies further described principles of community engagement such as collaboration and sustainability in their framings:

> "Community engagement used in health interventions is recognized as the process of working collaboratively with and through groups of people affiliated by geographic proximity, special interests or similar situations to address issues affecting their well-being [9, 10]. Community engagement can only be sustained by developing the community's capacity and resources and mobilizing community assets and strengths to make decisions and take action [9, 10]."

Watanabe et al. (2015, p. 2).

Exactly what community engagement entails, or precise characterizations of community engagement were varied. Whereas Barker et al. (2020) uses a continuum of levels of engagement activities, or Aantjes et al. (2016) consider engagement as an ongoing process of adaptive health systems, still Owczarzak (2009) describes a loose engagement process between a restructuring Polish state and the gay community at the onset of the AIDS epidemic. In describing how gay rights organizations offered HIV services in this context, the author notes how they "saw it as their task to provide information that would allow both myths of Polish gay life to be dispelled and AIDS to be prevented" (Owczarzak, 2009, p. 157). Engagement in this case is then a structure of organizations working along established networks to provide needed services and advocate for equal treatment in Polish society.

Notably, five of the 15 articles focused on HIV/AIDS, making it the most represented disease in the included results of our search. The approach used in these studies and other research done in the context of HIV builds on its specific vernacular of targeting "most affected", "most at risk", or "key" populations. In contrast, the studies that focus on Ebola Virus Disease or malaria, for example, aim their community engagement approaches toward a more general population. The question of who makes up a community is fundamental to approaching that group. These groups are described in terms of their shared history or vulnerability, as is discussed in section 3.1.1.

3.2.2. Doing community engagement

The specific activities that make up community engagement were also varied. In most cases community engagement consisted of conducting meetings with groups who make up a certain target group (Baum et al., 2009; Burns et al., 2020; Charania and Tsuji, 2012; Enria et al., 2016; Hussen et al., 2018; Watanabe et al., 2015) or with the general population of a locality. In some cases, this is built into the framing of community engagement itself:

> "CE for health is defined as the involvement of communities in decision-making and in the planning, design, governance and delivery of services aimed at improving population health and reducing health inequalities (Swainston and Summerbell, 2008; Popay, 2006; O'Mara-Eves et al., 2013)."

Barker et al. (2020, p. 417).

The engagement process is used to identify problems related to community responses to the disease in question. These problems are identified as areas of vulnerability (described above), such as history of conflict (Sahan et al., 2017) or political instability and differential power relations (Enria et al., 2016). However, issues may also arise within the

engagement process, such as infrastructural challenges described above, which must be addressed. For example, although Barker et al. (2020) approached their community engagement activities with a pre-determined framework, they still included "necessitated control" or *ad hoc* activities that responded to gaps in the health system identified by community members.

Studies also used engagement to understand the community dynamics as their potential to operationalize them for response to the disease. The use of existing social networks was the most prominent, used directly by Aantjes et al. (2016), Bedford et al. (2017), Watanabe et al. (2015), and Hussen et al. (2018). A consideration of the circulation of rumors was taken up by Barker et al. (2020), where, through the engagement process in the context of the Ebola epidemic in Liberia, one government official emphasized that "'For many people here, the message equals the messenger. So if you don't trust the messenger, you would not trust the message.' Later in the epidemic, health officials began to employ local leaders to share Ebola-related messages in local vernaculars with their communities." (p. 418). Enria et al. (2016) and Abramowitz et al. (2017) also mention that rumors were found to be a result of mistrust in government structures, foreign agencies, and healthcare centers and community concerns about the fairness of interventions or their disruption of everyday life.

Intersectoral collaboration contributed to the engagement process in multiple included studies (Aantjes et al., 2016; Charania and Tsuji, 2012; Hassaballa et al., 2019). Hassaballa et al. (2019) explicitly use a multisectoral health in all policies approach, citing:

> "engagement of partners from multiple sectors was seen to enable different sectors to target specific areas of contribution, including through education, governmental, nongovernmental, media, and health sectors. In the beginning, this outbreak was viewed as a health issue; but with its severity and complexity, it became a humanitarian problem that demanded contribution from actors outside the health sector."
>
> Hassaballa et al. (2019, p. 62).

This realization that infectious disease problems require an understanding of multisectoral processes was echoed in other studies in this review and was often tied to recommendations for future practice. Tangseefa et al. (2019), for example, formulate nine "dimensions" of engagement that require a multidisciplinary approach, especially in complex situations, such as the post-war border region in which their study takes place.

3.2.3. Empowerment and participation

Participation is clearly one of the minimum qualifications for community engagement, but the extent to which this is appropriate or necessary within engagement activities within the studies here is contested. Some studies focus on participation as a method of engagement, to a participation of empowerment which, as Watanabe et al., propose: "the enhanced empowerment in the active community engagement continuum may facilitate a smooth transition from externally driven interventions to community-led interventions" (2015, p. 9).

Much of the existing literature on community engagement studies focuses on the engagement process as contributing to methodological robustness. While engagement was said to contribute to the methods of the studies in this review, it was framed in terms of knowledge brokerage and from a stance on engagement that centers around the experiences of communities. Echoing this sentiment and emphasizing the need for a community-led approach, Charania and Tsuji write that "engaging the public, especially disadvantaged populations, can aid in providing pandemic policy planners with information about the unique, local issues they face" (Charania and Tsuji, 2012, p. 2).

Further, empowerment was cited as building social capital and bridging and sustaining connections for communities (Hussen et al., 2018). Watanabe et al. (2015) also rely on the notion of empowerment, explicitly using Health Empowerment Theory to guide engagement activities in Vanuatu. Such descriptions point to the need for understanding the challenges to achieving empowerment as well as ongoing vulnerabilities that communities face that help to shape appropriate engagement.

3.3. Conceptual underpinnings

The previous two sections outlined the uses of community engagement and vulnerability in the included studies. This section outlines the conceptual underpinnings or specific theories used to explain the connections between community engagement and vulnerability. This relationship is illustrated in Fig. 3, where vulnerability, conceived as history and social context and systems and structures, informs community engagement. Community engagement in turn, through responsiveness to community-identified needs, participation or empowerment, and intersectoral collaboration, is considered to mitigate identified vulnerabilities. This process is framed through various theories, detailed in this section.

The bottom part of Fig. 3 presents a sort of black box for describing a mechanism that illustrates the relationship between vulnerability and community engagement. It is clear that each study uses the two concepts differently. While some studies focused on the practical aspects of vulnerability that increased the efficiency of engagement (Aantjes et al., 2016; Barker et al., 2020; Sahan et al., 2017), others made more theoretical connections between vulnerability and community engagement.

Watanebe et al. (2015, p. 7) show that "interrelated individual and structural forms of capacity facilitated the effective mobilization and utilization of resources for their health and well-being." Similarly, Burns et al. use a social determinants of health framing to describe how they reflected on the multi-dimensional forms of vulnerability historically faced by participants and use those insights to inform program activities:

> "Both CWU and 5Voices@6 programs employ a social determinants of health framework to implement HIV prevention interventions to address barriers derived out of the social context, particularly racial discrimination and marginalization. The CWU project provides multiple forums and opportunities, both individually and collectively, for participants to talk about their lived experience in relation to HIV and begin to deal with the trauma related to multiple domains that may increase HIV vulnerability (e.g., socioeconomic status, racial/ethnic background, sexual identities)."
>
> Burns et al. (2020, p. 199).

Drawing from the vulnerability shown through systems and structures, Adams makes refence to fundamental cause theory (Link and Phelan, 1995), arguing that issues like poverty and violence in communities of young men who have sex with men and transgender women of color are at the root of the risk of HIV that these communities face. Consequently, the authors show that their engagement program adapted to directly address those vulnerabilities through activities based on participation and improving structural stability in everyday life.

> "Through the demonstration project period, staff learned that these factors frequently superseded youths' sexual health needs, and that addressing poverty and violence could not only improve the lives of the youth, but also allow them to address their sexual health when better structurally stabilized."
>
> Adams et al. (2018, p. 319).

Understanding fundamental causes of HIV risk in this way allowed for an engagement process that allowed the program to understand the underlying issues present in their participants' lives and recognize that the most effective program required addressing both the "fundamental" causes and more traditional prevention activities simultaneously.

Social capital was expressly used in two studies (Watanebe et al., 2015; Hussen et al., 2018) to illustrate the connections between

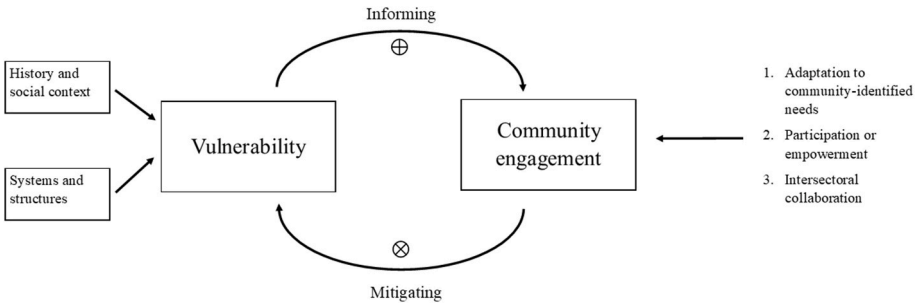

Fig. 3. The cycle of vulnerability informing and being mitigated by community engagement.

vulnerability and the way in which community engagement was able to be carried out. Citing Bourdieu (1986), Hussen et al. characterize the use of social capital within community engagement as drawing from existing social networks to build a community resilience against the threat of HIV.

> "This study indicates that the existing local social capital on Aneityum continues to foster a strong sense of community among members, which contributes to solving community-identified problems to develop preventive health behaviors and create health-enhancing environments for individual and collective well-being."
>
> Watanabe et al. (2015, p. 9).

Social capital was used alongside the language of resilience in HIV. Relating prevention efforts to a consideration of the "environmental" aspects of the community's experiences, Hussen et al. (2018) emphasize a "holistic" intervention that targets psychosocial factors affecting gay men's health. The studies in this review focusing on HIV use language that suggests an understanding of risk and vulnerability to virus transmission in terms of inequality and stigma and discrimination, in what is referred to (in)directly as "social determinants of disease" (Burns et al., 2020; Adams et al., 2018).

Finally, use of strictly biomedical approaches to infectious disease was also shown to be incongruous with many local understandings of disease, as seen in the West African Ebola epidemic, where rumors and mistrust in medical interventions were "rooted in histories of exploitation and mistrust" (Enria et al., 2016, p. 8). In order to better contextualize communities' relationships with medical interventions, Sahan et al. (2017) advocate for the importance of considering local understandings of medications and how they may differ from those of outside groups. Along the same lines, Ateinyum islanders used western medicine for malaria treatment, but preferred the local "kastom" medical system for certain symptoms (Watanebe et al., 2015). Moreover, an ignorance of these aspects of communities and their contexts lead to, as Aantjes et al. (2016) point out, a medicalization of health and a focus on donor-mandated recordkeeping, which hinders the adaptability and contextualization of engagement efforts.

4. Discussion

This review has shown a varied field of community engagement studies and diverse uses of vulnerability. The fifteen studies examined here take up frames of community engagement that range from communication methods, to community meetings, to health system strengthening. The most notable commonalities in these studies' approach to community engagement included: responsiveness to community-identified needs, intersectoral collaboration, and some form of participation or empowerment. Vulnerability was used as a frame for these studies in clearly differing ways, but generally with similar aims. The two general categories of vulnerability that were used are 1) history and community situatedness and 2) systems and structures affecting communities. Through these categories, authors of the studies reviewed here highlighted specific social, cultural, political, and economic factors that impacted communities' vulnerability to infectious diseases. The concepts connecting engagement with vulnerability were also varied, but included theories based on structural or systemic phenomena that illustrate how a thorough understanding of communities and their environments can aid in reducing vulnerabilities to infectious diseases.

Those who respond to infectious diseases are left with the questions of: what can go wrong during a pandemic, and what are the challenges present at all levels? Confusion, the spread of information, notions of fairness and trust all come to the fore here. These all rely on existing infrastructure and social networks. Governments and institutions can be hostile and point out "wrong" behaviors or groups of people, as seen, for example, in Owczarzak (2009), but according to the findings presented here, this only works to create further distance between responders and beneficiaries, and ultimately increases uncertainty and vulnerability. Based on the results presented in this review, there are a few key messages for future research and practice. The first is a call for more research in the area of community engagement that considers the added benefit of the literature on vulnerability. Conceptual frameworks such as social capital, fundamental cause theory, and social determinants of health were found in this review, but these are consistent with other concepts from the social sciences that may also be useful. In all, the literature suggests a conception of vulnerability that centers local processes, drawing connections to larger and historical phenomena. Vulnerability is the confluence of biological, social, political, economic, and other emerging factors, which put individuals and communities at greater risk of disease. Similarly, starting the engagement process from the community should also be a priority. Gaining insight into the historical situatedness of communities and their contexts was suggested as being a major factor in the success of many of the community engagement programs detailed here.

4.1. Connections to larger social science concepts

The concepts present in this review are not new to social science studies of community engagement. They have shown that issues such as war, racism, homophobia, political instability, and economic disparity contribute to vulnerabilities in communities that impact their capacity to prevent disease. Concepts like fundamental cause theory, social determinants of disease, and social capital were used to understand those issues at various points in the engagement process. The studies in this review highlight the types of vulnerability linked to social and political context and systems, as well as a deep local understanding of how individuals engage with these systems. The emphasis on social networks and utilizing existing local infrastructure is illustrative of this.

While the concept of structural violence was presented as one theoretical lens for analyzing structural framings of health care and the production of marginalized individuals it was not seen in the results. The only mention of structural violence came in the introduction section of one study (Enria et al., 2016). Similar descriptions of the concept do however appear in some historical accounts of communities within the studies, particularly in the studies focused on HIV. Indeed, social and structural violence faced by groups in relation to HIV prevention has

been described elsewhere (Shannon et al., 2008) and the rich literature within the social sciences on HIV may be a point of entry for other studies of infectious diseases, especially for community engagement. For example, much has been documented on the implementation of user fees for HIV services, which has shown to increase economic inequality through catastrophic health expenditures by the poor (Desclaux, 2004). Further, it has been suggested that examining social inequalities alone may not go far enough in understanding structural-level factors in vulnerability and how individuals cope with everyday violence and the threat of risk, to which Farmer (2004) asserts anthropologists are especially well-situated to address these types of subjectivities, where traditional infectious disease science may not go far enough. Pfeiffer and Nichter (2008) echo this sentiment by noting that medical anthropology can contribute to a full body of evidence for HIV prevention efforts, as well as provide "an understanding of the burden of illness beyond body counts of the afflicted or DALYs" (p. 413). Further mirroring the fragmentation and moralizing state policies in Owczarzak (2009) in this review, HIV testing for female sex workers in Ukraine has been shown to rely on a stigmatizing health system that rarely includes the voices of civil society (Tokar et al., 2019).

What we already know about vulnerability and the myriad social science uses thereof is not taken up in community engagement studies. The extensive uses of the concept, as described above, are not used as much as expected in studies that have been published on community engagement. The clear indicator of this is the small number of studies included in this review. Certainly an opportunity for future research in this field, the conceptual underpinnings of the connections between community engagement and vulnerability provide a few possible avenues for future research to explore. Fundamental cause theory has been highlighted elsewhere as a framework to decrease health inequalities (Goldberg, 2014) and an approach rooted in social capital can target social and economic factors that exclude certain populations from building resiliency and mitigating vulnerabilities (Perez-Brumer et al., 2017). Similarly, from disaster studies, Alexander (2012) description of social vulnerability in disasters highlights some historical, cultural and ecological framings for understanding vulnerability in context.

This review shows ways of understanding "risk" of an infectious disease that address those social and structural problems as forms of vulnerability. The community engagement in these articles have taken up vulnerability in this way to approach people and contexts not as static entities, but rather as dynamic and contested categories of people who shape and are shaped by many factors. Communities constitute uneven power structures internally and are also subject to external power structures that put some individuals in positions of being worse off. This is perhaps the reason why blanket measure to deal with infectious disease or inflexible community engagement models do not work for those in positions of increased marginalization. This is parallel to the context of the COVID-19 pandemic, where we see that calls to stay at home, for instance, do not work for those who are homeless, those who are working in essential industries, or those who must work in order to eat. Certain members of society often suffer from other forms of vulnerability and face the highest of an increased risk of infection.

The COVID-19 pandemic as well as past examples show that communities have not always been adequately "engaged" to the extent that is proposed by the UNICEF minimum quality standards or by the articles in this review. This is in part related to the lack of serious consideration of community engagement by certain actors within the humanitarian and development sectors (Smith, 2020). Leach et al. (2005) point to a lack of self-reflexivity by institutions as a form of power, and powerful institutions' limited engagement of lay knowledge render a "performative" form of citizen engagement. Calling into question the epistemic and ontological discrepencies in such processes, conceptions of engagement and notions of vulnerability are embedded in networks of actors with differing frameworks, agendas, and claims to knowledge (Latour and Woolgar, 1979). As indicated in the introduction, others have pointed to similar conceptual differences to understanding community dynamics as a significant institutional barrier (Little, 2009; Abramowitz et al., 2018).

Still, some questions remain given the results of this review. Uses of the concepts of social determinants of health or empowerment, for example, did not always include very "thick" descriptions of the groups they aimed to serve. An important part of assessing vulnerability is avoiding *a priori* assumptions about groups of people, including what constitutes vulnerability or indeed a group itself. Along the same lines, although nearly all the studies here describe community engagement in low-resource settings, it should be noted that other forms of vulnerability may be present in high-income contexts (see, for example, studies in this review from the United States). Additionally, not all studies considered vulnerability as a process rooted in not only local context, but its intersections with history and structures. Owczarzak (2009) stands as one example of an investigation of vulnerability from a historical perspective, tracing the engagement of a group across decades through regime changes, involvement of religious groups, and global economic hurdles. However, it is doubtful whether a social determinants of disease (Burns et al., 2020) or framing of vulnerability or focus on structural aspects alone can contribute to a holistic picture of communities. Investigating how it is that communities are made vulnerable, emphasizing the processual nature of vulnerabilization in addition to recognizing the more structural or stable aspects of social life in communities, is key to ensuring a meaningful engagement process.

4.2. Applications

The community engagement in this review was structured on the basis of what made communities vulnerable. The mechanisms that each author highlight operate along the lines of responding to what the locality "says" – from community needs expressed in dialogue sessions (Baum et al., 2009) to workshops (Watanebe et al., 2015) to ethnographic and historical methods (Owczarzak, 2009). Lambert et al. (2019) serve as one additional example of how medical interventions can incorporate carefully considered ethnographic work that uncovers differently situated understandings of medication prescribing and infectious disease diagnosis.

The implications of the results of this review are relevant for research, policymaking, and practice. As outlined above, the UNICEF standards for community engagement present a set of recommendations for structuring activities adapted to local contexts (UNICEF et al., 2020). Napier (2014) manual for assessing vulnerability similarly draws on local understandings of the concept and how they can be used to structure interventions, and has more recently been adapted and applied to infectious disease epidemics, including that of COVID-19. As applications of community engagement and vulnerability, it is useful to apply the concepts outlined in this review to such methodological frameworks, putting social science into practice. Using the concepts outlined in this review and the methods described by the two tools as guidance, we propose that community engagement in the context of infectious diseases could use such: Specifically, the engagement process should be informed by insights into local vulnerabilities (focusing on history and situatedness, systems and structures). What is more, engagement should be responsive to community-identified needs, promoting participation or empowerment in terms of problems and solutions. Ultimately, the outcomes of this process should be transformative by mitigating vulnerabilities and, ideally, instituting a sustained engagement structure for future use. This process could consist of:

1. Problem identification within a specific local context.
2. Carry out a vulnerability assessment to uncover local case definitions of vulnerability.
3. Use insights from vulnerability assessments to inform a dialogical engagement process with relevant stakeholders and community members to identify multi-scalar, multi-sectoral intervention(s).

4. Form policy recommendations or other avenues of implementing findings from the vulnerability assessment and community engagement process that have the potential to mitigate vulnerabilities in the context of the respective infectious disease.

The sequence of steps described above draws from the two tools, UNICEF community engagement standards and vulnerability assessment barefoot manual, as well as Fig. 3 above. The most important of these steps is the last one, mitigation of vulnerabilities. If community engagement takes into account the particular forms of vulnerability in a context, this can be a process that targets the most relevant aspects of the disease, while ensuring participation, empowerment, inclusion, two-way communication, and building on local capacity in a meaningful way. In this manner, community engagement may be seen as inseparable from its complementary vulnerability assessment. Figs. 1 and 3 are then also intrinsically linked – the first providing a set of standards for shaping adequate community engagement, and the latter offering a conceptual framing that includes a thorough consideration of vulnerability. Indeed, this review has shown that an understanding of individuals and groups requires a thorough grasp on vulnerability in context, and that coming to know vulnerability likewise requires a deeply engaged and participatory approach. This is a practical translation of the more theoretical findings from this literature review that might serve as one of the logical routes towards a transformation in vulnerability driven by community engagement. Operational uses of community engagement, such as the WHO RCCE strategey mentioned above, may take up a framing of community engagment that is inclusive and community-led, but should consider vulnerability more in terms of historical situatedness, systems, and structures beyond a narrow framing of socio-economic status or demographic data.Other examples from country-level strategies on COVID-19 do not engage with vulnerability in their community engagement planning (Nigeria Centre for Disease Control, n.d.) or make no mention of community engagement at all (Public Health England, 2019).

4.3. Limitations

With a total included study number of fifteen, the results presented in this review rely on a fairly small data set. As discussed above, this is indicative of a modest body of literature that uses the vulnerability concept in community engagement. This review is not able to provide a comprehensive set of recommendations for community engagement or how to practically implement the concept of vulnerability in engagement activities without more empirical evidence in more contexts. Due to the small size of the results and the varying types of engagement and diseases investigated, it would be impossible to recommend any universally applicable guidelines. However, this review also makes clear that such one-size-fits-all guidelines are often not optimally adaptable to community contexts that can differ substantially. The synthesis of results and recommendations that follow are based on the authors' interpretations and use already existing guidelines that fall closely in line with the studies in this review. A possible limitation is the search approach. Other iterations of the community engagement concept exist beyond what was used in the search. However, these other uses may be conceptually different from how community engagement was considered here, and thus likely outside the scope of this review. Additionally, the search was conducted in mid-2020 and therefore does not include studies that may have been produced in the context of the COVID-19 pandemic. A subsequent review of the literature in the context of COVID-19 could further illustrate the ways that vulnerabilty and community engagement were used. This will be particularly useful for understanding vulnerabilty and community engagement in high-income settings, as there were few included in this review and elsewhere (Gilmore et al., 2020).

5. Conclusion

This review, focusing on the cross-section between vulnerability and community engagement, proposes a unifying model to structure and evaluate processes of vulnerability reduction driven by collaboration between relevant community stakeholders in the context of infectious disease outbreaks (e.g. HIV/AIDS, Ebola Virus Disease or Covid-19).

The process detailed above suggests a vulnerability-community engagement relationship that draws from the theoretical connections that substantiate the connections made in the results of this review. Social capital, fundamental cause theory, social determinants of disease, and other concepts such as structural violence offer not only interesting theoretical understandings of the connections between vulnerability and community engagement, but also provide a potential theory of change for those who wish to use either concept as an intervention in the context of infectious diseases. Accordingly, and based on the findings of this review, community engagement activities could benefit from the broad approaches to vulnerability taken in the fifteen studies. Factors such as trust in the health system, history of political marginalization, various forms of racism and discrimination, and other aspects of vulnerability are the main challenges faced by communities and should be addressed appropriately by interventions that prioritize empowerment and intersectoral collaboration. Contributing to an understanding of this practical task, with all its challenges, social science offers methods and concepts for addressing a public health issue in infectious diseases management that are relevant to societies and communities all over the world.

Declaration of competing interest

This study was carried out in the context of the project Sonar-Global, which has received funding from the European Union's Horizon 2020 research and innovation program (Grant Agreement Number: 825671). The funder has not contributed to the views expressed in this paper.

References

Aantjes, C.J., Simbaya, J., Quinlan, T.K.C., Bunders, J.F.G., 2016. From end of life to chronic care: the provision of community home-based care for HIV and the adaptation to new health care demands in Zambia. Prim. Health Care Res. Dev. 17 (6), 599–610.

Abramowitz, S., Lindley McKune, S., Fallah, M., Monger, J., Tehoungue, K., Omidian, P. A., 2017. The opposite of denial: social learning at the onset of the Ebola emergency in Liberia. J. Health Commun. 22 (Suppl. 1), 59–65.

Abramowitz, S.A., Hipgrave, D.B., Witchard, A., Heymann, D.L., 2018. Lessons from the West Africa Ebola epidemic: a systemitic review of epidemiological and social and behavioral science research priorities. JID (J. Infect. Dis.) 218 (11), 1730–1738.

Adams, B., Krier, S., Netto, J., Feliz, N., Friedman, M.R., 2018. 'All we had were the streets': lessons learned from a recreation-based community health space for young black MSM and trans women across the HIV prevention and care continuum. AIDS Educ. Prev. 30 (4), 309–321.

Alexander, D., 2012. Models of social vulnerability to disasters. RCCS Annual Review 4 (4).

Barker, K.M., Ling, E.J., Fallah, M., VanDeBogert, B., Kodl, Y., Jallah Macauley, R., Viswanath, K., Kruk, M.E., 2020. Community engagement for health system resilience: evidence from Liberia's Ebola epidemic. Health Pol. Plann. 35, 416–423.

Baum, N.M., Jacobson, P.D., Goold, S.D., 2009. Listen to the people": public deliberation about social distancing measures in a pandemic. Am. J. Bioeth. 9 (11), 4–14.

Bedford, J., Chitnis, K., Webber, N., Dixon, P., Limwame, K., Elessawi, R., Obregon, R., 2017. Community engagement in Liberia: routine immunization post-Ebola. J. Health Commun. 22, 81–90.

Brunton, G., Thomas, J., O'Mara-Eves, A., Jama, F., Oliver, S., Kavanagh, J., 2017. Narratives of community engagement: a systematic review-derived conceptual framework for public health interventions. BMC Publ. Health 17, 944.

Burns, P.A., Williams, M.S., Mena, L.A., Bruce, M.A., Melverta Bender, M., Thomaseo Burton, E., Beech, B.M., 2020. Leveraging community engagement: the role of community-based organizations in reducing new HIV infections among black men who have sex with men. Journal of Racial and Ethnic Health Disparities 7, 193–201.

Charania, N.A., Tsuji, L.J.S., 2012. A community-based participatory approach and engagement process creates culturally appropriate and community informed pandemic plans after the 2009 H1N1 influenza pandemic: remote and isolated First Nations communities of sub-arctic Ontario, Canada. BMC Publ. Health 12 (268).

Desclaux, A., 2004. Equity in access to AIDS treatment in Africa: pitfalls among achievements. In: Castro, A., Singer, M. (Eds.), Unhealthy Health Policy: a Critical Anthropological Examination. AltaMira Press, Walnut Creek, CA, pp. 29–42.

Enria, L., Lees, S., Smout, E., Mooney, T., Tengbeh, A.F., Leigh, B., Greenwood, B., Watson-Jones, D., Larson, H., 2016. Power, fairness and trust: understanding and engaging with vaccine trial participants and communities in the setting up the EBOVAC-Salone vaccine trial in Sierra Leone. BMC Publ. Health 16 (1140).
Ezard, N., 2001. Public health, human rights and the hamr reduction paradigm: from risk reduction to vulnerability reduction. Int. J. Drug Pol. 12 (3), 207–219.
Farmer, P., 2004. An anthropology of structural violence 1. Curr. Anthropol. 45, 305–325.
Farmer, P., 1996. On suffering and structural violence: a view from below. Daedalus 125 (1), 261–283.
Galtung, J., 1969. Violence, peace, and peace research. J. Peace Res. 6 (3), 167–191.
Goldberg, D.S., 2014. The implications of fundamental cause theory for priority setting. Am. J. Publ. Health 104 (10), 1839–1843.
Gilmore, B., Ndejo, R., Tchetchia, A., de Claro, V., Mago, E., Diallo, A.A., Lopes, C., Bhattacharyya, S., 2020. Community engagement for COVID-19 prevention and control: a rapid evidence synthesis. BMJ Global Health 5 (10), e003188.
Hassaballa, I., Fawcett, S., Sepers, C., DiGennaro Reed, F., Schultz, J., Munodawafa, D., Phori, P.M., Chiriseri, E., Kouadio, K., 2019. Participatory monitoring and evaluation of ebola response activities in lofa county, Liberia: some lessons learned. Int. Q Community Health Educ. 40 (1), 57–66.
Hussen, S.A., Jones, M., Moore, S., Hood, J., Smith, J.C., Camacho-Gonzalez, A., del Rio, C., Harper, G.W., 2018. Brothers Building Brothers by Breaking Barriers: development of a resilience-building social capital intervention for young Black gay and bisexual men living with HIV. AIDS Care 30 (54), 51–58.
Janes, C.R., Corbett, K.K., Jones, J.H., Trostle, J., 2012. Emerging infectious diseases: the role of social sciences. Lancet 380 (9857), 1884–1886.
Jeleff, M., Lehner, L., Giles-Vernick, T., Dückers, M.L.A., Napier, A.D., Jirovsky, E., Kutalek, R., 2019. Vulnerability assessment tools for infectious threats and antimicrobial resistance: a scoping review protocol. BMJ Open 9, e031944. https://doi.org/10.1136/bmjopen-2019-031944.
Lambert, H., Chen, M., Cabral, C., 2019. Antimicrobial resistance, inflammatory responses: a comparative analysis of pathogenicities, knowledge hybrids and the semantics of antibiotic use. Palgrave Commun. 5 (85).
Latour, B., Woolgar, S., 1979. Laboratory Life: the Social Construction of Scientific Facts. Sage, Beverly Hills.
Linder, S.H., Volkmann, A., Wisniewski, T., Hesseldal, L., Napier, D., 2018. Understanding social and cultural factors associated with compositve vulnerability to better inform community intervention strategies: cities changing diabetes in Houston. Public Health and Community Medicine 2 (1).
Link, B.G., Phelan, J., 2020. Social conditions as fundamental causes of disease. J Health Soc Behav. Spec No:80-94. PMID: 7560851.
Zarowsky, C., Haddad, S., Nguyen, V., 2013. Beyond 'vulnerable groups': contexts and dynamics of vulnerability. Global Health Promot. 20 (1_suppl), 83–9.
Little, P.C.. Negotiating community engagement and science in the federal envrionmental public health sector. Med. Anthropol. Q.. 23(2), 94-118.
Marino, E.K., Faas, A.J., 2020. Is vulnerability an outdated concept? After subjects and spaces. Annals of Anthropological Practice 44 (1), 33–46.
Moher, D., Liberati, A., Tetzlaff, J., Altman, D.G., 2009. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statemetn. BMJ 338, b2535.
Napier, A.D., 2014. The Rapid Assessment of Vulnerable Populations: a 'barefoot' Manual. Univeristy of London, London.
Nigeria Centre for Disease Control. n.d. *Risk Communication and Community Engagement Strategy COVID-19 Prevention and Control In Nigeria.*
O'Mara-Eves, A., Brunton, G., McDaid, D., Oliver, S., Kavanagh, J., Jamal, F., Matosevic, T., Harden, A., Thomas, J., 2013. Community engagement to reduce inequalities in health: a systematic review, meta-analysis and economic analysis. Publ. Health Res. (1.4).
Osborne, J., Paget, J., Napier, D., Giles-Vernick, T., Kutalek, R., Rodyna, R., Ahmed, S.M., Dückers, M., 2021. Addressing vulnerabilites in communities facing infectious disease threats: a need for social science-driven assessments. J Glob Health 11, 03003.
Ouzzani, M., Hammady, H., Fedorowicz, Z., Elmagarmid, A., 2016. Rayyan—a web and mobile app for systematic reviews. Syst. Rev. 5 (1), 210.
Owczarzak, J., 2009. Defining democracy and the terms of engagement with the postsocialist polish state: insights from HIV/AIDS. East Eur. Polit. Soc. 23 (3), 421–445.
Perez-Brumer, A.G., Reisner, S.L., McLean, S.A., Silva-Santisteban, A., Huerta, L., Mayer, K.H., Sanchez, J., Clark, J.L., Mimiaga, M.J., Lama, J.R., 2017. Leveraging social captial: multilevel stigma, associated HIV vulnerabilities, and social resilience strategies among transgender women in Lima, Peru. Journal of the AIDS Society 20 (1), 21462.
Pfeiffer, J., Nichter, M., 2008. What can critical medical anthropology contribute to global health?: a health sytems perspective. Med. Anthropol. Q. 22, 410–415.
WHO, 2020. Community Engagement for Health Improvement: Questions of Definition, Outcomes and Evaluation. A Background Paper Prepared for NICE. National Institute for Health and Clinical Excellence (NICE), London.
Public Health England, 2019. PHE infectious diseases strategy 2020-2025: addressing urgent threats in the 21st century ttps://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/831439/PHE_Infectious_Diseases_Strategy_2020–2025.pdf.
Reynolds, L., Sariola, S., 2020. The Ethics and Politics of Community Engagement in Global Health Research. Routledge, Abingdon, Oxon.
Reynolds, L., Sariola, S., 2018. The ethics and politics of community engagement in global health research. Crit. Publ. Health 28 (3), 257–268.
Rhodes, T., Singer, M., Bourgois, P., Friedman, S.R., Strathdee, S.A., 2005. The social structural production of HIV risk among injecting drug users. Soc. Sci. Med. 61 (5), 1026–1044.
Sahan, K., Pell, C., Smithuis, F., Phyo, A.W., Maung, S.M., Indrasuta, C., Dondorp, A.M., White, N.J., Day, N.P.J., von Seidlin, L., Cheah, P.Y., 2017. Community engagement and the social context of targeted malaria treatment: a qualitative study in Kayin (Karen) State Myanmar. Malar. J. 16 (75).
Shannon, K., Kerr, T., Allinott, S., Chettiar, J., Shoveller, J., Tyndall, M.W., 2008. Social and structural violence and power relations in mitigating HIV risk of drug-using women in surivival sex work. Soc. Sci. Med. 66 (4), 911–921.
Smith, J., 2020. *Between Rhetoric and Reality: the Limits of "Community Engagement" in the Humanitarian Imaginary* (Unpublished Master's Thesis). University of York, York, UK.
Southall, H.G., DeYoung, S.E., Harris, C.A., 2017. Lack of cultural competency in international aid responses: the ebola outbreak in Liberia. Front Public Health 5, 5.
Stellmach, D., Beshar, I., Bedford, J., du Cros, P., Stringer, B., 2018. Anthropology in public health emergencies: *what is anthropology good for?* BMJ Global Health 3 (2), e000534.
Stephenson, N., Davis, M., Flowers, P., MacGregor, C., Waller, E., 2014. Mobilising "vulnerability" in the public health response to pandemic influenza. Soc. Sci. Med. 102, 10-7.
Swainston, K., Summerbell, C., 2008. The Effectiveness of Community Engagement Approaches and Methods for Health Promotion Interventions. National Institute for Health and Clinical Excellence.
Tangseefa, D., Monthathip, K., Tuenpakdee, N., König, A., Kajeechiwa, L., Thwin, M.M., Nosten, S., Tun, S.W., Ma, K., Hashimi, A., Lwin, K.M., Cheah, P.H.Y., von Seidlein, L., Nosten, F., 2019. Nine Dimensions": a multidisciplinary approach for community engagement in a complex postwar border region as part of the targeted malaria elimination in Karen/Kayin State, Myanmar. Wellcome Open Research 3 (116).
Tindana, P.O., Singh, J.A., Tracy, C.S., Upshur, R.E.G., Daar, A.S., Singer, P.A., Frohlich, J., Lavery, J.V., 2007. Grand challenges in global health: community engagement in research in developing countries. PLoS Med. 4 (9), e273–e.
Tokar, A., Osborne, J., Slobodianiuk, S., Essink, D., Lazarus, J.V., Broerse, J.E.W., 2019. 'Virus carriers' and HIV testing: navigating Ukraine's HIV policies and programming for female sex workers. Health Res. Pol. Syst. 17, 23.
UNICEF, Obregon, R., Elessawi, R., Chitnis, K., Bedsen, J., Abramowitz, S., 2020. Minimum Quality Standards and Indicators for Community Engagement. UNICEF C4D, New York (NY).
Watanabe, N., Kaneko, A., Yamar, S., Taleo, G., Tnihata, T., Lum, J.K., Larson, P.S., Shearer, B.C., 2015. A prescription for sustaining community engagement in malaria elimination on Aneityum Island, Vanuatu: an application of Health Empowerment Theory. Malar. J. 14 (291).
Wallace, R.G., Bermann, L., Kock, R., Gilbert, M., Hogerwerf, L., Wallace, R., Holmberg, M., 2015. The dawn of structural one health: a new science tracking disease emergence along circuits of capital. Soc. Sci. Med. 129, 68–77.
Wilkinson, A., Leach, M., 2014. Briefing: ebola – myths, realities, and structural violence. Afr. Aff. 114 (454), 136–148.
Wilkinson, A., Parker, M., Martineau, F., Leach, M., 2017. Engaging 'communities': anthropological insights from the West African Ebola epidemic. Philos. Trans. R. Soc. Lond. B Biol. Sci. 372 (1721), 20160305.
WHO, 2020. COVID-19 Global Risk Communication and Community Engagement Strategy: December 2020 – May 2021. World Health Organization.